

Tapping Our Potential: Business Process Management and Archival Content Management Systems

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Abstract: One of the most exciting developments of the last decade has been the development of archival content management systems that enable archivists to effectively manage information about their collections. Unfortunately, these systems are not designed for large institutions with distributed-workflows. In this presentation we will discuss the importance of adding business process management to archival content management systems. We will focus on the management of workflows and how they can be used to meet the needs of institutions with distributed-workflows. Workflows are a type of business process and can be defined as business processes that deliver services or informational products. Integrated workflow management would allow archival content management systems to deliver the right piece of work to the right resource at the right time. It would enable archivists to define specific tasks in the system and associate those task with specific resources based on role or position. It would also allow archives managers to analyze processes—tracking performance, identifying choke points, gathering statistics, etc.—with the aim of improving the overall effectiveness of the institution.

Introduction

In November 2002 the Association of Research Libraries (ARL) released the white paper, “Hidden Collections, Scholarly Barriers: Creating Access to Unprocessed Special Collections Materials in North America’s Research Libraries.”¹ This white paper defined “hidden collections” as those materials held by special collections repositories across the United States that were not publicly available for research use due to a lack of adequate access points. In many cases these materials had not been accessioned and only a handful of employees knew of their existence. In almost all cases there was no way for patrons to discover these materials as they had not been entered into online cataloging systems.

The archival community often refers to these “hidden collections” as “backlogs” and a large amount of time, thought, and effort have been invested in recent years to developing strategies for eliminating these backlogs and preventing them from re-developing.² This paper traces a recent project at Brigham Young University to better manage our archival workflows and examines how we came to the conclusion that business process management (BPM) when combined with archival content management (ACM) systems provides a powerful tool to help archivists manage and prevent backlogs.

¹ Barbara M. Jones, “Hidden Collections, Scholarly Barriers: Creating Access to Unprocessed Special Collections Materials in North America’s Research Libraries,” 2003 white paper for the Association of Research Libraries Task Force on Special Collections, available at: www.arl.org/collect/spcoll/ehc/HiddenCollsWhitePaperJun6.pdf (accessed August 21, 2009)

² See, for instance, Mark A. Green and Dennis Meissner, “More Product, Less Process: Pragmatically Revamping Traditional Processing Approaches to Deal with Late 20th-Century Collections,” *American Archivist* 68 (2): 208-263; Christine Weideman, “Accessioning as Processing,” *American Archivist* 69 (2): 274-283; and Donna E. McCrea, “Getting More for Less: Testing a New Processing Model at the University of Montana,” *American Archivist* 69 (2): 284-290.

Scope

Our current work with BPM principles and software is part of an ongoing exploration of task-based management at the L. Tom Perry Special Collections (hereafter Perry Special Collections). Beginning in the mid-1990s, department administrators have used various tools to help manage and track archival work. These originally consisted of paper checklists of archival tasks. In 2004 a prototype system was developed using Microsoft Access, with the goal of making a Web-based version of the paper form. However, it was soon decided to expand the scope of the project to build a full-scale ACM system that also managed archival tasks.

This project, begun in early 2005, was the Integrated Digital Special Collections project (hereafter INDI).³ The INDI project was designed to streamline and improve Special Collection (SC) workflow processes and integrate SC best practices into a workflow database system.⁴ The INDI system had the core goal of making it easier to manage the assignment and tracking of processing tasks, institutionalize departmental review steps, and integrate a variety of functional areas, such as processing activities, collection management, and micrographics. It also aimed to integrate multiple, at times redundant, database applications that were in use in the department.

The INDI system was initially built on a project management framework and included multiple phases. The project phases were:

- Phase 1 which would include the base application, a project management engine, and an accessioning tool,
- Phase 2 which would include a tool for archival description, and

Subsequent phases that were to focus on other aspects of the Perry Special Collections' distributed workflow.⁵ Phase one of the application was released internally in July 2007 and the code for this phase was publicly released in August 2008 under an Apache 2.0 license.⁶

While this first phase of development showed promise, following the departure of the application programmer in late 2007 concerns about sustainability emerged. At the end of April 2008 work on the existing code base was halted and planning began for a replacement system.

Purpose

As part of planning for a replacement system, the authors were asked to carefully review our requirements and to determine whether existing systems could meet these needs. From this review, we found our requirements included two types of functionality: task management and archival content management. Although we had used a project management paradigm in the development of INDI, through our testing of the system we had also found that this was the wrong approach. Projects are unique, with steps or tasks defined in the context of each project. What we wanted was to standardize processing activities by using the same procedures each time. This was not project management, but business process management (BPM). We also wanted the BPM functionality to act as the interface to the ACM functionality.

³ More information on the Perry Special Collections is available at <http://lib.byu.edu/sites/sc/> . (accessed August 25, 2009).

⁴ INDI project team, "Integrated Digital Special Collections (INDI) Project Definition Document," (Provo, UT: L. Tom Perry Special Collections, 2005). Copy in the possession of the authors.

⁵ More information on the INDI project can be obtained at <http://lib.byu.edu/indi/> (accessed August 25, 2009).

⁶ The code may be accessed at <http://code.google.com/p/sierra-indi/> (accessed August 25, 2009).

Business Process Management

The management of archival processing has always been a challenging task because of the number of tools used to create its associated work products and the number of individuals involved in the process (particularly at large institutions). This complexity has led to the development of inefficiencies that have contributed to the buildup of archival backlogs. Business process management offers a potential solution for streamlining and improving the management of archival processing and its associated tasks.

Business process management is a field of management focused on aligning organizations with the needs and wants of their customer bases. It is “a customer-focused approach to the systematic management, measurement and improvement of all company processes through cross-functional teamwork and employee empowerment.”⁷ It supports “business processes using methods, techniques, and software to design, enact, control, and analyze operational processes involving humans, organizations, applications, documents and other sources of information.”⁸ BPM enables standardization of activities and processes, and increases organizational efficiency.

There are two key components to successful BPM implementation. They are business process modeling and workflow management (WfM) systems.⁹ Business process modeling is a method for describing the flow of data between activities and the resources that are “actually performing the pieces of work represented by each activity.”¹⁰ It also enables the mapping of the controls that ensure that the appropriate data and resources are utilized. WfM systems draw heavily on the information gathered during process modeling and they are designed to “support the definition, execution, registration and control of business processes.”¹¹

Business Process Modeling

The focus of BPM is at the process level. Processes consist of “multiple *activities* (also known as 'steps' or 'tasks')” which are “created and linked to each other.”¹² There are four key elements that help to define processes:

- 1) predictable and definable outputs
- 2) a linear, logical sequence or flow
- 3) a set of clearly definable tasks or activities
- 4) a predictable and desired outcome or result.¹³

⁷ Hajo A. Reijers, *Design and Control of Workflow Processes: Business Process Management for the Service Industry* (Berlin: Springer, 2003), 18.

⁸ M. Weske, W. M. P. van der Aalst, and H. M. W. Verbeek, “Advances in Business Process Management,” *Data & Knowledge Engineering* 50, no. 1 (2004): 2, [doi:10.1016/j.datak.2004.01.001](https://doi.org/10.1016/j.datak.2004.01.001) (accessed August 25, 2009).

⁹ Business Process Management is often used to mean the narrower WfMS.

¹⁰ Frank Leymann and Dieter Roller, “Business Process Management with FlowMark,” In Proceedings of the 39th IEEE Computer Society International Conference, San Francisco, California, February 1994: 231, <http://citeseer.ist.psu.edu/leymann94business.html> (accessed August 25, 2009).

¹¹ Hajo A. Reijers, *Design and Control of Workflow Processes: Business Process Management for the Service Industry* (Berlin: Springer, 2003), 18.

¹² Tulu Tanrikorur, “Business Process Management 101: The Basics of BPM and How to Choose the Right Suite” *Intelligent Enterprise* (May 7, 2007): 3, <http://www.intelligententerprise.com/showArticle.jhtml;jsessionid=HQE4KXOBAHY0FQE1GHPCKHWATMY32JVN?articleID=199204260> (accessed August 25, 2009).

¹³ Mohamed Zairi, “Business Process Management: A Boundaryless Approach to Modern Competitiveness,” *Business Process Management Journal* 3, no. 1 (1997): 64.

Processes can include “person-to-person work steps, system-to-system communications or combinations of both.”¹⁴ Specialized processes that deliver services are referred to as workflows. Workflows involve “the automation of a business process, in whole or part, during which documents, information or tasks are passed from one participant to another for action, according to a set of procedural rules.”¹⁵

Process modeling involves carefully analyzing the component pieces of a process and how they work. It involves the creation of workflow diagrams and use cases. The completed process model describes the conditions that “define how and when an activity is performed.”¹⁶ Process models are also called a “workflow definition.”¹⁷ Process models are typically created as flow diagrams. Figure 1 (below) is an example of how minimal processing activities at Brigham Young University are modeled. A textual description of the workflow follows Figure 1.

The first task at BYU is to initiate minimal processing. The next step is to identify whether or not there is an existing series order to the collection. If there is an existing series order, then the processor describes that order. If there is no discernible series order, then the processor arranges the collection into series and then describes those series. The description is then forwarded to a supervisor who reviews the description and approves or rejects it. If the description is rejected, it is returned to the processor and they redo the description. The description then goes back to the supervisor. If the description is approved, it is forwarded to collection management and reviewed again. If the description is rejected by collection management, it is returned to the processor and they redo the description. The description is then returned to collection management. If the description is approved by collection management, the description is forwarded to the manuscripts cataloger for a final review. If the cataloger rejects the description, it is returned to the processor and they redo the description. The description is then returned to the manuscripts cataloger. If the cataloger approves the description, then minimal processing is completed. The flow diagram visually depicts how minimal processing is implemented in the Perry Special Collections. There are three basic steps described in the flow diagram that are applicable to almost all archival institutions. They are identifying original order or creating series order, describing that order, and appropriate reviews for compliance with institutional standards. This model is embedded in the trainings offered to students and curators in the Perry Special Collections and guides their application of minimal processing to all manuscript collections.

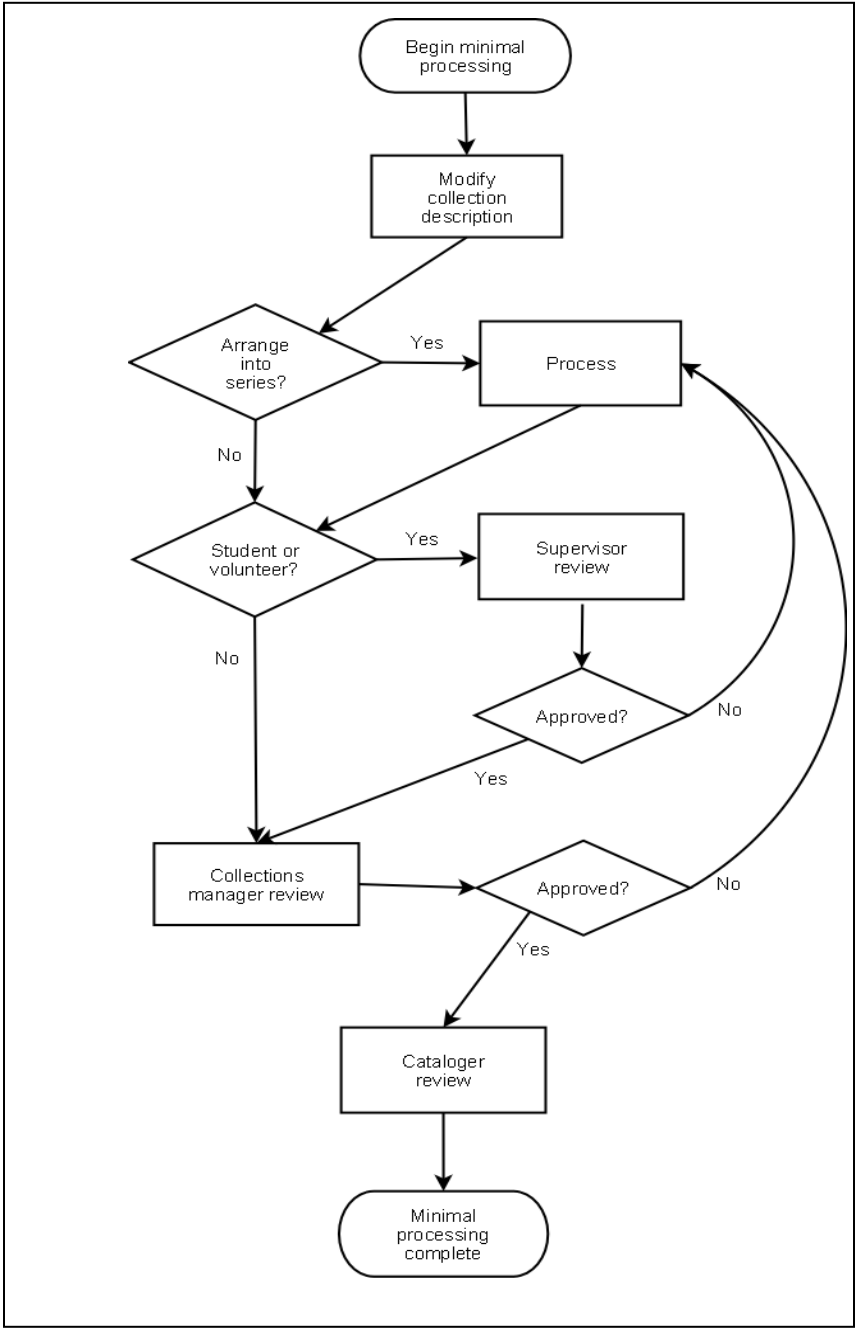
¹⁴ Tanrikorur, 1.

¹⁵ Weske, 2

¹⁶ Tanrikorur, 3.

¹⁷ Reijers, 18.

Figure 1. Process model for Perry Special Collections minimal processing tasks.



Workflow Management Systems

As modeled above minimal processing is a business process that delivers a service to researchers and as such comprises a workflow.¹⁸ Workflows are a specialized type of business process that can be easily automated. Workflow management systems (WfM) exist to “support the definition, execution, registration and control of business processes.”¹⁹ WfM systems guide users through the defined process, and provide controls to ensure that each task is performed according to the process model. Common system features include task routing, automated notifications, rules-based decision making, time-limit enforcement, prioritization, task tracking, and reporting. WfM systems require process participants to complete steps in their sequence, and allows administrators to measure the effectiveness and efficiency of the process. Once a process has been automated using a WfM system, throughputs can be analyzed to improve the process further.

The first step in implementing a WfM system is to identify the business processes that are to be automated. These processes are modeled at three levels: macro, functional-activity, and task-procedure.²⁰ Macro modeling captures the big picture and outlines the scope of the system to be automated. Functional-activity modeling is “a mid-level of detail ... [and] includes the job titles of the people working in the process as well as the activities that they perform.”²¹ Task-procedure modeling is “the most detailed” and includes the level of detail you would use to explain a particular task to someone during training.²² These models are then used to create a flow diagram that maps all of the steps that occur in a process and these steps are then automated using one of several workflow management software languages, or may be input using a visual editor. When done appropriately, WfM systems enable increased efficiencies by “delivering the right piece of work to the right resource at the right time.”²³

Archival Processing

The other functional area identified in the requirements was the management of archival information resulting from processing activities. In the Perry Special Collections processing activity is divided into nine tasks which are performed by several different individuals including processers, catalogers, stacks management staff, and curators. These tasks include the gathering of acquisition and donation information, accessioning the materials, processing the materials and completing a cataloging worksheet, finding aid production, creation of a catalog record in the online system, approval of the finding aid by Board of Curators when appropriate, labeling of boxes, any associated conservation work, and placement of the collection in the stacks and notating its location.²⁴ Each of these tasks needed to be managed within an ACM system in order for it to be useful to the staff in the Perry Special Collections.

Archival processing generates information that describes the creator(s) of the collection, the collection itself, and what the institution has done with the collection. This data has historically been created and gathered using a variety of different tools and has been stored in a variety of formats. However, in ACM

¹⁸ Reijers., 4.

¹⁹ Reijers., 18.

²⁰ Dan Madison, *Process Mapping, Process Improvement, and Process Management: A Practical Guide to Enhancing Work and Information Flow* (Chico, CA: Paton Professional, 2005), 21.

²¹ Madison, 23.

²² Madison, 23.

²³ Madison, 18.

²⁴ For a more detailed discussion of processing activities see Kathleen Roe, *Arranging & Describing Archives & Manuscripts* (Chicago: Society of American Archivists, 2005).

systems all information related to processing activities is gathered, managed, and stored in a single location.

Method

Having reaffirmed our basic requirements, we began developing a requirements document and examining existing BPM and ACM products to determine whether these tools could meet our needs. The requirements document included detailed definitions of desired functionality and the prioritization of the features.²⁵ These requirements were then placed in a matrix for recording the comparing the different systems. The matrix also included pricing, sustainability, and support.

Results

Our initial hope was to find an existing ACM system that included WfM functionality. However, in reviewing available systems, when ACM developers spoke of supporting workflow this often meant providing features in support of a given workflow and not WfM features such as task routing or automated rules-based decision making. Conversely, our review of WfM systems found that while they were able to manage workflow they lacked the functionality to adequately gather and manage archival data, particularly descriptive data.

Based on this research we have decided to implement a two-system solution, with separate applications for workflow management and archival content management. For WfM we selected ProcessMaker, an open-source, Web-based business process management application.²⁶ Once implemented ProcessMaker will make assignments, manage tasks, send notifications, and implement review procedures. For managing information about the materials undergoing archival processing we selected the Archivists' Toolkit, an open-source, desktop-based ACM system.²⁷ While recognizing that this two-system solution is less than ideal, it does have the benefit of allowing us to continue to examine workflow management and how it can benefit archival activities.

Findings

Over the course of the last decade the management of the archival workflows in the Perry Special Collections, and other archival institutions, has gradually evolved. We have moved from utilizing paper forms and detailed processing guides to the automation of the management of archival content through tools such as the Archivists' Toolkit, ICA-AtoM, and Archon.²⁸ This evolution has been prodded along by the development of national standards related to description, such as Encoded Archival Description (EAD) and *Describing Archives: A Content Standard (DACS)*, and the steady growth of our collections. It has become imperative to efficiently and expeditiously process collections so that they can be utilized by researchers. Our quest for greater efficiencies points us to the discipline of business process management and workflow management.

²⁵ J. Gordon Daines III and Cory L. Nimer, "ABP Project Requirements," (Provo, UT: L. Tom Perry Special Collections, 2009). Copy in the possession of the authors.

²⁶ Information on ProcessMaker is available at <http://www.processmaker.com/> (accessed August 25, 2009).

²⁷ Information about the Archivists' Toolkit is available at <http://www.archiviststoolkit.org/> (accessed August 25, 2009).

²⁸ It was recently announced that the Archivists' Toolkit and Archon will be combining development activities. Information on the Archivists' Toolkit is available at <http://www.archiviststoolkit.org/> (accessed August 21, 2009), Archon at <http://www.archon.org/> (accessed August 21, 2009) and ICA-AtoM at <http://www.ica-atom.org/> (accessed August 21, 2009).

In the Perry Special Collections, we have come to recognize the importance of process modeling and workflow management for the improvement of our archival processing activities. Through process modeling we are better able to visualize the tasks involved in archival processing, and to explore ways in which the process might be streamlined or improved. This has ultimately resulted in improved access to our materials for our patrons. Streamlining our workflow has eliminated the number of individuals “touching” archival collections and has decreased the amount of time that it takes to get a new collection to researchers. With the implementation of workflow management tools we hope to gather statistical information about process task completion, which we can use to further refine our process and procedures.

Our review of existing ACM and BPM systems points to the simple fact that these important tools for automating archival processes need to be better integrated. This could be accomplished by either 1) directly integrating workflow management tools as part of the base of ACM systems or 2) utilizing Web services to enable workflow management systems such as ProcessMaker (or a workflow management tool developed by the archival community) to be coupled to an ACM system.

Combining ACM and WfM systems offers us the potential to make our collections more widely accessible to researchers in a timelier manner and will make us better stewards of the cultural resources with which we are entrusted. An integrated system utilizing either Web services or a direct database connection would provide data entry functionality, while providing the tracking, notification, and enforcement features that make workflow management software so useful. In the business community BPM engines are being integrated into a variety of enterprise applications; ProcessMaker alone has been integrated into multiple open source business tools, including the document management system KnowledgeTree, the enterprise resource management application OpenBravo, customer resource management system SugarCRM, and the collaboration suite Zimbra.

Regardless of the choice made, there needs to be tight integration between the database and its interface. Workflow management principles need to serve as the basis for the application design in order to ensure that the system is capable of walking users through the various tasks associated with archives management and providing them with appropriate data entry forms when they are needed. Archivists need to identify the basic steps for processing that occur in every institution so that a generic workflow model can be created and integrated into existing ACM systems. As programmers utilize this basic workflow model to create workflow management tools within the ACM system, they need ensure that the workflow is customizable and configurable to individual institutional needs.

It is our hope that archivists will begin modeling their business processes and work towards creating a basic workflow for archival activities that could be used to open a dialogue with ACM system designers. It is also our hope that ACM system designers will examine business process management tools, and consider ways in which they might be integrated into their development.

Resources

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