

How to Build a Workflow: Improving Digital Content Appraisal and Processing at the University of Illinois Library

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Abstract

This paper discusses the research and activities of a working group at the Library of the University of Illinois at Urbana-Champaign (UIUC Library) to review and revise digital curation workflows. Called Improving Digital Content Appraisal and Processing (IDCAP), the working group sought to identify needs and assess and create sustainable digital curation workflows to build capacity across special collections units to manage digital content (and born-digital content in particular). The IDCAP working group focused on three initial tasks: 1) creating use case profiles drawn from examples of born-digital acquisitions from special collections units; 2) surveying peer institutions' workflow documentation; and, 3) and conducting a gap analysis of the Library's practices and documentation across special collections units. Assessing commonalities and differences that emerge from these activities will be used to inform and refine the development and documentation of sustainable digital curation workflows. Additionally, this assessment will lay the foundation for a set of recommendations for how the UIUC Library manages its born-digital content.

Introduction

Improving Digital Content Appraisal and Processing (IDCAP) is a working group initiated by the Library of the University of Illinois at Urbana-Champaign (UIUC Library). The working group's chief goal was to enhance and develop workflows across the UIUC Library's special collections units that support the appraisal and processing of digital content, with a specific focus on born-digital content. Given the distributed nature of special collections units across the UIUC Library, workflows vary considerably. IDCAP was conceptualized as a way to identify common challenges and best practices, and share knowledge between units. By bringing together stakeholders from each of the separate special collections units, IDCAP sought to collectively identify current practices and workflows, review workflow documentation from peer institutions, and engage in discussion in a way that attends to the diversity of needs presented by the various stakeholders and the range of born-digital content acquired by the UIUC Library.

This paper describes how the IDCAP working group used basic project management tools to guide the three initial tasks of the IDCAP working group: 1) creating use case profiles drawn from examples of born-digital acquisitions from special collections units; 2) surveying peer institutions' workflow documentation; and, 3) and conducting a gap analysis of the Library's practices and documentation across special collections units. Upon completion of these tasks, the IDCAP working group assessed commonalities and differences of special collection units' needs to refine the development of the UIUC Library's digital curation workflows and related documentation.

Problem Statement

Since 2003, the UIUC Library has launched numerous initiatives to provide curatorial and technical support for born-digital content identified as having archival or long-term value. However, special

collections units have not had clear or consistent approaches to developing and supporting workflows that provide a comprehensive and sustainable digital preservation model, due in part to digital preservation's rapidly changing environment and competing priorities in the Library. IDCAP sought to develop recommendations for a sustainable digital curation workflow model through a methodical process of reviewing existing internal workflows and related documentation, an analysis of the results from an informal survey of workflow documentation from peer institutions, and a gap analysis to distill major challenges across the Library's special collections units. This process has resulted in a more complete and shared understanding of the larger landscape of digital curation workflows by all UIUC Library stakeholders providing a foundation for more sustainable digital curation workflows going forward.

Background

Changing Landscapes for Digital Curation Workflows

Workflow development for digital archival materials is an evolving space, both within specific institutional settings and the archives profession more broadly. Initiatives that analyze or model workflows aim to build capacity for preserving born-digital content, but more fundamentally they encourage institutions to document their workflows. Early discussions in this space include Ben Goldman's foundational 2011 article "Bridging the Gap," in which Goldman delineated basic steps and recommendations for archivists acquiring born-digital materials.¹ Ricky Erway's 2012 OCLC Research report, *You've Got to Walk Before You Can Run*,² identified eleven key steps for managing born-digital content. This report was followed by more detailed guidance on how to implement these steps.³ The Society of American Archivists' Manuscript Repositories Section developed the "Jump In" initiative in response to the former, where twenty-three repositories tested these initial steps and shared the results.⁴ As an antecedent to developing workflows, these discussions emphasized the importance of identifying the basic key steps for managing born-digital materials, and sought to provide feasible ways to implement these steps across repositories, regardless of resources or staffing.

Many case studies and projects have emerged since, and practitioners have shared experiences and challenges to form a community of practice around digital curation and preservation workflows. A notable and recent systematic assessment of digital curation workflow development is Educopia Institute's OSSArcFlow (2017-2020),⁵ which sought to understand how institutions specifically use open-

¹ Ben Goldman, "Bridging the Gap: Taking Practical Steps Toward Managing Born-Digital Collections in Manuscript Repositories," *RBM* 12 (2011), 11-24, <https://doi.org/10.5860/rbm.12.1.343>.

² Ricky Erway, *You've Got to Walk Before You Can Run: First Steps for Managing Born-Digital Content Received on Physical Media* (Dublin, Ohio: OCLC Research, 2012), <http://www.oclc.org/research/publications/library/2012/2012-06.pdf>.

³ Julianna Barrera-Gomez and Ricky Erway, *Walk This Way: Detailed Steps for Transferring Born-Digital Content from Media You Can Read In-house* (Dublin, Ohio: OCLC Research, 2013), <http://www.oclc.org/content/dam/research/publications/library/2013/2013-02.pdf>.

⁴ "Jump In Initiative," Manuscript Repositories Section, Society of American Archivists, 2013, <https://www2.archivists.org/groups/manuscript-repositories-section/jump-in-initiative>.

⁵ OSSArcFlow is a collaborative project between the Educopia Institute and the University of North Carolina at Chapel Hill School of Information and Library Science, LYRASIS, and Artefactual, Inc, as well as twelve

source software in born-digital workflows.⁶ This recent work is part of digital preservation's long progression as an evolving professional area of expertise. The Commission on Preservation and Access and the Research Libraries Group created the Task Force on Digital Archiving in December 1994 for the purpose of investigating how to ensure "continued access indefinitely into the future of records stored in digital electronic form."⁷ And still, institutions have largely either not documented their digital curation workflows, or have not made them widely available due to a variety of reasons. Katherine Skinner notes that "[m]ost collecting institutions believe that their born-digital archiving workflows are still too ad hoc or nascent to deserve formal documentation, and the lack of formal documentation keeps collecting institutions from being able to see, share, compare, and build upon their collective successes, failures, gaps, challenges, and opportunities."⁸ Digital curation workflows are in many ways always a work-in-progress. While any workflow in any archival setting could be argued to be always in a state of becoming and constantly evolving as new guidelines and best practices emerge, it can be also argued that digital curation workflows are especially more dynamic and subject to change given the rapid pace of technological change. As Trevor Owens notes in his concluding paragraph of *The Theory and Craft of Digital Preservation*, "There is no end for digital preservation. The best one can hope for is to be one link in an unbroken chain of memory."⁹

This is not to say that digital curation workflows are constantly in flux and unable to be documented, but there is a sense in which they seem to evade finality. This state of becoming is also sometimes acknowledged in workflow documentation itself. For example, the University of Michigan Library's Digital Preservation Laboratory notes, "... we are still learning the intricacies of preserving this type of content, and workflows will likely change as we adjust our methods."¹⁰ Another reason that institutions may not have documented workflows is because they are transitory works-in-progress, and thus practitioners may conclude they are not ready to be documented. If the workflows are documented in some form, they may not be ready to be shared given their preliminary status, or because they contain information that should only be made available internally, such as information about infrastructure, procedures, and security (e.g., network storage location or system login information). Despite these caveats, sharing information about workflows (or even parts of workflows that are appropriate for public access) help to identify common challenges across and within institutions and to develop shared digital

institutions/project partners. "OSSArcFlow," Educopia Institute, accessed June 3, 2021, <https://educopia.org/ossarcflow/>.

⁶ "OSSArcFlow," Educopia Institute, accessed November 30, 2020, <https://educopia.org/ossarcflow/>.

⁷ Don Waters and John Garrett, *Preserving DIgital Information. Report of the Task Force on Archiving of Digital Information* (Washington, D.C.: Commission on Preservation and Access, Research Libraries Group, Inc., 1996), <https://files.eric.ed.gov/fulltext/ED395602.pdf>.

⁸ Katherine Skinner, "Introduction," in Alexandra Chassanoff and Colin Post, *OSSArcFlow: Guide to Documenting Born-Digital Archival Workflows* (Atlanta: Educopia Institute, 2020), <https://educopia.org/ossarcflow-guide/>.

⁹ Trevor Owens, *The Theory and Craft of Digital Preservation* (Baltimore, Maryland: Johns Hopkins University Press, 2018), 200.

¹⁰ "Workflows," Digital Preservation Laboratory, University of Michigan Library, accessed December 1, 2020, <https://digipreslab.lib.umich.edu/workflows/>.

preservation strategies.¹¹ Sharing information about digital curation workflows enables us to collectively ask and collaboratively answer questions about how to build (and in some cases, rebuild) a workflow.

Digital Preservation at the University of Illinois

The UIUC Library has been investing in digital preservation since the early 2000s. Early investments focused on introducing digital preservation concepts to Library staff through the award-winning Digital Preservation Management workshop¹² originally created by Cornell University Library, and through the establishment of the UIUC Library's institutional repository, Illinois Digital Environment for Access to Learning and Scholarship (IDEALS).¹³ From these early efforts, the need for investing resources in a more robust digital preservation environment became apparent. Between 2010 and 2014, the UIUC Library increased its resource expenditures on staff devoted to digital preservation and began developing its own digital preservation repository, Medusa.¹⁴ Initially launched in 2014 as a "dark archival" preservation repository, the focus of Medusa was to gain control over the preservation actions needed to support the Library's digital holdings. Medusa has since evolved into a set of services that support a variety of the Library's repository platforms.

As more and more special collections units transfer, acquire, and preserve born-digital content, the need for support has grown immensely. Each curator or archivist requires sufficient digital storage space to securely review and further appraise content. This growing need has opened up conversations specifically about digital appraisal, re-appraisal, privacy rights, and ultimately, access. The IDCAP working group is the latest in a series of efforts by the Library to address gaps in workflows and think critically about appraisal, storage, and access.

Methodology

How do you build a workflow? What are the steps you should take not only after you have acquired born-digital content, but also *before* you appraise and acquire materials? These are fundamental questions that practitioners and curators ask themselves as they begin deciding how to acquire, appraise, arrange, describe, preserve, and make that content accessible. But these are also questions that we find ourselves asking time and again as we consider how to revise and update workflows. For the UIUC Library, the question is not only how to build a workflow, but how to rebuild and revise workflows as the digital

¹¹ Alexandra Chassanoff and Hannah Wang, "Laying Out the Horizons of Possibilities: Reflections on Developing the OSSArcFlow Guide to Documenting Born-Digital Archival Workflows," *BloggERS*, November 17, 2020, <https://saaers.wordpress.com/2020/11/17/laying-out-the-horizon-of-possibilities-reflections-on-developing-the-ossarcflow-guide-to-documenting-born-digital-archival-workflows/>.

¹² "Digital Preservation Management: Short-term solutions for long-term problems," Massachusetts Institute of Technology, accessed December 1, 2020, <https://dpworkshop.org/dpm-eng/workshops/fiveday.html>.

¹³ University of Illinois Digital Repository, IDEALS, accessed December 1, 2020, <https://www.ideals.illinois.edu/handle/2142/4>.

¹⁴ University of Illinois Preservation Repository Services, accessed December 1, 2020, <https://medusa.library.illinois.edu/>.

preservation field evolves and new needs emerge. The Library has previously established digital preservation and curation workflows, as well as reliable preservation and access mechanisms in the form of digital preservation repository services, and yet integrating and streamlining digital curation workflows across the Library's distinctively separate special collections units, all of which have different collecting scopes, has proven challenging. How to make such workflows sustainable, especially as the amount of born-digital content continues to grow, has proven to be an even more pressing question (and challenge).

To begin addressing these questions, the IDCAP working group developed a lightweight project management structure to support three initial tasks, all related to data collection: creating internally focused use cases, undertaking an informal survey of peer institutions' workflow documentation, and conducting a gap analysis of our current digital curation workflows.

Project Management Tools

The IDCAP working group used classic project management techniques outlined by the Project Management Body Of Knowledge (PMBOK) Guide.¹⁵ The project lead team (comprising the three authors) developed a Project Overview document and a Charter/Scope document at the start of the initiative. The Project Overview document outlines the project justification, measures of success, alternatives considered, timeline, and resource requirements. The Charter/Scope identifies the project sponsor, outlines the scope of the project including the business need, deliverables and objectives, and provides a description of what is in scope versus out of scope. It includes a project processes section that addresses sharing communications and includes an agreement section where the working group sponsor and project leads sign off indicating their commitment to the project. The project leads also relied on the Digital Libraries Federation (DLF) Project Managers Toolkit¹⁶ for resources to help with the project Charter/Scope document, workflow analysis, proposal process, project plans, and coordinating documentation management.

Overall, the methodology used by the IDCAP working group was grounded in core project management concepts but carried out with a degree of flexibility to accommodate a disparate group of stakeholders. The group prioritized methods focused on defining workflows and conducting a gap analysis. The project leads recognized the need to build a high level of consensus if a future state of improved digital curation workflows will be sustainable and successful.

Data Collection

Use Cases

As a starting point for data collection, the IDCAP project leads initiated a data collection approach with use cases. Members of the IDCAP working group were asked to reach out to stakeholders within each of the special collections units and gather information describing the types of circumstances or situations

¹⁵ *Project Management Body Of Knowledge Guide*, Project Management Institute, accessed December 1, 2020, <https://www.pmi.org/pmbok-guide-standards>.

¹⁶ "DLF Project Managers' Toolkit," Digital Library Federation, accessed December 1, 2020, https://wiki.diglib.org/DLF_Project_Managers_Toolkit.

where born-digital content would be donated or transferred and eventual access through the UIUC Library. A very simple template was created to consistently collect data. Template data fields included the following:

1. *Team Member* - (the name of the IDCAP working group member collecting information)
2. *Stakeholders Consulted* - (the person(s) responsible for collection appraisal and acquisition)
3. *Source/Donor Profile* - (a description of the donor or source, in the case of an administrative unit of the University)
4. *Source/Donor Details* - (contact information for the source or donor)
5. *Content Description: Informational* - (a description of the intellectual nature of the content)
6. *Content Description: File Formats* - (a listing of the typical type of file formats that might be expected from the Source/Donor)
7. *Acquisition Rationale* - (a brief description of why the content is considered to have archival or long-term value)
8. *Expected Frequency of Acquisition* - (an indication if the acquisition will be something that has annual accruals, some other frequency of occurrence, or is a one-time acquisition)
9. *General Notes* - (used to capture any other information that may be useful in understanding the acquisition, the Source/Donor, or particularities with media or file formats)

IDCAP working group members held phone interviews with stakeholders and provided summaries of their findings to the whole group. The total number of stakeholders interviewed (seven) was relatively small, since this exercise only involved reaching out to individuals directly engaged in some capacity of digital acquisitions. Findings were aggregated and shared with the entire working group.

Internal Data Gathering

To get a sense of current practice within each stakeholder unit, IDCAP project leads conducted a “documentation roundup” exercise and scheduled interviews with digital stewards, walking through the steps undertaken in curating their born-digital collections. Identifying gaps and articulating priorities was completed using an intensive interviewing technique, wherein the digital steward was asked to talk through the steps of processing a digital collection. After an interview session, IDCAP project leads reviewed notes and generated a visual diagram representing actions and decision points. Accompanying the diagram is a narrative document that details the “who, what, where, when, why, and how” of completing steps in the workflow. Through this combined informational representation method project leads were able to identify gaps in practice, bottlenecks, or lack of resources.

Workflow Documentation Survey

In addition to reviewing internal documentation and practices, the IDCAP project leads conducted an informal survey of public digital curation workflow documentation available from peer institutions.¹⁷ The survey provided an overall sense of the digital curation workflow landscape and a view into how practitioners are implementing steps to acquire and manage born-digital content. The IDCAP working

¹⁷ This work was completed with the assistance of Bridgette Hammond and Grace Moran, who are also members of IDCAP. We are grateful for their work on this project.

group mostly reviewed workflows that have been made public, with a few exceptions of workflows that were directly shared by colleagues. This task provided an opportunity to compare and contrast internally developed workflows with those of a select group of peer institutions.

Questions posed by the survey were intended to uncover how other institutions are structuring their digital curation workflow documentation and what degree of specificity is addressed by the documentation. Examples of questions include: Which activities does the workflow cover? Are there separate workflow instructions for specific formats such as email, software, or websites? How is the workflow documentation organized? Other questions focused on how documentation is presented. For instance, does the documentation represent steps in a workflow visually through birds-eye flowcharts, written step-by-step instructions, or both? Does the documentation include tutorials for using specific software tools? The survey also looked at the software platforms used for creating and managing workflow documentation such as wikis, Google Docs, and GitHub.

Initially, survey efforts focused on other Big Ten institutions, largely because one of the authors is part of the Big Ten Academic Alliance Digital Preservation Peer Group, and members of that group had previously shared information about their workflows. Further efforts focused beyond the Big Ten to look at institutions similar in size and setup, as well as on workflows made available through the OSSArcFlow initiative¹⁸ and Library Workflow Exchange.¹⁹ In addition to the OSSArcFlow workflows, information from sixteen institutions was gathered and presented in a spreadsheet. While these sixteen examples are not the only workflow documentation the team encountered, they are the most clearly representative examples of workflow documentation rather than documentation that pertains to specifically to policies, collection development, or donor relations.

Gap Analysis

Through the aforementioned activities and analyses, the IDCAP working group identified needs for improvement in existing workflows and their execution. IDCAP also uncovered a growing set of challenges largely due to increasing amounts of acquired or accessioned content and limited available resources. While the working group detailed a long list of challenges in a gap analysis format, these challenges were able to be distilled into three main categories:

- Category One: Inconsistencies in the development of procedures and their implementation and maintenance.
- Category Two: Confusion around the roles/responsibilities of individuals involved in the acquisition and processing of born-digital content.
- Category Three: Increasing backlogs and preservation expectations associated with the expanding acquisitions of born-digital content.

¹⁸ See the section “Born Digital Archiving Workflows,” OSSArcFlow, Educopia Institute, accessed December 1, 2020, <https://educopia.org/ossarcflow/>.

¹⁹ Library Workflow Exchange, accessed December 1, 2020, <http://www.libraryworkflowexchange.org/>.

These overlap in some respects, but they also point to the importance of having clarity and consistency in workflows, and having dedicated staff who can enforce procedures and provide oversight.

Results and Findings

Use Cases

After reviewing all use cases, we found that the Source/Donor types fell into five general categories: Student Organizations, Administrative Records, Faculty, Individual Donors, and Associations (the UIUC Library is home to the archives of organizations such as the American Library Association and the National Council of Teachers of English). File format information did not vary from one type of Source/Donor to another. All file formats are likely to be found in materials acquired from any of the Source/Donor types with the bulk of them belonging to standard Microsoft Office file formats or Adobe file formats.

Content Types considered most likely to be found in deposited materials included: Correspondence, Publications, Websites, Photos, Governing Documents, Meeting Notes, Sound/Film, and Events/Training. Specifically for Faculty, Data and Research Notebooks were also noted. Some Content Types showed up equally across Source/Donor types such as: Correspondence, Publications, and Photographs. Web content did not arise as a primary type of content for Faculty but did show up in all other Source/Donor types. Associations and Student Organizations both indicated Sound/Film as types of content and Administrative Records and Student Organizations both indicated Governing Documents, and Meeting Minutes as a typical type of content. Administrative Records and Associations were most likely to have annual deposits of materials whereas Faculty and Individual Donors were most likely to have a one-time deposit of materials.

Deposits of materials from the University's Student Organizations was unpredictable and for Faculty, Research Data and Notebooks were an outstanding type of deposit that did not show up for any of the other categories of Source/Donor types.

The findings from this exercise indicate that the UIUC Library can likely plan for most acquisitions to fit into a few categories of file formats and some acquisitions can be planned for routine annual deposits. But findings also indicate variability should be expected both in the timing of acquisitions and in file formats which means any sustainable workflows must have built in "exceptions" to the standard processes.

Internal Data Gathering

The documentation roundup exercise rendered results were unsurprising in that units which are more engaged in digital stewardship had the most documentation, both formal and informal. Formal documentation included some level of structured text intended for distribution to an audience of more than one. Informal documentation included draft notes or guidance that may not have been shared with other staff. The University Archives and Digital Preservation services at the UIUC Library had the most mature formal documentation and workflows. As these workflows were based on extensive research and

were primarily structured around archival processes, they served as a starting point for iterating to the next phase of workflows.

Workflow Documentation Survey

Because digital curation workflows exist in different environments, with different administrative structures, resources, and staffing models, what works in any particular context depends on a host of factors. Variances in what type of workflow documentation was made available or the level of detail provided no doubt was influenced by these factors. The variances caused a host of new questions regarding staffing and general levels of resources. Sometimes staffing and resource information could be gleaned from lists of roles and responsibilities, or mentions of hand-offs in the workflow. But oftentimes information about staffing and resources could only be implicitly inferred. In terms of platforms used for hosting digital curation workflow documentation, the institutions surveyed use a wide variety of systems, including wikis and Google Docs.

Survey results were parsed into three tiers: *Tier One* - Institutions that make available high-level policies or information about digital materials for donors. *Tier Two* - Institutions that make available workflow documentation primarily focused on accessioning and digital forensics work. *Tier Three* - Institutions that have workflow documentation publicly available detailing step-by-step instructions, including information beyond accessioning and reformatting born-digital media.

Many of the examples of workflow documentation reviewed were organized by activity type: Accessioning, Processing, Ingest, etc.²⁰ Some workflows were organized by format type: Website content, Email, Digitized Materials, etc.²¹ The landscape of digital curation workflow documentation varies considerably within these three tiers.

Gap Analysis

The three main categories identified point to some important considerations. For Category One (inconsistencies in the development of procedures and their implementation and maintenance), the IDCAP working group found a recurrence of inconsistencies in the development, maintenance, and implementation of procedures for managing born-digital content that connected to a lack of clarity on lines of authority for their oversight or mechanisms for communication and enforcement. This relates closely to Category Two (confusion around the roles/responsibilities of individuals involved in the acquisition and processing of born-digital content). Roles and responsibilities are not well defined or assigned. Lastly, Category Three (increasing backlogs and preservation expectations associated with the expanding acquisitions of born-digital content), indicates that the rate of increase in the receipt of born-digital content is outstripping the library's current capacity to appraise, process, and ingest this content into the digital preservation repository or provide the appropriate level of digital curation and preservation

²⁰ The Ohio State University represents an example of this type of documentation illustrating a workflow at a high level, accessed December 1, 2020, <https://library.osu.edu/document-registry/docs/691/download?1452707175>.

²¹ For example, Princeton University has workflow documentation organized by content type, accessed December 1, 2020, <https://library.princeton.edu/special-collections/workflows/born-digital/university-archives>.

actions. The IDCAP working group developed a set of recommendations to address these issues, including developing clearer administrative structures, increasing staffing, and developing a more comprehensive digital curation infrastructure.

Conclusion and Next Steps

Digital curation workflow development is a dynamic, iterative process, and there are many moving parts that need to be identified and routinely addressed. While identifying bottlenecks and gaps are an important part of that process, it is only a beginning toward sustainable success. Equally important are supporting a clear and continuous stream of communication and securing buy-in and institutional support from senior administrators in a way that empowers practitioners with the authority to ensure agreed upon workflows are adhered to.

The next steps for the UIUC Library include a thorough review of the recommendations submitted by the IDCAP working group to Library administrators. Upon completion of that review, a plan to move forward in stages toward a more sustainable set of practices for digital content appraisal and processing will need to be established. The role of IDCAP will be assessed to determine if it is the best structure for providing a mechanism for periodic self-assessment and revision of workflows. As technologies continue to evolve, new approaches will continue to emerge, and workflows will continue to need to be revisited and revamped. At the point at which improvements in processes focused on born-digital content have been established, the next step will be to develop a similar plan that can support the ever-growing expanse of digitized content.

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