Robotic Process Automation:

Implementation in Private/Public Sectors and

Opportunities for Cultural Heritage Organizations

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Abstract

In the current race to master digital transformation and harness its potential in the workplace, Robotic Process Automation (RPA) is gaining popularity among cognitive technologies as a robust and easy way to streamline certain repetitive processes. As automation strategy goes, RPA offers a solution to simplify business complexity by automating rule based and repetitive tasks without requiring major changes to existing hardware and systems' architecture. A unique feature of RPA programing is that it does not require knowledge of coding. The RPA software uses graphical user interface (GUI) to capture keystrokes and mouse clicks to automate an entire workflow or just certain tasks within a bigger process. This paper presents how RPA is being implemented in different industries to broaden the general track to digital transformation and further the path of freeing employees from redundant and repetitive tasks in order to spend more time on high-value work that requires creativity and decision-making skills. While many businesses where the need for speedy solutions to deliver data and complete repetitive tasks have begun adopting RPA and using artificial intelligence integrated solutions, libraries, archives, and museums (LAMs) are still lagging in RPA implementation. To raise awareness and curiosity among LAMs about RPA technology, this research has relied predominantly on literature review from resources outside the LAM field to highlight how RPA is being implemented to augment the workforce in other fields to boost efficiency and develop employees to handle more complex decision-making tasks. Thus, improving productivity and, where external stakeholders are involved, client satisfaction.

Keywords: Robotic Process Automation, RPA, LAMs/LAM, digital transformation, repetitive tasks

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The ability to store, retrieve, and share digital content has proven to be a crucial factor in an organization's success. Managing digital assets effectively provides economic and financial advantage particularly as it relates to workforce management and overall production of trustworthy and accurate information crucial for timely and judicious decision making. The manner in which collecting institutions store, preserve, and provide access to digital content for use and reuse has evolved over the years. Data that used to inhabit hard and external drives is now stored in the cloud, which has essentially resolved the issue of digital storage space on local servers. Furthermore, access to data which used to be in the hands of the few privileged who were fluent in the computer languages or who were "tech" savvy can now be accomplished by anyone with few clicks on a computer screen.

On the other hand, the speed and volume by which digital content is generated continues to pose for organizations in general, and cultural heritage institutions in particular, a challenge to making rapid decisions about collecting and preserving authentic digital objects and scholarship for posterity. This challenge demonstrably has been compounded by rapidly evolving crisis or unforeseen events such as the COVID-19 pandemic and recent social and racial issues where digital material is not only vital to tell the stories and provide essential resources for current and future generations, but also to help inform the public into making educated decisions. With enhanced developments and versatility of systems, the quest for easy and seamless access to

digital content remains a pain point as organizations try to meet the demands and expectations of users.

In the past decade, we have witnessed many industries, specifically banking, insurance, finance, and manufacturing, successfully implement usage of cognitive technologies and robotic software tools to streamline digital data workflow, and processes to eliminate redundancies, automate repetitive tasks, and through it all improve employee satisfaction and customer service. Nonetheless, we have yet to see cultural heritage institutions follow suit where the need varies only slightly from those previously mentioned. Of those needs specific to cultural heritage institutions, one identifiable process that can benefit from RPA technology is routing data between collection management systems and archives databases. Unfortunately, museums and other cultural heritage institutions have been slow to take advantage of such technology to alleviate backlog in digital curation and streamline archival practices.

Historically, cultural heritage institutions have had to deal with backlog in digital curation and archival practices within the confines of finite financial and human resources. The advancement and proliferation of cognitive technologies could alleviate some of the backlog. As such, the purpose of this research paper is to discuss how Robotic Process Automation (RPA) could be implemented to augment the workforce and handle repetitive and rule-based functions enabling staff to better manage the more complex decision-making tasks.

Research Design

Given the relative novelty of RPA technology in the cultural heritage field and the presence of limited use cases in collecting institutions, opportunities for open-ended interviews with experts and practitioners in libraries, archives, and museums (LAMs) for this research proved to be both

challenging and limited in scope. However, the literature review derived primarily from sources outside the LAM field, and reflecting on the digital curation process and lifecycle, helped inform a vision where RPA could be tapped into to introduce process improvements in those cultural heritage organizations.

Currently, RPA technology is predominantly used to manage business processes and facilitate customer service in many sectors such as finance, accounting, insurance, banking, and human resources. However, adoption of RPA and other cognitive technology is not prevalent in the cultural heritage field in general. Therefore, as stated in the introduction, finding established RPA use cases in LAM's has proven to be a challenge. Notwithstanding, the author's informational conversation with staff in the Office of Innovation at the National Archives and Records Administration (NARA) was promising as will be illustrated in the analysis section of this paper. During the course of the discussion, the author found that National Archives staff were in the very early stages of consideration to develop a pilot project using RPA.

Considering how RPA has been implemented in other fields, the author believes there will be many benefits and tremendous value of this technology in LAMs and hopefully, this paper will raise awareness and curiosity in cultural heritage institutions enough to start a serious consideration towards the adoption of RPA technology. For example, one of the extremely important steps in digital curation discipline is the preservation of digital content by ensuring that files are migrated to new versions and media are reusable in a newer media format. Above all, come the means and manner with which each of these processes and steps are documented. While we humans are great at creating and designing these processes, we sometimes fail at carrying them out ourselves flawlessly and in a timely fashion. This shortcoming brings to the

forefront the need to overcome it through innovative designs and solutions; one of which is Robotic Process Automation.

Curating, archiving, and preserving digital content for the purpose of making data available to researchers and casual users while maintaining accuracy and relevancy of the data is key to successful records management. Intrigued by how RPA is being used by businesses to improve data reporting and maintain its accuracy and integrity, while keeping up with the tediousness of repetitive tasks, the author directed the questions for the purpose of this research to revolve around the topic of how RPA could produce the same outcome in archival practices in LAMs. So, this research aims to address the following main question and two sub questions:

What are the foreseeable uses and challenges that RPA would facilitate and overcome in museums and archives?

a) Where is RPA used and how it has made a difference?

b) How has RPA changed the workplace in industries where it has been implemented and how by extension could this be mapped to processes in museums and archives?

Literature Review

The use of the word “robotic” in virtually every context conjure up images of a mechanical robot built by engineers in their laboratories to perform certain human-like functions on command. Considering the emerging usage of RPA, this research paper will clarify, among other things, that the term *Robotic* in RPA has no similarities to the mechanical robot as described above. Specifically, “Robotic” in RPA is loosely used and refers to a computer software that is trained to operate as a digital worker by performing digital tasks that are rule based, structured, and repetitive. In that respect, the RPA process earned the moniker, robotic.

The literature review shall inform how RPA works, what type of tasks are best suited for RPA, and where best expanded usage of RPA through integration with other cognitive technologies can be determined. Another component of the analysis for this paper, was to highlight benefits of RPA especially where the hybrid workplace gains popularity as the new norm after the onset of the pandemic and the retreat to homes as the alternate and viable working place. In a recent forecast, Gartner, Inc. (2020) noted that demand for RPA software will continue to increase year after year especially during the pandemic as businesses explore new ways to adapt and transform their business models.

What is Robotic Process Automation

RPA is an emerging technology that is gaining popularity in different industries such as banking, financial institutions, manufacturing, insurance, and wherever else data is produced, used, and presented to process invoices, reconcile accounts, audit reports, and administer employee's data for HR purposes. RPA is a software used to program a digital worker--sometimes called "bot" --to perform rule-based and repetitive tasks. In essence, actions by this digital worker mirrors those of humans who interact with different applications to perform tasks or execute processes.

To explain RPA by way of an example, one popular application of this technology would be when there is a need to access a database, create a report or query to produce data in a legible manner and present it to stakeholders. In many instances, performing these tasks will require more than one employee: one with database management skills; another person with the knowledge of data query tools to pull the raw data but who does not necessarily understand the data; and yet another person who understands the raw data and will analyze it, populate results,

and present a final product to stakeholders and decision makers in usable and meaningful formats be it charts, maps, graphs, or tables. RPA can in effect do the work of the technician and data design component by mimicking keystrokes to interact with different systems and retrieve the data, populate results, and present the findings to decision makers.

The RPA digital worker or bot can perform tasks unattended or attended. Unattended RPA tasks or processes can be programmed in their entirety to be performed by the bot without human interference. For example, unattended RPA could key information from a spreadsheet into different applications (Leibowitz & Kakhandiki, 2018). On the other hand, an attended RPA requires the bot to perform only that part of the process that is rule-based and repetitive. Thus, requiring human involvement to complete the defined task. A common example of attended RPA is in customer service call centers where the bot retrieves customer information from one application and populates it in another, freeing the employee to focus on solving the customer's problem and spending less time keying repetitive information such as name and address (Leibowitz and Kakhandiki, 2018).

How Does Robotic Process Automation Work?

An RPA bot works virtually in the background at the user interface level essentially replicating actions normally performed by humans such as logging into applications, executing keystrokes and mouse clicks. Boulton (2019) put it simply, "RPA is governed by set business logic and structured inputs" (para. 2). Examples of tasks performed by RPA bots are running queries, producing reports, comparing data, entering, and retrieving data.

Unlike traditional automation, RPA programing does not require system changes or specialty knowledge of coding, thus making it attractive to process owners as a tool that is easier

to implement. In *The Ultimate Guide to RPA*, Linda Tucci (2012) explained that "RPA systems typically develop the action list simply by recording the user's actions as they perform a task in an application's graphical user interface (GUI)" (para. 13).

Benefits of Robotic Process Automation

Appendix A provides a snapshot of RPA's key benefits compiled by Radke, Dang, & Tan (2020) from various studies. Among the many benefits usually reported by users of RPA, accuracy and efficiency are the most common. Generally speaking, iterative processes, and sometimes repetitive tasks, are subject to human error, particularly when a task is carried out by one particular worker. Over time and with familiarity, complacency, or total self-assuredness sets in leading to errors and inaccuracies. Since data integrity and accuracy are key, RPA could, to a large extent, eliminate those inaccuracies resulting from human error. As we are aware, human boredom or inattention could cause data entry errors which the bot would not be subjected to. Boredom would not impact the engine operating the nature of the repetitive tasks perfected by a set of strokes designed to produce the same results. The RPA bot will surely produce repeatedly and accurately so long as it was properly programmed the first time.

Employee productivity is a term commonly used in industry as a measure of efficiency or the amount of output produced. Such a broad, but commonly used measure of productivity may easily be defined in some industries where the product is a physical widget expected to be produced hourly or daily. However, in industries where data management reigns, the measure of productivity maybe less well defined. For example, in data management, the products such as reports, or statistical assessments dominate the output measure, and the effective implementation of RPA could have a significant bearing on how employee productivity is assessed.

For example, producing a report can vary from one employee to another when manual interaction for data retrieval is required to prepare a report or provide data for further analysis. Whereas, when RPA is provided the appropriate retrieval keystrokes that can be repeated in the data retrieval process without further human interaction, consistent results are produced within exact time frame repeatedly. Therefore, with the use of RPA, one would have the same results within the same period of time eliminating any guesswork to the productivity measures. Taking it a step further, freeing employees from low-value repetitive tasks to spend more time on high-value or demanding intellectual tasks is another form of enhanced productivity by introducing efficiencies in completing the work.

Another strategic benefit of RPA is the ease of implementation. Technology and technical advancements in an organization often come at a price. In many instances every time there is an overhaul of a system or an upgrade, there is also the fear of loss of older material when formats of earlier versions are upgraded and thus rendered obsolete. However, in the case of RPA no change is required to be made to the infrastructure or the architecture of an existing system. RPA's adaptability lends itself to success in the digital transformation realm without the need to change the infrastructure. Subsequently, developing and implementing RPA projects could take much less effort and time in comparison.

It is difficult to speak of digital transformation without mentioning the hybrid workplace. When the pandemic set in, "work from home" was regarded with skepticism. Although somewhat widely used for certain jobs albeit not in LAMs, it was regarded with suspicion by managers and people at higher ranks of organizations. Now after an 18-month period of successful experimentation and implementation of work from home, comes a new phrase dubbed

hybrid workplace. This has the potential to become the standard rather than the exception, and as such, technologies such as RPA will gain more popularity and usability as a solution for repetitive tasks involving the accurate storage and retrieval of data.

Hybrid workplace seems to be, at this point of our recovery from the pandemic, the digital workplace of the future. Studies are still underway to determine what it would actually look like. But what is abundantly clear is that hybrid workplace is more than providing workers with technical tools such as computers and internet connections or facilitating remote video teleconferencing for instance. While it is still in the design phase as many industries grapple with this new concept, a seismic shift is to be expected in the workplace. A hybrid workplace is more than one online connection to office tools and software. This is one area where process owners would team with the designer of the hybrid workplace to identify tasks that can be relegated to the RPA bot who works virtually behind the scenes and round the clock on tasks that normally require employees to be onsite to execute.

In summary, it is envisioned that RPA has the potential to become what personal computers are today where each employee could be empowered with an RPA bot as an assistant to program and facilitate particular jobs (Shrikanth, 2019). In this context, with every step of change in technology comes new opportunities to streamline processes and activities to make sure steps in the digital curation lifecycle are met in a timely fashion.

Robotic Process Automation Drawbacks and Outlook

One of the technical limitations of the RPA bot is the lack of cognitive capabilities to make decisions on its own. Therefore, it cannot handle unstructured data or exceptions that are part of a task or process. RPA software developers are turning these limitations into

opportunities for the next generation of RPA software by integrating RPA with other cognitive technologies such as Machine Learning or Artificial Intelligence. In practice, RPA has the potential to transition from a standalone bot to one that is part of a holistic automation strategy.

It would be shortsighted to talk of automation and tasks handled by bots without acknowledging that some jobs might become redundant. Although that may very well be a first conclusion, implementing RPA in LAMs could compensate for limited financial and human resources and augment the workforce in a meaningful and practical way. Also, stepping outside the guardrails of the thesis of this paper, it is worth noting that some research on the future of work projects that emerging technologies in robotics and automation could create jobs, and more importantly, equitable opportunities for people with disabilities to enter the workforce and perform tasks that otherwise would not have been possible (Maffeo, 2017).

Analysis

Robotic Process Automation in Private and Public Sectors

Undeterred by COVID-19 pandemic or perhaps because of it, adoption of RPA software as a tool for automation is on the rise. Titans of the technology industry envisage exponential growth in the RPA market. Gartner Inc. (2020) forecasted that almost all large organizations globally will have incorporated RPA in their processes by 2022 as they look to adapt their business strategies and accommodate post-pandemic workforce model.

This expansion of RPA adoption is not limited to the private sector. In an effort to modernize legacy and bureaucratic processes, many government agencies both in the US and abroad are promoting the use of RPA as an innovative solution to achieve full or partial

automation. The main driver is low cost of programming and immediate realization of impact compared to traditional capital IT projects.

In 2020 the Federal RPA Community of Practice published an inventory of over 300 RPA use cases that have been spearheaded by a dozen US government agencies in the previous two years. The author presents a summary of that report in Table 1 which illustrates the use of RPA by US government agencies across key business functions. These 319 use cases have been established across many agencies and departments spanning different areas from healthcare to agriculture, to defense. (See Table 1)

Table 1

319 RPA Use Cases in the US Government

Agency	Acquisition	Admin Services	Clinical Care	Finance	Human Resources	IT	Inspector General	Mission Assurance	Policy	Strategic Communications	Travel	Trouble Ticket Reports	Other
Bureau of Fiscal Service	2	24		13	3						3		
Defense Logistics Agency (DLA)	10			17		36	1						
Department of the Army	1			13									
Forest Service	2												
General Services Administration (GSA)	6	5		36	2			2		1			
Internal Revenue Service(IRS)	1												
National Aeronautics and Space Administration (NASA)	18	4		21	5								3
Office of the Secretary of Defense	4			25									
US Department of Agriculture	1			11								6	
Department of the Navy				8		1	2		2		1		
Department of Veterans Affairs			1										
Department of the Air Force				2		3	5				3		
Food and Drug Administration				2									
Office of Information and Resource Management				9									
Center for Medicare and Medicate Services					1								
National Institutes of Health (NIH)					2								
Defense Finance and Accounting Service						1							
Use Case Totals by Function	**45**	**33**	**1**	**157**	**13**	**41**	**8**	**2**	**2**	**1**	**7**	**6**	**3**

Note. Raw Data is from RPA Use Case Inventory Published November 1, 2020, by Federal RPA Community of Practice. https://digital.gov/guides/rpa/rpa-use-case-inventory/

In their paper about RPA in the public sector, Rehr and Munteanu (2021) mentioned several examples of RPA projects by governments around the globe. One of the examples was at a government agency in the United Kingdom where RPA bots cleared "over 30,000 claims in two weeks with a calculated return on investment of 15 to 1" (p.19), and a second example at the Health Services Executive agency in Ireland where RPA bots downloaded COVID-19 lab results reducing human errors, manual work, and saving nurses "…[three] 3 hours per day of administrative work…" to focus on patients' care (p.19).

Robotic Process Automation and Cultural Heritage Institutions

Unlike organizations in the private sector and government agencies, RPA has not gained traction among cultural heritage institutions given the novelty of the technology. However, the future looks promising as awareness of RPA technology increases and prominent institutions within the cultural heritage field lead the way in identifying use cases for RPA implementation. In 2020 the National Archives and Records Administration (NARA) published a white paper on cognitive technologies highlighting the functionalities and potential application of the Internet of Things, Robotic Process Automation, Machine Learning, and Artificial Intelligence to manage records. The author had an informational conversation with Mr. James Mischke, IT Specialist at NARA's Office of Innovation, about potential use of cognitive technology to automate certain functions. Mr. Mischke shared that NARA is in the initial stages to roll out two separate pilot projects in Spring 2022 involving Robotic Process Automation, and Artificial Intelligence (J. Mischke, personal communication, October 22, 2021).

The Robotic Process Automation pilot is for the National Archives at St. Louis, Missouri. Among the holdings maintained at this location are permanent records of Official Military Personnel Files, Selective Service Records, Official Personnel Folders, and Deceased Veteran's

Claim Files (National Archives at St. Louis, n.d.). Additionally, the National Archives at St. Louis houses the Centralized Military Records System (CMRS) and receives approximately 5000 requests daily for records in the center's vast holdings. Due to the COVID-19 social distancing restrictions and other protocols, only a limited number of staff may be on premises to fulfill incoming requests. As such, the National Archives at St. Louis is experiencing a major backlog in processing an exponential number of unfulfilled requests for official records. The pilot project envisions an RPA bot to help resolve this backlog by scanning incoming email requests and routing the emails to the relevant area to be fulfilled. Since an RPA bot can work unattended in this case, it can fully perform the task round the clock.

The other pilot project NARA is developing involves the use of Artificial Intelligence (AI) to describe digital images and enhance the functionality of their online catalog. The National Archives catalog which represents only a small fraction of all of the Archives' records, which counts in millions of records, provides less than optimal search results for users, partly due to limited descriptive metadata of the existing records. The goal of this initiative is to use AI to self-describe records that are images to a point that it is intended to improve the search function and discoverability in the catalog. With AI doing the initial description and populating required metadata, archivists have more time to add useful metadata to enhance the description of the image to improve search results and allow users to easily sort and narrow such results.

Implementation of Robotic Process Automation

While RPA implementation includes a technical component and involves an IT oversight, it is considered a business project rather than an IT one. RPA is part of an organization's business strategy whereby efficiencies in executing repetitive and rule-based tasks are

introduced. Therefore, RPA projects are expected to be spearheaded by the units in charge of the processes and not the IT department. Such endeavors require organizations to map their processes and to deconstruct them into tasks to make informed decisions about which tasks are suitable for automation. In other words, it is the business process experts who identify which processes or parts of processes are best suited for RPA in the execution of the project. Notwithstanding, identifying tasks or processes that would be ideal candidates for an RPA project is a challenging endeavor especially as a pioneer. In addition to rule-based and repetitive tasks, Syed et al. (2019) lists several characteristics of tasks suited for RPA which include “high volume”, “have been in place for a while”, “highly manual”, “transactional”, “well-documented”, and “interacts with many systems” (p.5). Appendix B provides a list of questions aimed to help an organization evaluate RPA viability by identifying which and how much of a process could be automated (Anagnoste, 2018).

Furthermore, RPA software and tools are intentionally intuitive in order to allow business units to program and implement identified elements in the core of their work. So, it is important to note that RPA tools do not require changes to IT systems or infrastructure already in place in the organization. Therefore, the author believes at the heart of implementing RPA in the workplace is managing change in an organization’s culture, identifying strategic opportunities for innovation, and managing human resources by shifting their attention to high-value tasks or reskilling them to handle other responsibilities.

In other words, an RPA project is a business and workforce management initiative. It is driven by process owners who understand the intricacies of the job and who are in a position to identify how the task could improve with automation. Process experts or process owners first

examine and outline a process, determining whether to automate or not to automate, and then the business analysts and liaison experts contribute by determining which RPA vendor tool is best designed to meet the tasks at hand. In essence, leadership and process owners have to agree and be aligned in their strategies to implement RPA. There has to be a mutual interest. Otherwise, there may be a lot of hurdles that process owners have to overcome in order to avoid a failed attempt at such a project.

Trends and Future Research

Businesses are always reevaluating how they work and deliver their services to gain efficiencies in productivity and reduce operational and administrative costs. The pandemic has accelerated this practice and introduced new dimensions forcing businesses to question old assumptions and established norms. As the hybrid model is under study and experimentation, workers need to be placed at the center of this new design. Beyond connectivity, there should be an element of producing what is needed when it is needed and more importantly how it is needed. Determining those elements will create a successful hybrid workplace. The “how” will help us determine RPA usage and how the bots will be employed within a workplace particularly to fulfill requirements on daily or otherwise regular basis.

A pandemic that abruptly changed how organizations conducted work almost overnight, has ultimately led to a new and in-depth look at the work regardless of location, or even time zone. What started as a temporary situation has become a way of life after a period of 18 months and counting. A recent article in McKinsey Insights, highlighted the importance of reskilling and upskilling employees to adapt to modified post-pandemic business models (Agrawal et al., 2020). One of the steps the article suggested in executing a reskilling strategy is to “Start now,

test rapidly, and iterate" noting "that simply getting started on reskilling programs makes organizations better prepared for potential future role disruption—and is preferable to waiting" (Agrawal et al., 2020, para. 32). Furthermore, research shows that expenses associated with new hires, in general, are more than double the cost of training, upskilling, or reskilling existing employees (Bodem-Schrötgens et al., 2021). Therefore, investing in the reskilling and/or upskilling of employees in high demand areas who might be affected by emerging technology is a worthwhile investment.

Considering the speed by which technology changes, the author found this information particularly useful to illustrate that RPA has an extended shelf life beyond that of a typical technical novelty, and therefore, it is worthwhile for LAMs to investigate its application in their business processes. For example, RPA could be implemented as a standalone bot, or it could be combined with other cognitive technologies such as Machine Learning or Artificial Intelligence to automate more complex processes. Pritchard (2021) noted that RPA could be implemented alongside machine learning and artificial intelligence to handle unstructured data and exceptions in the process. Along the theme of data management, Foote (2021) highlighted that "RPA can be used to draw out information from [Optical Character Recognition] OCR documents, which can then be used to create metadata, or reduce content for big data research or machine learning processes" (para. 14). Moreover, RPA has a longevity in that it is easily compatible with old, current, and new programs from which it may wish or need to draw data.

The use of cognitive technology in general, and RPA in particular in LAMs is at its infancy. At a foundational level, more research is needed to identify specific tasks in LAMs that could be automated by RPA. A wider scale of adoption and implementation of RPA in various

areas in LAMs is necessary in order to provide enough data to analyze the impact of RPA in terms of productivity, adaptability, and ultimate efficiency. To build upon such findings, more research is needed to identify the benefits and Return on Investment (ROI) for the use of RPA in LAMs. This expanded base of use will help LAMs make informed determination of the efficacy of RPA in their field.

Conclusion

Several industries have adopted one form of RPA implementation or another; thus, we witness RPA is rapidly growing as a major contributor to the digital transformation. As RPA evolves and is integrated with other cognitive technologies such as machine learning and artificial intelligence, it is becoming more popular and established as a mainstream tool geared towards increasing efficiency and accuracy by performing repetitive and rule-based tasks.

One of the main reasons RPA is gaining popularity is the absence of the dreaded need to make changes to IT systems or existing infrastructure. Furthermore, RPA software is easy to operate since it is based on user interface and does not require users to learn code writing, or specific technical knowledge usually reserved to IT experts. Another reason RPA is gaining popularity is its scalability. Depending on the task, RPA software can automate an entire workflow or just part of a particular process as needed.

Furthermore, RPA is an automation technology that complements rather than competes with the workforce at LAMs. Human resources are key assets at LAMs. They are as important as the collections themselves and therefore, LAMs are responsible to free subject matter experts from repetitive and mundane tasks in order to focus on high value tasks which require creativity

and decision making. In other words, LAMs need to find ways to achieve more in a finite amount of time and limited resources. RPA seems to be providing that capability.

Aiming to meet the heightened expectation of visitors and researchers to readily have access to collections and/or information about collections, LAMs would benefit from reviewing workflows and processes to identify strategic opportunities for innovation, perhaps replacing some of the repetitive tasks through the implementation of RPA software. In parallel, LAMs could manage their human resources by adapting roles post COVID-19 and reskilling employees to handle other responsibilities. Therefore, maximizing the potential of their workforce while increasing efficiencies in the workplace.

References

Agrawal, S., Smet, A. D., Lacroix, S., & Reich, A. (2020, May 7). To emerge stronger from the COVID-19 crisis, companies should start reskilling their workforces now. *McKinsey Insights*, N.PAG. Retrieved from https://web.p.ebscohost.com/ehost/detail/detail?vid=2&sid=9e73fa3a-8a57-40fc-8c18-21a8b001c5cc%40redis&bdata=JkF1dGhUeXBlPWlwLHNoaWImc2l0ZT1laG9zdC1saXZlJnNjb3BlPXNpdGU%3d#AN=143117540&db=bsu

Anagnoste, S. (2018, June 14). Robotic Automation Process – The operating system for the digital enterprise. *Proceedings of the International Conference on Business Excellence*, 12(1) pp. 54-69. Retrieved from https://www.sciendo.com/article/10.2478/picbe-2018-0007

Bodem-Schrötgens, J., Reich, A., Schaninger, B., & Sharma, K. (2021). Three keys to building a more skilled post pandemic workforce. *McKinsey Quarterly*, 3, 1-5. Retrieved from https://web.s.ebscohost.com/ehost/detail/detail?vid=3&sid=74ad542c-b883-4ff3-a2eb-dce0702af5bb%40redis&bdata=JkF1dGhUeXBlPWlwLHNoaWImc2l0ZT1laG9zdC1saXZlJnNjb3BlPXNpdGU%3d#AN=152455484&db=bsu

Boulton, C. (2019). RPA is Poised for a Big Business Break-out. *CIO*. Retrieved from https://www.cio.com/article/228818/rpa-is-poised-for-a-big-business-break-out.html

Federal RPA Community of Practice (2020, November 1). RPA Use Case Inventory. GSA Digital.gov. Retrieved from https://digital.gov/pdf/federal-rpa-use-case-inventory-compliant.pdf

Foote, K. (2021, March 23). *Fundamentals of Robotic Automation and Data Management*. Dataversity. Retrieved from https://www.dataversity.net/fundamentals-of-robotic-process-automation-and-data-management/

Gartner, Inc. (2020, September 21). *Gartner Says Worldwide Robotic Process Automation Software Revenue to Reach Nearly $2 Billion in 2021* [Press release]. Retrieved from https://www.gartner.com/en/newsroom/press-releases/2020-09-21-gartner-says-worldwide-robotic-process-automation-software-revenue-to-reach-nearly-2-billion-in-2021

Leibowitz, S., & Kakhandiki, A. (2018, November 19). What is the difference between "attended" and "unattended" RPA bots? IBM [Blog post]. Retrieved from https://www.ibm.com/blogs/cloud-computing/2018/11/19/attended-unattended-rpa-bots/

Maffeo, L. (2017, January 12). Emerging Technologies Will Achieve Employment Equity for People with Disabilities. Diplomatic Courier. Retrieved from https://www.diplomaticourier.com/posts/emerging-technologies-will-achieve-employment-equity-people-disabilities

National Archives and Records Administration. (2020, October 19). Cognitive Technologies White Paper: Records management Implications for Internet of Things, Robotic Process Automation, Machine Learning, and Artificial Intelligence. Retrieved from https://www.archives.gov/files/records-mgmt/policy/nara-cognitive-technologies-whitepaper.pdf

National Archives at St. Louis. (n.d.). *Home page*. Retrieved from https://www.archives.gov/st-louis

Pritchard, S. (2021, April 12). How RPA is Getting Smarter as it Evolves: Robotic process automation is evolving, adding artificial intelligence layers that render it more resilient and agile. *Computer Weekly,* 13-17. Retrieved from https://web.a.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=23&sid=66fb03fb-143f-4b94-8df6-995d664f0a75%40sdc-v-sessmgr03

Radke, A.M., Dang, M.T., & Tan, A. (2020). Using Robotic Process Automation (RPA) to Enhance Item Master Data Maintenance Process. *LogForum*, 16(1), 129-140. Retrieved from https://www.logforum.net/pdf/16_1_10_20.pdf

Rehr, D. & Munteanu, D. (2021, June 22). The Promise of Robotic Process Automation for the Public Sector. George Mason University, School of Policy and Government. Retrieved from https://cbce.gmu.edu/wp-content/uploads/2021/06/The-Promise-of-RPA-For-The-Public-Sector.pdf

Shrikanth, G. (2019, June). A Robot for Every Employee: Robotic Process Automation or RPA, will radically change the workplaces of the future. *Dataquest*, *37*(6), 18–19. Retrieved from https://web.p.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=16&sid=e0a9df39-ec41-4bba-aaa2-0f2456e694d2%40redis

Syed, R., Suriadi, S., Adams, M., Bandara, W., Leemans, S. J. J., Ouyang, C., ter Hofstede, A. H. M., van de Weerd, I., Wynn, M. T., & Reijers, H. A. (2019, December 19). Robotic Process Automation: Contemporary themes and challenges. *Computers in Industry*. Retrieved from https://www.sciencedirect.com/science/article/abs/pii/S0166361519304609

Tucci, L. (2021, May 17). Ultimate Guide to RPA (robotic process automation). TechTarget. Retrieved from https://searchcio.techtarget.com/Ultimate-guide-to-RPA-robotic-process-automation

Annotated Bibliography

Anagnoste, S. (2018, June 14). Robotic Automation Process – The operating system for the digital enterprise. *Proceedings of the International Conference on Business Excellence*, 12(1) pp. 54-69. Retrieved from https://www.sciendo.com/article/10.2478/picbe-2018-0007

The article highlights potential business types and tasks that could benefit from partial or full automation using RPA namely banking, finance, insurance, healthcare, manufacturing, and energy. The article includes a very useful list of questions designed to determine if a process has potential for automation. The article provides details about two case studies involving RPA. One is about the use of RPA and chatbots to handle administrative tasks such as responding to predefined or repetitive questions. The other case studies were about RPA and Intelligent OCR to process claims and invoices.

Federal RPA Community of Practice. (n.d.). Retrieved from https://digital.gov/communities/rpa/

This Community of Practice is comprised of many US government agencies. The website includes RPA Guidelines, RPA Playbook, and Federal Use Cases Inventory which provide some insight into the application of RPA. The RPA Playbook has a wealth of information about RPA's definition, value, program development, and implementation. In addition, it covers security and privacy policies related to RPA initiatives.

Foote, K. (2021, March 23). *Fundamentals of Robotic Automation and Data Management*. Dataversity. Retrieved from https://www.dataversity.net/fundamentals-of-robotic-process-automation-and-data-management/

This article covers two points that are particularly relevant to the author's paper. It explains the Graphical User Interface (GUI), which RPA uses, highlighting that it is easier to use and does not require programing as is usually the case with text command or other types of interfaces. The article also mentions new emerging possibilities for RPA to manage big data such as those related to normalizing and reducing data for research, and even creating metadata. Such processes are commonly pursued in many fields and organizations including museums and archives. Thus, steering these entities to potential use of RPA in LAMs.

National Archives and Records Administration. (2020, October 19). Cognitive Technologies White Paper: Records management Implications for Internet of Things, Robotic Process Automation, Machine Learning, and Artificial Intelligence. Retrieved from https://www.archives.gov/files/records-mgmt/policy/nara-cognitive-technologies-whitepaper.pdf

This white paper on cognitive technologies highlights the functionalities and potential application of the Internet of Things, Robotic Process Automation, Machine Learning, and Artificial Intelligence to manage records. The paper points out that RPA is suited for structured input and output such as scanning and routing email requests to the reference desk. Also, RPA could be combined with optical character recognition technology to identify, capture, and key data into a structured format.

Pritchard, S. (2021, April 12). How RPA is Getting Smarter as it Evolves: Robotic process automation is evolving, adding artificial intelligence layers that render it more resilient and agile. *Computer Weekly*, 13-17. Retrieved from

https://web.a.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=23&sid=66fb03fb-143f-4b94-8df6-995d664f0a75%40sdc-v-sessmgr03

This article which was published recently in *Computer Weekly* provides a general overview about Robotic Process Automation. It highlights the historical evolution of RPA and its primary use and function. Additionally, the author explains the limitations of RPA especially its lack of decision-making capability. To overcome such limitation and expand RPA's usage, the author points out to new technical developments that would potentially integrate RPA and Artificial Intelligence (AI) for seamless solutions. The article provides information about RPA to both technical and non-technical professionals. Thus, catering to a wide range of audiences. It is useful as background information especially considering the novelty of RPA.

Radke, A.M., Dang, M.T., & Tan, A. (2020). Using Robotic Process Automation (RPA) to Enhance Item Master Data Maintenance Process. *LogForum*, 16(1), 129-140. Retrieved from https://www.logforum.net/pdf/16_1_10_20.pdf

Based on literature reviews, semi-constructed interviews, and two case studies, the authors in this article concluded that Robotic Process Automation (RPA) is beneficial for manufacturing companies to manage their master data. The authors highlighted some of the challenges associated with managing master data in manufacturing companies namely being stored in different systems which require manual transfer creating inefficiencies in the workflow and affecting the timeliness and accuracy of the data. The article cited other studies that illustrated the benefits of RPA as far as efficiency, productivity, and data accuracy is concerned. Based on their findings from the two case studies, the authors

recommended an RPA implementation plan. While the article does not address specifically the needs and application of RPA at LAMs, it does provide a good and general background to the application and benefits of RPA.

Rehr, D. & Munteanu, D. (2021, June 22). The Promise of Robotic Process Automation for the Public Sector. George Mason University, School of Policy and Government. Retrieved from https://cbce.gmu.edu/wp-content/uploads/2021/06/The-Promise-of-RPA-For-The-Public-Sector.pdf

This paper highlights the increased use of RPA in the public sector to capitalize on both the strength of the bot and the employee. It provides a brief summary of benefits or RPA and lists most common applications of RPA in government agencies including data collection and processing, document management, identity verification, and call center support.

Syed, R., Suriadi, S., Adams, M., Bandara, W., Leemans, S. J. J., Ouyang, C., ter Hofstede, A. H. M., van de Weerd, I., Wynn, M. T., & Reijers, H. A. (2019, December 19). Robotic Process Automation: Contemporary themes and challenges. *Computers in Industry*. Retrieved from https://www.sciencedirect.com/science/article/abs/pii/S0166361519304609

The authors from Queensland University of Technology in Australia, and Utrecht University in The Netherlands reviewed 125 papers about RPA's emerging technology and distilled their findings in this article which include RPA's benefits, capabilities, and challenges. Among the benefits listed are efficiency, accuracy, and compliance. Some of the capabilities mentioned include consistent performance by RPA and the ease by which

the workload can be scaled. One of the main challenges noted is that organizations struggle to identify opportunities to deploy RPA and maintain a pipeline of RPA projects.

Tucci, L. (2021, May 17). Ultimate Guide to RPA (robotic process automation). TechTarget. Retrieved from https://searchcio.techtarget.com/Ultimate-guide-to-RPA-robotic-process-automation

This guide is written with the business decision-maker in mind and in particular one who is curious about learning the nuts and bolts of RPA technology, its benefits, and which companies/ industries are using it. It also covers risks pertaining to RPA projects and how to avoid common mistakes which could lead to implementation failure. Additionally, the author provides throughout the guide links to additional information about particular areas for the reader to further explore such as a list of what to look for when shopping for RPA software.

Appendix A

Snapshot of Robotic Process Automation Key Benefits Compiled by Radke, Dang, & Tan (2020)

Table 1. Key benefits of RPA

No.	Studies	Processing times reduction	Productivity increase	Compliance levels improvement	Data accuracy improvement/ Human errors reduction	Cost reduction
1	Anagnoste 2018	✔	✔	✔	✔	
2	Bloem et al. 2014	✔	✔	✔		
3	Friedman 2006			✔		
4	Fung 2014	✔	✔	✔	✔	✔
5	Institute for Robotic Process Automation 2015	✔	✔	✔	✔	✔
6	Wald 2017	✔	✔		✔	✔
7	Kedziora & Kiviranta 2018	✔	✔		✔	✔
8	Lacity & Willcocks 2016	✔	✔	✔	✔	
9	Fersht & Slaby 2012	✔	✔	✔		✔
10	Fersht & Snowdon 2018	✔	✔	✔		✔
11	Rajesh, Ramesh & Rao 2018	✔	✔	✔	✔	
12	Sibalija, Jovanović & Đurić 2019	✔	✔	✔	✔	✔
13	Willcocks, Lacity & Craig 2015A	✔	✔	✔	✔	✔
14	Willcocks, Lacity & Craig 2015B	✔	✔	✔	✔	✔
15	Willcocks, Lacity & Craig 2017	✔	✔			
16	Zhang & Liu 2019	✔	✔			

Source: extracted from various literature

Radke, A.M., Dang, M.T., & Tan, A. (2020). Using Robotic Process Automation (RPA) to Enhance Item Master Data Maintenance Process. *LogForum*, 16(1), 129-140. Retrieved from https://www.logforum.net/pdf/16_1_10_20.pdf

Appendix B

Questions to Evaluate Robotic Process Viability
Compiled by Anagnoste (2018)

Table 2. Typically asked questions for assessing the automation potential

Criteria	Question
Digital data availability	What percent of data are available in digital format?
Data source quality	Where are the major source of data quality errors?
Effort to execute	How many FTEs are required to execute the process/task? How many different individuals are involved?
Time to execute	What is the average time required to execute the process/task? How much of that time is spent "waiting" on information, system processing, etc.?
Average FTE cost	What is the average cost of FTEs executing the process?
Data protection prevents offshoring	Are any processes prevented from being offshored due to regulatory constraints?
Ownership of process	Who is accountable for the end to end process?
Existing process automation	What level of automation currently exists? How many systems, applications (including Access dBs, Excel spreadsheets/workbooks, OCR, etc.) are used in the process? What percent of the process is performed manually vs. automated?
Interaction channel	How do you communicate with your customers and how do they communicate with you?
Process complexity	How complex are the processes being performed, and do they require a lot of specialist knowledge? Are subjective decisions made by specialists or are decisions based on pre-defined rules?
Workload volume and growth	What is the current transaction volume? How fast is the workload growth in terms of year on year transactions growth?
System change	How frequently are the development cycle/system updates/bug fixes/new releases of the core systems/applications used in the process?
Change portfolio	Are there any major transformation programs taking place in your area?

Anagnoste, S. (2018, June 14). Robotic Automation Process – The operating system for the digital enterprise. *Proceedings of the International Conference on Business Excellence*, 12(1) pp. 54-69. Retrieved from https://www.sciendo.com/article/10.2478/picbe-2018-0007