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Taking the Library of Congress CIP Program into the Future with PrePub Book Link

Caroline Saccucci[(a)]

a) Library of Congress, http://orcid.org/0000-0003-2398-4105

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ABSTRACT

The Library of Congress Cataloging in Publication (CIP) Program and its sister program the Preassigned Control Number (PCN) Program have provided prepublication metadata to publishers since 1971. For the first three decades, CIP publishers submitted paper applications, and CIP staff manually keyed the information into the Library of Congress's local cataloging system. Between 1999 and 2003, the Library developed an in-house online CIP and PCN system with separate backend modules, the EPCN Traffic Manager and the ECIP Traffic Manager. In 2017 the Library let a contract to completely overhaul the aging online system and replace it with a custom application on a ServiceNow platform. The intensive design and development phase, followed by the controlled chaos surrounding implementation, resulted in a stable, functional, and state-of-the-art application named PrePub Book Link (PPBL). PPBL brought both the CIP and PCN programs into the future with an overall improved user experience, increased security, advanced account management, dynamic Web forms, enhanced ONIX integration and workflows, and features such as the MARC Editor and the customizable CIP data block generator. As the CIP Program prepares for the next 50 years, continued development of PPBL will enable the CIP and PCN programs to thrive.

KEYWORDS

Cataloging in Publication Program; Preassigned Control Number Program; PrePub Book Link; ONIX; CIP record; CIP data; LCCN.

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Introduction

The Cataloging in Publication[1] or CIP Program has been serving the needs of U.S. publishers and U.S. libraries since 1971. Indeed, this year the CIP Program celebrates its 50th anniversary! To participate, publishers and their imprints must meet certain eligibility requirements. For instance, they must have published at least three books by three different authors, and their books must be held by at least 1,000 libraries across the United States as found in WorldCat[2] holdings. This is because the CIP Program provides the cataloging of books most likely to be widely acquired by U.S. libraries. In return for providing the cataloging, publishers are required to send a copy of each book to the Library of Congress. When the books arrive, they need only minimal processing to be ready for researchers. These books typically are received and processed considerably faster than the books received via Copyright since typically those come without any MARC records. CIP books that are not selected for the Library of Congress permanent collections are made available to other libraries via the Library's Duplicate Materials and Exchange Program for overseas exchange or the Surplus Books Program for domestic libraries. Over 2,700 publishers and imprints participate in all major categories: trade, scholarly, children's, and government. Every subject area is covered, but only monographic works are in scope for the CIP Program. Every year, the CIP Program creates over 50,000 bibliographic records. Since the program was established by Congress in 1971, over two million CIP records have been created.

The CIP Program is a major source of collecting for the Library of Congress. Annually the Library receives over 90,000 print books and e-books from participating publishers. 95% of all CIP titles are selected for the permanent collections and represent the output of almost all major publishers (including multinational publishers) in the United States. Two areas where the Library does not collect comprehensively, per the Collection Policy Statements,[3] are clinical medicine and technical agriculture. The National Library of Medicine and the National Agricultural Library are mandated by law to collect in those areas, and they participate in the CIP Partnership Program to catalog those materials via the CIP Program.

Since the CIP Program's inception, the CIP data block provided to publishers to print in the book appeared like a card from the old card catalog to enable libraries to create their own catalog cards if they did not purchase cards from the Library of Congress. In 2018 the CIP Program moved from this card catalog "look and feel" to a more modern labeled display. The newer format included different subject thesauri, genre terms, more RDA elements, and the LCCN permalink. Now if a user goes to the URL, the MARC record is available for direct download from https://catalog.loc.gov.[4] This is useful for those libraries that rely on Library of Congress cataloging without access to a Library of Congress MARC Distribution Service subscription or bibliographic utility.

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[1] https://loc.gov/publish/cip/.

[2] https://www.worldcat.org/.

[3] https://www.loc.gov/acq/devpol/.

[4] Karl Debus-López, Marilyn McCroskey, Regina Romano Reynolds, Caroline Saccucci, Camilla Williams and Michele Zwierski. (2017). "Transforming the CIP Data Block: Assessing User Needs to Re-envision a Venerable Library Icon", *Cataloging & Classification Quarterly*, 55:7–8, 522–548. Accessed May 24, 2021. DOI: 10.1080/01639374.2017.1354116.

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A CIP record traditionally has always included full description according to *Resource Description and Access* (RDA) (or its predecessors), authorized access points, Library of Congress Classification (LCC), Dewey Decimal Classification (DDC), and Library of Congress Subject Headings (LCSH). CIP records cataloged by the National Library of Medicine (NLM) include Medical Subject Headings (MeSH)[5] and NLM classification. CIP records cataloged by the United States Government Publishing Office (GPO) include the Superintendent of Documents (SUDOC) number. CIP records in scope for the Children's and Young Adults' Cataloging (CYAC) Program[6] for juvenile fiction include CYAC subject headings. CIP data can also include Book Industry Standards and Communications (BISAC) subject terms[7]; BISAC is the thesaurus maintained by the Book Industry Study Group in the United States and used by bookstores to organize their books. The CIP Program has also partnered with the American Mathematical Society (AMS)[8] to include their subject terms in CIP records published by the AMS.

In 2012, the CIP Program integrated e-books into the workflow. For all CIP requests, publishers can also request that a record be created for the e-book. When they request this, they agree to send a digital rights management (DRM) free copy of the e-book in addition to the print book. The former ECIP Traffic Manager (see below) was programmed to automatically generate an e-book record based on the fully cataloged CIP record for the print version; this process has continued to the present in the successor system, PrePub Book Link. After publication, publishers send e-books via secure file transfer protocol. The e-books are made available to authorized users within the Library's secure network on a local platform called Stacks. Currently, the PCN Program has not integrated e-books into the workflow, although some exceptions have been made.

Finally, the Preassigned Control Number (PCN) Program[9] is a sister program to serve those publishers and self-publishers that do not meet the eligibility requirements for inclusion in the CIP Program. For instance, for the CIP Program, publishers need to have published at least three books by three different authors, and at least 1,000 libraries across the United States need to hold a copy of their books as evidenced in WorldCat. After creating a brief bibliographic record in the Library's catalog, the publisher liaison sends the Library of Congress Control Number or LCCN to the publisher for printing in the book. The LCCN is the unique identifier for each record in the Library of Congress catalog. After the book is published, the publisher sends a copy of the book to the Library of Congress. When the book arrives, if the selection decision is to keep the book, there is already a record for it, which expedites the processing. At this point, the record is completed with name authority work and subject analysis. Therefore, the LCCN is "preassigned" instead of waiting for the book to come in and then creating a record and assigning it an LCCN. Over 60% of PCN titles are selected annually, and they often include works in areas that the Library collects comprehensively, such as local U.S. history, genealogy, and personal war narratives of U.S. military veterans. These genres tend to be published either by small, independent publishers, or they are self-published, and are therefore in scope for the PCN Program. While the Library of Congress also may receive the same book via the U.S. Copyright

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[5] https://www.nlm.nih.gov/mesh/meshhome.html.
[6] https://www.loc.gov/aba/cyac/.
[7] https://bisg.org/general/custom.asp?page=BISACFaQ.
[8] https://zbmath.org/static/msc2020.pdf.
[9] https://loc.gov/publish/pcn/.

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Office, books coming through the PCN Program already have a record in the catalog and can therefore be more efficiently processed. Books that are not selected for the collections are made available to foreign libraries through the Library's Duplicate Materials and Exchange Program or to domestic non-profit organization via the Surplus Books Program.

Forerunners

When the CIP Program started in 1971, the entire process was paper based and depended on the U.S. Postal Service. Publishers used to fill out a form by hand or with a typewriter. The form with the marked-up manuscript galley was mailed as a package to the Library. The galleys provided the cataloger with enough of the manuscript to describe the resource, create and update name authority records, and perform subject analysis. CIP Program staff would create an initial bibliographic record based on the information in the application and then forward the package to the cataloging divisions to complete the cataloging. The CIP metadata would be mailed back to the publisher for inclusion in the printed book; publishers would need to retype the metadata onto the copyright page because it came in hardcopy only, not electronic format. At this time, the CIP Program guaranteed a two-week turn-around time for all CIP cataloging. Catalogers were required to contact the editorial offices of publishing houses in order to disambiguate authors or to find out more information about a conference referenced in the manuscript. With the wider implementation of e-mail usage, catalogers could begin emailing publishers, provided the email address was included in the CIP package.

Between 1999 and 2003, the CIP Program developed completely in house an online system to manage the flow of applications for CIP and PCN data. The online CIP system was a vast improvement over the labor-intensive paper-based workflow. This system consisted of three modules: the public-facing CIP and PCN systems, the staff-side EPCN Traffic Manager and the staff-side ECIP Traffic Manager. Publishers used a web-based form to request access to the PCN system or the CIP system. Publishers in the CIP system could apply for a preassigned control number, but PCN publishers could apply only for the PCN. If a PCN publisher applied to be in the CIP Program, the internal publisher directory included two separate accounts, distinguished by their account ID starting either with a "p" for a PCN account or a "c" for a CIP account, e.g. pgm2043 or ckg9672. From a security stand-point, the CIP system had a serious flaw, namely that there were only a single username and password. Publisher contacts were given an account ID, which served as their username to enter the portal. They had only one password that had to be shared by all staff at the publishing house. If one of them changed the password or had the password reset, they had to share that information with their colleagues. CIP publisher liaison staff spent a considerable amount of their time resetting passwords for publishers who were locked out of their accounts. In some cases, publishing houses created multiple accounts in order to help them keep track of the account IDs and passwords. Often houses with multiple editorial offices would create independent accounts for their own staff, and there was no way to link them together as a single entity. When publishing houses started a new imprint, the imprint would need to create a new account, but there was no way to link them back to the "parent" house. CIP publishers submitted their applications via a Web form and attached their galleys, which had to be submitted in ASCII format. This meant, however, that publishers needed to convert their Word documents to ASCII and then tag their files with HTML-like markup to indicate title page, copyright page, series title page, table of contents, first chapter, second chapter, etc. Very little data in the application was

prepopulated, and each application was time consuming to complete and submit. PCN publishers filled out a lengthy Web form but did not attach any galleys since the PCN were not fully cataloged at this stage.

The EPCN Traffic Manager ("E" for electronic) managed the "traffic" or flow of PCN applications. Each liaison was assigned a block of publishers, so all applications sent from a publisher were automatically assigned to a particular liaison. The publisher liaison would assign an LCCN to the application and then convert it to a pre-MARC form. At this stage, the staff member could adjust MARC tag and indicators and edit text in the subfields. The publisher liaison then "sent" the PCN record to the Library's integrated library system (ILS) where no more updating occurred. The EPCN Traffic Manager then emailed the preassigned LCCN to the publisher for printing in the published book. If a publisher wanted to make a change to the information, e.g. a change in the title, they submitted a PCN change request form with the changes indicated. The liaison made those changes in the ILS. There were a number of canned emails that liaisons could use to ask for more information or even reject requests for various reasons. The email messages were sent to the publishers from the EPCN Traffic Manager, but inbound messages and all further correspondence took place in the liaison's email account.

The ECIP Traffic Manager (again, "E" for electronic) managed the "traffic" or flow of CIP applications. Publisher liaisons reviewed the applications for completeness, but most processing was done by catalogers. Catalogers viewed the ASCII text file galley attachments as web pages since the text file was rendered in HTML, although all text looked identical in size and style. The cataloger could not see any illustrations or mathematical formulae, for instance, and diacritics were often rendered as upside down question marks. The tagging added by the publisher created specific pages and chapter headings for easier navigation. Library of Congress staff created a special cataloging software called OnTheMarc to convert text from the galley title page and other front matter into a MARC record. Catalogers could send outbound email messages from the ECIP Traffic Manager, but, as with the EPCN Traffic Manager, the response emails came back to the personal email inbox, not back to the ECIP Traffic Manager. After the cataloging process was completed, the ECIP Traffic Manager generated a CIP data block that publishers received in an email message. Unfortunately, the mailer often garbled any diacritics in the CIP data.

In 2010 the CIP Program started utilizing Online Information Exchange (ONIX)[10] metadata in the cataloging workflow by linking the ISBN in the CIP application to the ISBN in the ONIX product record and mapping that record's ONIX to MARC fields. ONIX is an XML-based metadata standard used by publishers and retailers to communicate information about their books to the supply chain. While ONIX-to-MARC process worked for internal catalogers, this mapping was not available to the 32 institutions that cataloged CIPs via the CIP Partnership Program, even if their university presses created ONIX for their forthcoming titles. CIP cataloging partner institutions were also required to send their CIP MARC records to the Library via file transfer protocol (FTP), a process that frequently resulted in temporarily "lost" MARC records.

The ECIP Traffic Manager managed the workflow by using some tables to map from the subject selected by the publisher to the specific cataloging team responsible for that subject. For instance, if

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[10] https://bisg.org/page/onixforbooks.

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the publisher selected "political science" as the subject, the CIP application would automatically route to the Geography, Political Science, and Education Section for cataloging. If the cataloger determined that the work was not in scope for LCC schedule J but really in scope for history (LCC schedules D-F), the CIP could be referred to the History and Military Science Section. If the cataloger needed assistance from a Korean language cataloging specialist to complete a name authority record, the cataloger could refer the CIP application to the North Asian Section. Once the LCC and LCSH were assigned, the cataloger referred the CIP application to the Dewey Section for the addition of the DDC to the CIP record. Then the CIP application was forwarded back to the publisher liaisons to send the CIP data to the publisher. If a publisher submitted a change request during the pre-publication stage, the publisher liaison would route the change request to the default cataloging team, who then might forward it to the team that did that actual cataloging. With over 3,000 CIP applications and hundreds of change requests received on a monthly basis, using default mappings was critical to keep the work moving, even if it meant that some applications would need to be referred to another team.

As staff resources decreased due to retirements but without the ability to fill critical positions, the CIP workload continued to increase while the pace slowed down. The CIP Program was no longer able to maintain the two-week turn-around time, and publisher liaisons received daily phone calls and email requests to expedite their CIP requests because publishers were about send their galleys to be printed and needed the data for the copyright pages. Supervisors received these rush requests and immediately had to reprioritize their staff's work. The problem was exacerbated by the inability for CIP Program management to easily determine if a particular staff member was working on a CIP application; ECIP Traffic Manager did not provide this important management data in an efficient manner. It was built to move CIPs through the pipeline, not to manage huge backlogs. Supervisors resorted to using spreadsheets to manage their catalogers' workloads. As a way to help cataloging teams prioritize their work and get ahead of rush requests, some teams used the projected data of publication (PPD), which was clearly visible and sortable in their team accounts.

The PPD was the date the book would be available for sale on bookstore shelves and was originally intended to be the date used for claiming purposes. It was converted to the YYMM format in the 263 field of the MARC record, and the publisher contact information was mapped to a local 963 field. After the CIP record was marked complete, a monthly script ran in the ILS to search for all CIP records where the 263 field was older than four months. Then it would generate a claiming email to the publisher contact in the 963 field and add a note to an acquisition note field with the date of the first claim, second claim, etc. The PPD was never intended to be used as a prioritization date. It frequently gave false confidence to staff to see a date far in the future, and they were alarmed to find that these CIP requests were frequently marked as rush requests. In actuality the prioritization needed to be based on the date that the book was going to the typesetter to be printed, i.e. a projected *print* date; keeping to that deadline would satisfy publisher demands. The problem was that this kind of technical update was not feasible in the ECIP Traffic Manager.

In 2015, the Library of Congress Office of the Chief Information Officer (OCIO) was keen to update outdated custom software, decommission old servers, and mitigate the many security risks in systems such as shared passwords. Over the years, CIP Program staff had made occasional updates to the three modules, but by 2015, the amount of technical debt was too enormous. The systems were a combination of many Oracle tables and thousands of stored procedures, making the update to a new

version of Oracle or the migration to a new server extremely labor intensive, if not impossible. Because of its critical function in cataloging, the dependence of thousands of publishers, and the partnership with many prestigious institutions, the CIP and PCN systems were allowed to limp along. Finally in 2017, the Library allocated funding for a contract to develop a completely new database, based on a ServiceNow[11] platform and which would eventually become known as PrePub Book Link.

Agile Development Cycle

The CIP Program collaborated heavily with several important partners throughout the contract period of performance, which was extended several times until June 2019. The group used Agile[12] methodology for the design and development of the new system. CIP Program staff brought the business requirements and CIP expertise to the table. OCIO provided a project manager, a user experience (UX) designer, a system architect, a system administrator, and overall contract oversight. The ILS LS Program Office provided MARC integration support including diacritics analysis and support. Finally, the contractor provided a business analyst, several developers, and a dedicated tester. The team worked in two-week development sprints in a very iterative process. The business analysist and project manager created user stories in Jira, an IT development tracking application. User stories defined the user or role, the action, and the expected result. For instance, a user story could be, "As a publisher liaison, I want to generate the CIP data block as a specially formatted text file that incorporates certain field from the ILS." User stories could include Mcrosoft Excel spreadsheets, illustrations, charts, etc. They also included the testing protocols. The project manager assigned stories to developers in each sprint. The developers had a few days to review the stories and met the team midweek for a development meeting to discuss the requirements in the stories. At the end of each two-week sprint, the developers had to provide a sprint review, a kind of "show and tell," to give a live demonstration of what they had developed in the development instance and to talk about next steps. After the sprint review, the developers migrated their work to the test instance where CIP team and the dedicated tester tested the new functionality and wrote up bug stories for any problems encountered. Once the functionality worked as expected, it was finally pushed to the production instance. Many times the stories assigned in a sprint were not completed and were moved to the next sprint. One of the challenges of the project manager was to keep development moving ever forward in this very Agile development process. To that end, the team met twice a week at 9:15 am for fifteen-minute standup meetings where team members reported what they were working on and if they were encountering any obstacles. (The team considered itself fortunate to be required to meet only twice a week for standups; "real" Agile methodology requires *daily* standups).

In the midst of all this, the CIP Team met with the UX designer very regularly, sometimes several times a week, to allow the CIP staff to completely reimagine what a new system could do for them and for their various users. The team needed to really consider how each specific user group, e.g. CIP publisher, PCN publisher, liaison, internal cataloger, partner cataloger, CIP Program management, would need to interact with the system. How could the workflow be improved? What information did catalogers want to see? How could publishers take advantage of their own ONIX to fill out a CIP

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[11] https://www.servicenow.com/.
[12] https://en.wikipedia.org/wiki/Agile_software_development.

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request form? What integrations would be needed between the new system and the ILS, and how would the data be formatted? These were hard, complex questions that resulted in many rounds of meeting, charts, and spreadsheets. The UX designer created extensive wire frames to help the team visualize how publishers would interact with the system or how catalogers would convert publisher-supplied data to a MARC record. Sometimes he created recorded demos that showed a workflow. He wrote code in JSON[13] for the developers and added his documentation to the user stories he carefully composed.

All relevant documentation was uploaded to Confluence, the Library's in-house wiki. The Confluence site contained contract documents, business requirements, designs, testing scripts and results, and mapping charts, diagrams, and spreadsheets. Links to external documentation such as the MARC 21 format and ONIX schema were included. All development and sprint review meetings were recorded since the developers were remote and needed to meet with the team virtually. In fact, the CIP team was an early adopter of virtual meetings long before the COVID-19 pandemic had everyone meeting virtually. Having the recordings available, as well as other documentation, located in a well-organized wiki enabled the project manager and the product owner (the author of this article) to review decisions and verify contract obligations.

Throughout this process, the team wanted to keep stakeholders informed. CIP Program management gave several presentations to Library of Congress staff. The UX designer showcased his designs, so staff could have a sense of the direction for the new system. In early spring 2018, the team decided to name the product to distinguish it from the old ECIP identity and to allow stakeholders to acclimate to it. Since before the contract was awarded, the project was referred to as "ECIP replacement" or simply "ECIP." The team envisioned a unified platform for CIP and PCN publishers and wanted to ensure that the new name strongly implied its purpose. The team decided on PrePub Book Link (PPBL).

PrePub Book Link was officially announced at the American Library Association (ALA) 2018 Annual Conference. With a firmly established name, the UX designer could now design a logo, and the Library's Office of Communications could outline a communication strategy. The CIP team worked with the contractor to send out mass communications to all publisher stakeholders. The CIP team started a series of blog posts on the CIP website with a two-week interval; each post described a new feature that publishers would experience with PPBL. As the time to launch approached, the team held live demos for all Library of Congress cataloging staff.

Design and Development Decisions

As noted above, PPBL was built on a ServiceNow (SN) platform, which was great for many things that the CIP Program needed such as workflow tracking, full database searching, and a consolidated publisher database. SN had already been implemented for internal usage at the Library for IT support ticketing and tracking, but for this use case, the internal environment of SN had been utilized. The Library has since used the CIP Program as the first use case for the external environment of SN; the CIP Program was the proverbial guinea pig.

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[13] https://www.json.org/json-en.html.

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The UX designer listened intently to and asked intelligent and specific questions of the CIP staff to really understand what the publishers and internal users needed from CIP and LCCN systems. In fact, PPBL looks today almost exactly as he envisioned it because his designs became the blueprints for all custom-developed parts of the platform. He argued that the publishers needed a positive, user-friendly experience with a modern portal design. He designed the publisher and author portals and all the functionality in My Requests. He created complicated wire frames showing how publishers could be linked to each other. The LCCN and CIP request forms were designed to include all the possible information that publishers could include and map to a MARC record, and he integrated best practices that the CIP Program had learned over the years. For instance, the publisher liaisons routinely had to reject applications for being out of scope for the CIP Program, so he designed questions that would automatically deter the publisher from continuing the form based on their answers. He provided drop down lists that led to certain mappings in the backend or in the MARC record. He provided several design options for the galley upload functionality until the team finally settled on one option. He was instrumental in the design of the ONIX prefill functionality as well.

For the backend, the UX designer created designs for the MARC Editor, the e-book record generator, and the CIP data block generator. For the MARC Editor, he learned MARC 21 and wrote code in JSON to explain in script how the developers should implement it. Again, he listened carefully to catalogers tell him what they liked or wished they could have in a cataloging software and created an incredibly adaptable interface for catalogers and publisher liaisons. For the e-book record generator, he learned how e-book records used to be created in the former ECIP Traffic Manager and upgraded the design. Finally, for the CIP data block generator, he learned exactly which data elements should be included and how to explain that to the developers. Again, he listened to the liaisons when they told him how often publishers did or did not want the summary or audience level included in the data block, so he designed a toggle that would allow publishers to include or ignore those data elements.

Based on conversations with the UX designer, the PPBL team decided to rebrand the PCN application in order to clarify to publishers what they were actually requesting in the new system. The team changed the name from a PCN request to Publisher LCCN request. As part of this rebranding, the author user group was created to allow one-time authors who wanted an LCCN for their books -- and a chance to have their books considered for the collections of the Library of Congress -- a way to do that without having to be part of a publishing entity. Authors were previously lumped together with all PCN publishers as self-publishers. Creating a separate user group made their process much simpler. This user group would not need to undergo a publisher account approval process; instead, their simplified experience would allow them to create an account and apply for the LCCN in one step. Unlike the publisher LCCN requests, however, their brief bibliographic records would have a default "do not acquire" acquisition decision note, and the record would be suppressed from public view. When the book arrived, the selection officer could reverse that decision by manually updating the acquisition decision and unsuppressing the record.

Major development milestones were the integration of MARC Editor with the mid-server. The Library's ILS prohibits direct conversation from a third-party source such as PPBL to the ILS. To accommodate this and catalogers' requirements, the developers needed to create a custom application that would send a MARC file to a mid-server that would then relay to the ILS. The system architect utilized a BatchCat program to relay the MARC Editor-generated MARC files to the ILS. He also wrote

scripts on the mid-server to replace Unicode characters that do not fit the limited character set allowable in the ILS. The mid-server was set up to transact all file uploads from partner catalogers as well. The former ECIP Traffic Manager utilized a script to open a record in the ILS, and the PPBL team decided to reuse this script in PPBL. Once a record exists in the ILS, the staff member can open the record with this script.

All of the publisher interface was custom as well as all the parts of the backend that needed to interact with the ILS, i.e. the MARC Editor, the e-book record generator, and the CIP data block generator, but the backend workflow was decidedly out-of-the-box. The liaison and cataloger user interface appeared much like the IT support ticketing platform. This was the interface that managed all the workflows and user roles, and this is really where SN showed its advantages. In addition to the CIP publisher, LCCN publisher, author, liaison, cataloger, and partner cataloger roles, the program specialist role was a critical role that permitted higher level management of other applications. Only the system administrator role had more permissions and authorizations. Program specialists are the staff somewhere between publisher liaisons and catalogers. They are librarians whose primary responsibilities are to oversee the CIP and PCN programs, answer complex questions from publishers, liaisons, and catalogers, work with partner catalogers, manage the e-book record workflow, and test ongoing PPBL development.

Ready, Set, Go!

As the team inched ever closer to the go-live date, the frequency of meetings increased dramatically. There were so many loose ends to tie up and small and large decisions to make. The testing was in a frenzy; staff spent countless hours testing and retesting to make sure that the end-to-end workflow had no bugs.

One of the major challenges that this project faced was data migration. Before the 2017 contract, there had been a few other attempts to create a new database for CIP, and data migration was a fatal flaw for one failed contract. The PPBL project manager was very concerned that data migration would be a problem with this contract as well; she spent considerable time and attention on ensuring a smooth data migration from the ECIP Traffic Manager backend to PPBL. Only CIP publisher accounts would be migrated, and CIP data applications that were either pending or complete back to two years would be migrated. The older CIP applications would be migrated in case publishers needed to submit change requests for them and also so they could be captured for claiming. The ECIP Traffic Manager system administrator created spreadsheets of all CIP publisher data and CIP applications and worked closely with the project manager. The team decided not to migrate any PCN publisher data, PCN applications, or PCN and CIP change requests. The rationale was that too many PCN publishers had been inactive for so long, and they could just create a new account if needed. The PCN applications could have a cutoff date, after which no new PCN applications could be received. This would give the publisher liaisons a few weeks to process any open PCN requests before PPBL launched. They also needed to complete any change requests for PCN applications, and catalogers needed to complete any CIP change requests. If publishers needed to submit a change request, they did not need the original request to be in PPBL. Furthermore, CIP Program management staff would have one year of read-only access to ECIP Traffic Manager to clear up any discrepancies or research data migration issues.

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Once the team decided on work freeze dates and the data migration plan, the team sent out targeted emails to each PCN and CIP publisher account holder with instructions on how to log into the new system and whether their information would be migrated to PPBL or if they would need to create a new account. The team created extensive documentation for each user group: CIP publishers, LCCN publishers, authors, publisher liaisons, internal cataloging staff, and partner institution cataloging staff. The publisher documentation was also translated into Spanish. The team created a comprehensive training plan for all internal users and partner catalogers; the training included recorded webinars for users who could not attend live training. Finally, the team completely overhauled the CIP and PCN program websites and created a new PrePub Book Link website with links to user documentation and the portals.

The PPBL team decided on a phased launch. The publisher interface was ready before the "backend" interface. This gave publishers a chance to start using the system. The publisher and author portals went live on May 21, 2019, as did the newly updated websites and user documentation. The backend was not ready because there were a number of data migration issues that needed to be resolved first. The backend for liaisons, catalogers, and partners went live on May 30. The change request workflow for the backend went live several weeks later because that workflow was still in flux, although publishers could begin submitting change requests.

On May 30, training commenced for over 300 backend users. Specialized training took place for each internal user group. The training lasted over three weeks. Post-launch, the team had to perform considerable data cleanup. The developers continued to work on the change request workflow, which meant that the team needed to continue testing and writing bug stories in Jira. The team also faced several issues related to diacritics and made fixes to the character replacement application, which was developed to convert the fully Unicode-compliant data from PPBL to the more limited character set for the Library's ILS. The team found that publishers needed considerable support when they created unnecessary accounts and locked themselves out.

Meanwhile, publishers and authors successfully submitted CIP and LCCN requests, and catalogers, partners, and liaisons successfully cataloged and processed these requests. In the first full month of implementation, liaisons completed 925 author LCCN requests, 3,974 publisher LCCN requests and 116 change requests. CIP publishers submitted 3,112 CIP requests, and liaisons sent publishers 1,207 CIP data blocks, many of which were for legacy CIPs, migrated from ECIP Traffic Manager. By February 2020, all legacy CIP requests had been completed, and the active CIP requests were all "born" PPBL and not overdue to the publishers. By March 2020, there were 2,760 CIP publisher accounts (largely migrated), 3,117 LCCN newly created publisher accounts, and 8,048 newly created author LCCN accounts. This astonishing achievement demonstrated the functionality and stability of PPBL as well as the popularity of the CIP and PCN programs and the importance of these programs to the U.S. publishing industry.

The Overall Publisher's Experience

PrePub Book Link provides an overall enhanced user experience for publishers and authors. One of the most basic benefits is a unified CIP and PCN publisher portal. All publisher accounts are searchable in one database. Instead of PCN publishers needing to create a new CIP publisher account, they need only to submit a request to upgrade their PCN account to a CIP account by entering the

three titles with over 1,000 holdings in WorldCat. Depending on the account type, the publisher can submit CIP and/or LCCN requests. The "My Requests" feature provides a list of submitted requests and the ability to submit a change request or cancel the publication.
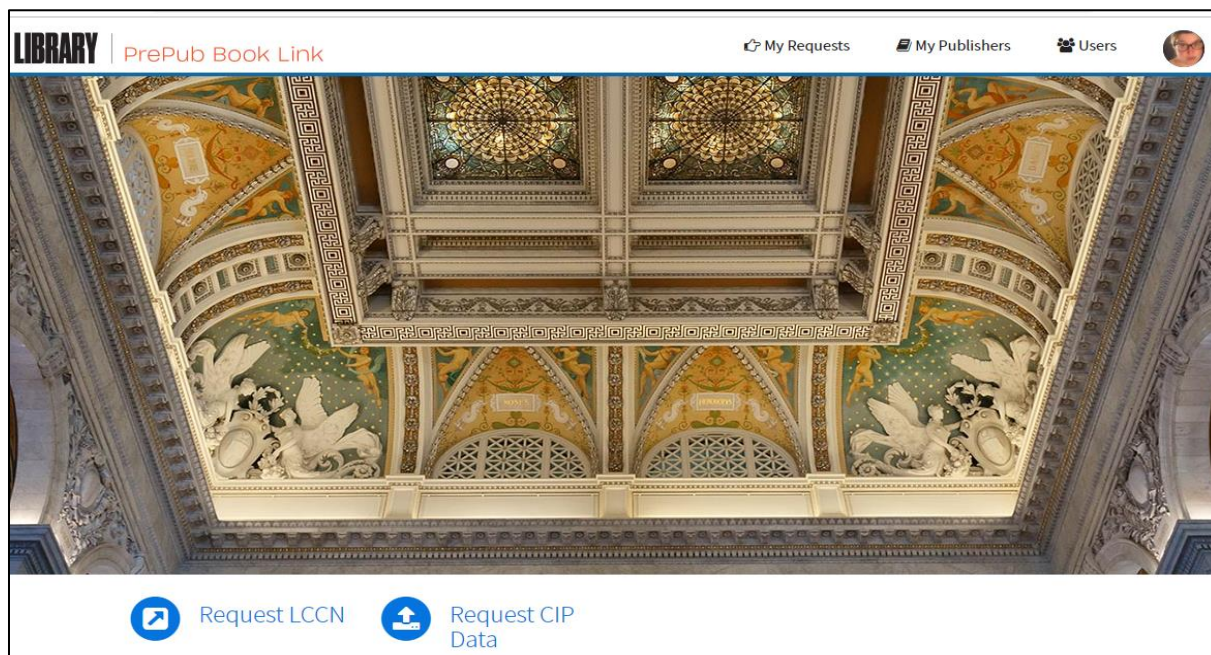
The CIP Publisher Portal

A guiding principle for the design of the publisher portal was the ability to link multiple users with a single publisher account. All users need to create an account in PrePub Book Link with their username and password. Then they can search for their publisher name and request to link to that account. The account administrator at the publishing house receives an email to approve the new user's request to link to that acount. Once approved, the new user can submit requests on behalf of the publisher. This is especially useful for imprints that have a parent company or for those publishing house with multiple editorial offices. Account management is the responsibility of the publishers; when staff leave or join a publishing house, the account administrator can update the portal access. Library of Congress staff can always assist as needed.

As explained above, PrePub Book Link established authors as a new category of user. This user group does not have a named publisher to link to an account. Therefore, author account creation does not include publisher account approval. Instead, as soon as an author creates a login to PrePub Book Link, the account is available for immediate use. Authors have a nearly identical interface as CIP and PCN publishers. They can submit LCCN requests and change requests via their My Requests feature. There is no option to upgrade to a CIP account from the author portal.

The CIP Publisher Experience with ONIX Prefill

In 2010, the Library of Congress integrated ONIX 2.1 into the CIP cataloging workflow. When a cataloger started to catalog the CIP request, the in-house built application called OnTheMARC

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attempted to match the ISBN in the CIP request with the ISBN for the product in the ONIX already sent to the Library. If there was no match, the cataloger continued with the regular TCEC (Text Capture and Electronic Conversion) processing. If a match was found, the cataloger was prompted to use the ONIX-to-MARC converter and accept the ONIX record. Once the bibliographic record was created in the local ILS, the cataloger needed to go back to the CIP request and review the galley to be sure that the title, contributors, publisher name and date, series information, etc., all matched. Often there were serious discrepancies between the ONIX metadata for the title and the CIP galley.

Since publishers create ONIX for their forthcoming titles, it seemed redundant to ask them to manually key in much of the same information in a CIP request. The product owner had an idea: what if publishers could take advantage of their own ONIX metadata at the CIP request stage to prepopulate as much of the CIP request as possible? The PPBL UX designer implemented this vision by designing a "Prefill with ONIX" functionality on the CIP request form where the publisher only needed to input the ISBN for the forthcoming title. That was the easy part. The PPBL team then needed to figure out how to make the ONIX searchable and then how it would prepopulate the CIP request.

The Prefill with ONIX button at the beginning of the CIP request

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The PPBL Team collaborated extensively with the Book Industry Study Group (BISG) Metadata Committee to learn more about ONIX and the needs of ONIX providers. The BISG Metadata Committee offered free webinars to the team and worked on mappings from the ONIX metadata to the CIP Request form. The UX designer used those mappings to write explicit JSON script for the developers. The team decided that ONIX receipts would be stored in a products table within PPBL. Once the required fields from an ONIX record were identified, the project manager mapped out the specific fields that would need to be stored in the products table. When a publisher inputs an ISBN, PPBL searches the products table and prepopulates the CIP request with the appropriate metadata. Approximately 40% of the CIP request can be prepopulated using the ONIX prefill functionality. This streamlines the workflow for publishers and encourages more accurate ONIX; publishers will be more motivated to create good ONIX to save them time later in the publisher supply chain.

When PPBL was under development, the U.S. publishing industry standard was ONIX 2.1, even though ONIX 3.0 had been implemented in other parts of the world. The UX designer created mappings for ONIX 2.1 and 3.0. At the time, the PPBL team opted to focus on 2.1 only, with the understanding that 3.0 could eventually be implemented. In the summer 2020, the U.S. industry decided to make the switch to 3.0 by January 2021, in large part as a result of Amazon.com's decision[14] to accept only 3.0. By this point, the Library had let a contract for maintenance and development of PPBL, and the contractor was tasked with upgrading the ONIX integration to 3.0. As of January 1, 2021, the Library accepts only ONIX 3.0.

The CIP Request

The publisher can choose to use the "Prefill with ONIX" feature or fill in the form manually. If the publisher does select "Prefill," he can make any changes to the prepopulated data. The publisher selects a general subject term used for auto-routing to a cataloging section. There is a geographical focus question to further refine the mapping for geographic areas that our cataloging partner institutions specialize in, such as Southern States of the U.S., Pakistan, Sub-Saharan Africa.

The form was designed to allow individuals and organizations/corporate bodies to have specific entries. Publishers can provide as much information as possible about the names, even if the names won't appear that way on the title page. By having the name and birthdate in a formatted way and requiring the contributor type, this data can automatically convert to the MARC format. Once the full name is entered, the publisher can adjust the name in a different part of the CIP request to match the form of name as it will appear on the title page. For instance, if the publisher enters the name "Caroline E. Saccucci" but on the title page, it will appear Caroline Saccucci (no middle initial), the publisher can update this.

In the section for the place of publication, a dropdown list includes all U.S. states and territories. The state list also maps to the MARC code list for countries, provinces, states for the purposes of the 008 byte of the MARC 21 record. In ECIP Traffic Manager, the cataloger had to manually enter the specific MARC code as part of the process, so this is a more streamlined approach. If the publisher is multinational, the cataloger can adjust the publisher information in the MARC record.

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[14] https://bisg.org/news/486584/A-Countdown-Calendar-for-ONIX-3.0.htm.

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Parts of the CIP request are dynamic. For instance, the publisher can add as many contributors as needed; there is no maximum number allowed. Similarly, the publisher can enter more than one series title, series number, and ISSN. Multivolume information is likewise unlimited. There is also system validation for the ISBN and the ISSN.

English-language summaries are required for every CIP request. The summary is always mapped to the MARC field, although it can be deleted by the cataloger. The summary provides important information for subject analysis, and, if included in the MARC record, it is a great source of keyword access.

The PDF attachment is one of the most important enhancements for both publishers and catalogers. Publishers no longer need to retro-convert their Word files into ASCII, and all diacritics and special characters render appropriately. Publishers are still required to include the title page, copyright page, table of contents, and the first and last chapters, at the very least; the full text is always preferred, however.

The PPBL team included an option appropriate for CIP requests submitted by the American Mathematical Society (AMS), which publishes an extensive Mathematics Subject Classification. AMS staff include the numerical MSC codes in the specified text box; mappings within PPBL link the numerical codes and output the textual meaning in the MARC record. This subject classification is important to scholars of mathematics.
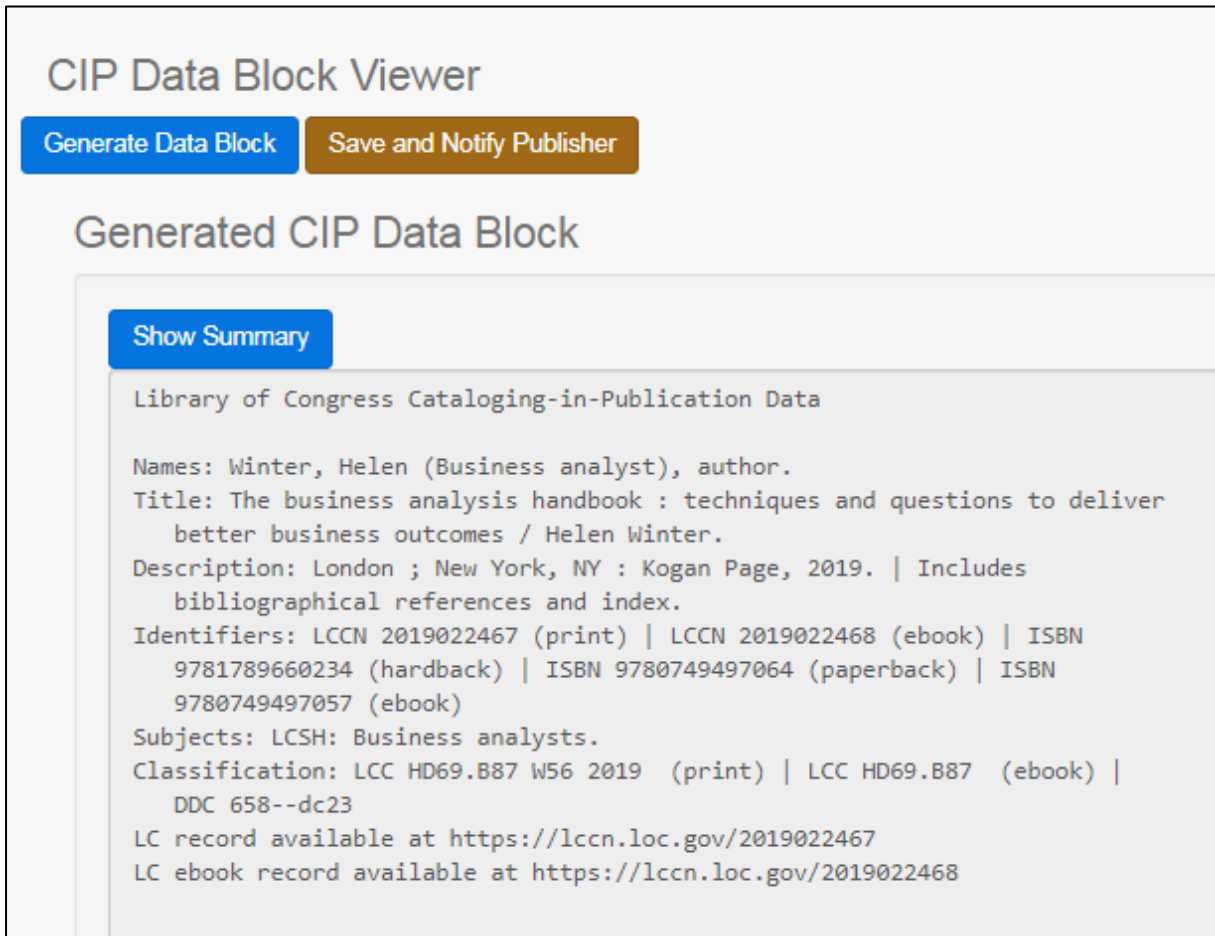
After the publisher submits the CIP request, it is viewable in My Requests where the publisher can see the status of the CIP request and submit change requests. Once the cataloging of the CIP is complete, the publisher will receive an email with a link to the CIP data. The link will enable the publisher to copy and paste the data without concern for garbled diacritics. PPBL will enable publishers to identify any staff who may need access to this CIP data. The CIP data will be generated directly from the MARC record, and publishers will be able to indicate whether they want the age/grade levels and/or summaries to appear in the CIP data block. (This hide/show feature would apply to the CIP data as it would appear in the published book and have no effect on the MARC record.) Once the CIP is complete, the publisher can submit a change request.

The Publisher Liaison's Experience with CIP Requests

After the CIP publisher submits the CIP request, it is assigned to a publisher liaison. Because some publishers submit both CIP and LCCN requests for the same title, even though they are instructed not to do so, PPBL provides duplicate checking between CIP and LCCN requests. A publisher liaison is the first point of contact for the publisher, and at this point, the liaison can contact the publisher with questions. All correspondence is tracked in PPBL.

After verifying information in the CIP request and ensuring that the correct PDF galley was uploaded, the publisher liaison assigns the LCCN from LCCN number ranges stored in PPBL. Once the LCCN is assigned, the liaison kicks off the workflow by clicking "send to cataloging." The CIP request auto-routes to the appropriate cataloging section for full cataloging based on the subject (and possibly the geographic region) selected by the publisher in the CIP request. If the publisher checked the box under e-book ISBNs, PPBL knows that an e-book record will be derived from the print record. In preparation, it adds a 776 field to indicate the identifiers for the e-book record.

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Once the cataloging of the print title is complete, it comes back to the liaison workflow. If the e-book box was checked, the liaison is presented with a button for the E-book Generator. This creates the e-book bibliographic record. The final step is for the liaison to click "Generate CIP Data Block." PPBL searches for the completed record in the ILS and generates the formatted data. Once the CIP data link has been sent to the publisher, the workflow is complete.

CIP Data Block Viewer

[Generate Data Block] [Save and Notify Publisher]

Generated CIP Data Block

[Show Summary]

Library of Congress Cataloging-in-Publication Data

Names: Winter, Helen (Business analyst), author.
Title: The business analysis handbook : techniques and questions to deliver
    better business outcomes / Helen Winter.
Description: London ; New York, NY : Kogan Page, 2019. | Includes
    bibliographical references and index.
Identifiers: LCCN 2019022467 (print) | LCCN 2019022468 (ebook) | ISBN
    9781789660234 (hardback) | ISBN 9780749497064 (paperback) | ISBN
    9780749497057 (ebook)
Subjects: LCSH: Business analysts.
Classification: LCC HD69.B87 W56 2019 (print) | LCC HD69.B87 (ebook) |
    DDC 658--dc23
LC record available at https://lccn.loc.gov/2019022467
LC ebook record available at https://lccn.loc.gov/2019022468

The publisher liaison generates the CIP block and then sends it to the publisher. The publisher can click on the "show summary" tab to include the publisher-provided summary in the CIP data block

If the publisher decides to send a change request, the publisher liaison either makes the change or sends it to the appropriate cataloging team. Once the change is complete, the liaison generates a revised CIP data block to send the publisher. The publisher can always get the most updated CIP data block from their My Requests page.

The CIP Cataloger's Experience

A cataloger in a cataloging team is assigned to review new CIPs for subject scope. If the cataloger decides that the CIP is not in subject scope for the team, the CIP is assigned to a different team with an explanatory note. Otherwise, the cataloger assigns the CIP to himself or to another cataloger,

depending on team practice. Once the CIP is assigned, PPBL can show which cataloging team and cataloger have the CIP. This is important for tracking and overall management. The cataloging teams can prioritize by the projected print date, and they can sort by the subject selected by the publisher to refine the list of CIPs in that team. CIPs can be assigned in batches to a cataloger for added efficiency. PPBL contains a number of drop-down lists for workflows, such as name authority assistance or new subject heading preapproval.

The cataloger begins the cataloging process by opening the MARC Editor. At this point, most fields in the MARC Editor can be changed, deleted, retagged, and moved around. Whether or not the publisher chose to prefill the application with ONIX, the cataloger can pull the table of contents from ONIX. If no ONIX is available for the CIP, the cataloger can create a table of contents note with a custom table of contents builder. The cataloger can view the galley PDF at any time to make cataloging decisions. When the cataloger is satisfied with the MARC record as displayed in the MARC Editor, he creates the MARC file. At this point, BISAC terms are displayed; this is enabled because PPBL contains complete mappings of BISAC codes and vocabulary terms updated annually. If the cataloger needs to make a change, he can close that window and return to the MARC Editor for updates and regenerate the MARC file. A Library of Congress cataloger sends the MARC file to the ILS where it is saved in the local database and opens up, ready for updating. A partner cataloger downloads the MARC file to the OCLC Connexion[15] client for cataloging. Once the record is in either the LC ILS or Connexion, the cataloger continues with name authority work and subject analysis. Once the partner cataloger completes the cataloging, the cataloger uploads the local MARC file to PPBL; this automatically inserts the record in the Library's ILS. At this point, any and all changes to the record, including change requests, must be handled by Library of Congress staff. Once the cataloging is complete, the CIP is assigned back to the publisher liaison to complete the workflow. The completed CIP MARC record is distributed via MARC subscription channels.

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[15] https://www.oclc.org/en/connexion.html.

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The MARC Editor is used by catalogers and publisher liaisons to convert publisher-supplied data to the MARC 21 format

The Publisher Liaison's Experience with LCCN Requests

As noted above, publisher liaisons process all LCCN requests from publishers and authors. These LCCN requests also utilize the MARC Editor to convert the publisher-supplied data to a MARC record and send the MARC file to the local ILS. At this point, however, no more work is done to the record. Instead, it remains an initial bibliographic record until the book is received, selected, and cataloged. Once the publisher liaison has sent the MARC record to the ILS, the publisher liaison generates an email to the publisher or author with the LCCN to print on the copyright page of the published book. Because e-books are not yet in scope for LCCN requests, there is no e-book generator option. Publisher and authors can send change requests, which are processed exclusively by the publisher liaisons.

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Lessons Learned

PPBL is robust and stable while also incredibly complex, with thousands of moving parts. To get to this point, there were several important lessons. The only way such a bespoke system would have been possible was with a dedicated UX designer who advocated for the best possible experience for all user groups but especially for the external customers. This required thousands of hours of time from the business owners, i.e. the program specialists and CIP Program managers as well as liaisons and catalogers. (The level of involvement by the program specialists is still extremely high with twice-weekly standup meetings, weekly development meetings with the contract developer, story prioritization meetings among business owners, story writing, and testing in the test instance.) During the initial design and development cycle, the level of intensity with near constant meetings and related work was sometimes almost too much. The sprint cycle was relentless, and new development required lengthy end-to-end testing of each workflow. Any team needs to be fully aware of this level of commitment.

The team learned a few downsides to the development process. ServiceNow is constantly upgrading, usually twice a year, although the Library sometimes skips versions. The result is very regular regression testing of all parts of the database. The disadvantage to a custom application is that future is uncertain; the custom features may need to be altered with future upgrades. A commericial off-the-shelf customer service team is less likely to find solutions to problems that they deem were caused by custom code. Since PPBL was the first application of the external environment of SN, there were development decisions that ran contrary to current best practice.

Next Steps

The Library has let two annual maintenance and development contracts for PPBL, with a third to commence in August 2021. In addition to the regular SN upgrades, there is a long wish list of development tasks still in Jira. For instance, the PPBL team would like to improve the MARC Editor by enabling catalogers to change the capitalization of words in titles without needing to retype the words. Other development includes integrating the ONIX prefill functionality for publisher LCCN requests. As noted above, the PCN Program does not currently include e-books. Should the decision change, development would be needed to provide the same functionality as for CIP e-books, albeit without fully cataloged bibliographic records at the pre-publication stage.

The claiming workflow is an example of pending implementation. When PPBL was first implemented, the claiming workflow was designed to send individual claiming emails for all books with a projected date of publication four months past. There was a glitch in the workflow in that PPBL showed that the book was ready for claiming, even though the ILS still had a future publication date. Also, many authors received emailed claims for books, which the Library had already received. Clearly, there were problems that needed to be resolved. The team completely reconsidered the workflow and decided that author LCCN requests would not be claimed since the likelihood of their selection was low. Furthermore, instead of individual claiming emails, publishers would receive quarterly emails reminding them to send their outstanding books. There would be a new feature on the publisher portal that listed all books owed to the Library. The team was about to implement the new workflow just when the coronavirus pandemic began. As a result, the team decided not to implement any claiming workflows until more normal operations at the Library resumed and books

held in offsite storage and in the mail room could be checked in as received and the ILS updated to reflect that.

The PPBL team is currently collaborating with Harvard University Library and the BISG to integrate the International Standard Name Identifier (ISNI)[16] into the CIP workflow. The goals is to encourage U.S. publishers to include ISNIs in their ONIX and thereby expand the ISNI universe. The PPBL team has a multi-prong approach to this effort. The CIP request would need a text box to include the ISNI for the contributor and potentially an API call out for the ISNI for those hosted by a third party. More development would be needed to map the ISNI in ONIX to the appropriate field in the PPBL products tables and then to the CIP request and the MARC Editor. Finally, the team would need to decide whether the ISNI in the bibliographic record should appear in the CIP data provided to publishers and allow for that development.

Finally, BIBFRAME (BF)[17] integration with PPBL has been a goal since PPBL was implemented. Currently, CIP cataloging is not in scope for the BIBFRAME Pilot for two reasons. Catalogers would need to generate a MARC record with the PPBL MARC Editor and then wait over twenty-four hours for the CIP record to migrate to the BIBFRAME database (BFDB). After waiting for a day to complete the BIBFRAME description using the BIBFRAME Editor (BFE), the cataloger would need to complete the MARC record in the ILS. With publisher deadlines foremost in catalogers' minds, it was not feasible to wait this long for each CIP request. In an effort to expedite the copy cataloging workflow, BF developers plan to migrate newly created bibliographic records to the BFDB every five minutes, with a summer 2021 timeframe for implementation. This would enable copy catalogers to download a record from OCLC and within five minutes be able to edit the BF description. The CIP cataloging process can also take advantage of this new workflow. This drastically reduced migration time would enable CIP catalogers to send MARC files from the PPBL MARC Editor and within a few minutes begin completing the BF descriptions in the BFE before completing the MARC record. Double-keying would still be necessary until the BF-to-MARC migration is stable. While many CIP catalogers had hoped for PPBL to generate BF descriptions, in addition to MARC files, the pragmatic approach is to take advantage of the reduction in MARC-to-BF migration time. PPBL is very heavily dependent on the Library's current ILS, so waiting for the Library to upgrade to a BF-conversant ILS to add the generation capability makes the most sense. Some other workflow considerations are change requests and CIP verification, which is the process of updating the CIP record to reflect the published book; this is because any updates to the CIP record would possibly necessitate updates to the BF description. Incidentally, all PCN records are also migrated to the BFDB because they are newly created MARC records. BF catalogers already complete the BF descriptions for the published PCN books.

Conclusion

The CIP Program and its sister PCN Program continue to meet the needs of U.S. publishers and now specifically authors as well. Over the last 50 years, both programs have seen major technological innovations that brought CIP and PCN onto the World Wide Web. With the implementation of

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[16] https://isni.org/.
[17] https://www.loc.gov/bibframe/.

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PrePub Book Link, the Library of Congress took the technology to the next level to provide enhanced customer service to publishers to meet and exceed printing deadlines. While PPBL provided publishers with an overall enhanced user experience, PPBL resulted in significant improvements to efficiency and workload management for publisher liaisons, internal catalogers, and partner catalogers. With the enhanced ONIX integration, CIP publishers, publisher liaisons, and all catalogers could finally take full advantage of ONIX metadata either to prefill part of the CIP request or as part of the cataloging workflow. Additionally, the MARC Editor automatically converted publisher-supplied data to a MARC format for all backend users, saving both time and keystrokes. The PPBL team looks forward to future development and integrations with ISNI and BIBFRAME and beyond as the CIP Program flourishes for the next 50 years.

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