The Cost of Inaction: A New Model and Application for Quantifying the Financial and Intellectual Implications of Decisions Regarding Digitization of Physical Audiovisual Media Holdings

by chris lacinak
president
avpreserve

AVPreserve | Media Archiving & Data Management Consultants
350 7th Avenue, Suite 1605 | New York, New York | 10001
917.475.9630 | www.avpreserve.com | info@avpreserve.com

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Introduction

The paragraphs that follow tell the story of Anon University, a hypothetical university representing a conglomeration of organizations with holdings of legacy physical audiovisual media. This is done in order to provide a realistic look into a universal conundrum that poses a serious threat to the future value derived from content stored on physical audiovisual legacy media. While the subject of this story is a university, this conundrum is not specific to academic institutions. It manifests in organizations of all types and sizes, including government institutions, corporations, non-profits, museums, media companies, and more. Some of the arguments and positioning differ based on organization size and type, but the core concepts and calculations are the same.

Setting the Stage

The Archives and Special Collections within Anon University (ASCAU) estimate that they hold about 100,000 rare or unique audio and video items which would be deemed preservation-worthy but that have not yet been digitized. Less than 3% of their total AV holdings have been digitized to date. ASCAU's non-digitized holdings are effectively inaccessible in any meaningful way because they are largely undescribed and unplayable in their current state. Their backlog of unprocessed materials represent approximately 50% of the total holdings. For these materials there is minimal, collection-level description and most of them do not contain inventories. For the 50% of processed AV collections there is no item level description. Adding to the backlog, acquisitions far outpace the rate of preservation and the budget for acquisitions is larger than the budget for preservation.

As this type of scenario commonly plays out, there are few requests for access to materials because there is very little information that is discoverable about audiovisual content in the holdings. When requests do come in, each one becomes an immediate preservation project that jumps the prioritization queue, because in almost all cases they are unable to fulfill a request without digitizing materials. There is no ability to play back most of the materials and it is against policy to play back original recordings for access even in cases where they do have the equipment and expertise.

The backlogs and limited description leave the employees of ASCAU to depend on varying levels of descriptive annotations (with varying levels of dependability) scribbled on boxes and labels to discern whether or not a particular item is likely enough to be the subject of the patron's request to deem it worthy of using a portion of the small on-demand digitization budget reserved for such purposes. Once this decision is made it could take weeks to receive the access copy. It is not until this point, when the content is actually accessible, that the patron is able to establish whether or not it is indeed related to what they were searching for. While it is easy to bemoan the expectations of a culture that demands instant access and expects everything to be online, it is also the case that the scenario described here would not be deemed as effective or meaningful access by most people. Additionally, access requests are the number one driver of digitization, but the lack of discoverability in the collections means there are far fewer requests for access to materials than are expected.

When such requests for access are received, the materials generally must be outsourced to a digitization vendor unless the formats meet the capabilities of the Library's services. In-house, there is a small digitization facility for audiocassettes and VHS tapes within the Preservation Department at the Anon University Library but there is no permanent staff for digitization, and finding the expertise and funding to do training with graduate students on a regular basis is challenging as well as being a high cost due to inefficiency from frequent turnover and re-training.

There is no programmatic ongoing digitization effort. Most digitization has been funded through grants, although these tend to be focused on access-centric projects such as online exhibitions where only a small portion of the budgets go to digitization.

A Shift

In 2013, List-Serv messages, blog posts, and conference presentations began to catch the eye of multiple stakeholders in the Archives and Preservation Departments. The initial post was from Richard Wright on the Association of Moving Image Archivists (AMIA) List-Serv in which he stated:

> *"For video the problem is even sharper: complete disappearance of an (affordable) ability to transfer."*[1]

The thought of this possibility caused great alarm, and they searched for additional information to support his claim. They found on the Presto Centre blog a couple of additional statements from Wright on the topic:

> *"75% of the analogue video held in Europe in 2006 will be lost by 2023 when video digitisation will simply have "ceased to be."*[2]

> *"So that's it: going, going, gone for analogue by 2023"*[3]

This spawned further research where they discovered the following statements:

- The IASA Task Force to Establish Selection Criteria from 2003 reported, "in the mid- to long-term there is a major risk that carrier degradation combined with playback obsolescence will defeat the efforts of archivists." A decade had passed, making them concerned about where they were on the timeline[4].
- The United States' National Recording Preservation Board report on "Capturing Analog Sound for Digital Preservation" from 2006 reported "it is alarming to realize that nearly all recorded sound is in peril of disappearing or becoming inaccessible within a few generations."[5]

1. Wright, Richard. <preservation.guide@GMAIL.COM> "Re: Storing 16mm Full-Coat Mag." 17 February 2013. <amia-l@lsv.uky.edu> (31 May 2014).
2. Wright, Richard. PrestoCentre Answers: "Digital master archive format" 5 February 2013. <https://www.prestocentre.org/answers/tv-radio-and-new-media-broadcasting/digital-master-archive-format> (31 May 2014).
3. Wright, Richard. (2013). "Going, Going, Gone: prospects for analogue audiovisual content." PrestoCentre Blog. <https://www.prestocentre.org/blog/going-going-gone-prospects-analogue-audiovisual-content> (31 May 2014).
4. "International Association of Sound and Audiovisual Archives Task Force to establish Selection Criteria." (2003) Introduction. <http://www.iasa-web.org/task-force/2-introduction> (31 May 2014).
5. "Capturing Analog Sound for Digital Preservation: Report of a Roundtable Discussion of Best Practices for Transferring Analog Discs and Tapes." (2006), v. <http://www.clir.org/pubs/reports/pub137/pub137.pdf> (31 May 2014).

- The United States' National Recording Preservation Plan Sound Study published in late 2012 reported that "many analog audio recordings must be digitized within the next 15 to 20 years—before sound carrier degradation and the challenges of acquiring and maintaining playback equipment make the success of these efforts too expensive or unattainable." They also noted that while this was published in late 2012, it was years in the making going back to 2009, leaving them wondering whether 15–20 years was more like 10–15 years now[6].

Prompted by their growing concern they looked to organizations such as the International Association of Audiovisual Archivists (IASA), the Association for Recorded Sound Collections (ARSC), and the Association of Moving Image Archivists (AMIA) to confer with colleagues. Among experts they found consensus around the prediction that between now and some time between 2023 and 2028 analog materials would become inaccessible.

With their newfound knowledge they formed a Working Group within the University, pulling together stakeholders including archivists, preservation experts, researchers, faculty, and IT to focus on the issues surrounding preservation and access of the AV holdings.

Invigorated, they prepared a bold statement for the upper administration laying out the information about the estimated size of their holdings and the timeline in which they have to act. They also took the opportunity to express the troubled state of access to their AV holdings, proposing it as a warning of what could become permanent if action was not taken. Their main focus points were:

- The great cultural significance of the collections, highlighting particularly valuable content and examples of how it was used in important work.
- The valuable public relations and reputation building stemming from acquisitions and holdings.
- The potential damage to their good reputation by falling short on their obligation to preserve and make accessible their recordings.
- The potential damage suffered to their good reputation if the significant highlighted materials were permanently lost while in their care.
- The potential perception of irresponsibility implied in acquisitions that outpace and demand greater budgets than preservation and access.
- The potential failure to fulfill their mission to provide access to faculty, students, researchers and the public.
- A call to action to identify, prioritize, and digitize the priority materials before 2028.

The upper administration took the statement to heart and charged the Working Group with quantifying the problem and putting together a budget and timeline for getting this work done. The administration provided them with a modest budget in order to conduct a survey of holdings and to report on the findings along with an estimated budget and timeline.

6. "The Library of Congress National Recording Preservation Plan" (2012), <http://www.clir.org/pubs/reports/pub137/pub137.pdf> (31 May 2014).

Feeling the wind at their back, the Working Group got to work and over the course of the next several months conducted a survey of holdings which they used to generate a plan for digitization. Based on their findings they estimated that approximately 65% of the undigitized holdings would ultimately be deemed worthy of digitization and preservation, totaling approximately 63,050 items, made up of 60% audio and 40% video.

Exploring the economics of digitization they discovered that the cost of outsourcing preservation reformatting had decreased approximately 70% on average in the past 5 years. In other words, what would have cost $150 in 2009 costs $45 in 2013. This provided an impetus to outsource a majority of the work, although they also identified that there were certain materials that they would want to digitize in-house. Concerned about keeping the budget as low as possible in order to increase the likelihood of funding, they decided to focus on doing the minimum necessary to ensure the materials were not lost. Items could be cataloged and made accessible in all kinds of ways after 2028, but only if they were digitized prior to that. In order to maintain the option to do anything with the content after 2028 they needed to digitize it. After 2028 there was no option available -- the content would be permanently lost. With this in mind they decided to capture a minimal amount of metadata, focusing on information that they wouldn't be able to capture later as well as any metadata required to be able to responsibly manage the collection of files. They also recognized that they needed to have a reasonably robust centralized digital storage environment. The risk of storing all of the digitized files on unreliable and/or non-centralized storage would be too great.

After a great deal of analysis and planning their total budget estimate to digitize and store everything by 2028 was $9,305,311. This was a sizable number that worried the Working Group, but they found confidence in their strong arguments, solid planning, and well reasoned budgeting. It was also not an unprecedented number for other types of projects considered a University-wide priority, particularly given that the budget was allocated over the course of 15 years. They would also argue that the University's continued acquisition of materials over the coming years would be well served by this same infrastructure.

In addition to delivering the report, the Working Group gave a presentation on their proposed plan to upper administration. Despite what were eye-popping numbers at first glance, they entered the meeting with a good deal of hope based on their previous success in garnering support and great enthusiasm about the importance of the project.

During the presentation the upper administration was outwardly stunned by the dollar amount. Questions were asked about whether or not all of the "priority" materials were truly preservation worthy, and whether or not the Working Group could get the digitization done more cheaply with student labor. The conversation turned to thoughts of monetization and revenue streams, wondering aloud about everything from licensing content as a way to generate revenue to having vendors digitize the content for free in exchange for offering the firm exclusive licensing.

Diplomatically, the Working Group reminded the administration of the complex issues of rights and donor agreements and the challenges that these presented in regard to licensing content. They also raised concerns in a nuanced way about the innate contrast between their mission of providing access and placing the keys to the content solely in the hands of a commercial interest. The administration then turned to thoughts of Anon University being a service provider to other institutions as a way to generate revenue. They asked the Working Group about the feasibility of this, to which the Working Group replied that it was a possibility but that it would

take more staff and an increase in annual throughput in order to get their own work done in addition to doing work for others. The budget would have to go up significantly to accommodate these increases, and they admitted that they felt unsure about it as a strategy for recouping any costs beyond those of acting as a service provider.

Frustrated at the seeming lack of good options, the administration brought the meeting to a close, conveying that the bottom line was that it would be irresponsible of them to expend those funds without a plan for return on investment (ROI). It was a non-starter without a plan for ROI. They asked the Working Group to come up with thoughts on ways to generate revenue and at minimum recoup their investment in the digitization project.

An Impasse

The impasse represented in this scenario is one that has presented itself for decades. Archivists and caretakers of collections have been frustrated by what is perceived as shortsighted thinking; and executives and administrators have been frustrated by a perceived inability to face the economic realities. This disconnect has persisted over time with each "side" digging their heels in further.

As a community, archivists and caretakers have fallen back on arguments centered on potential loss of intellect and culture, as well as damage to reputation and failure to fulfill institutional missions. While executives and administrators care a great deal about these arguments, at the end of the day they are staring at a budget for which they are responsible that does not care for non-quantifiable arguments. In rare cases when compelling arguments based on reputation, mission, and the currency of intellect and culture have fallen on the right ears at the right time, they have translated into currency that will fund initiatives. In most cases these arguments alone are not effective in capturing the understanding and wallets of funders.

There is a critical component that is often overlooked in these exchanges and the thinking that surrounds them. This is the Cost of Inaction, or COI. Let's look at what this looks like in the case of Anon University.

A New Perspective: The Cost of Inaction

At the next Working Group meeting a realization materialized. The Archives and Special Collections at Anon University were established in 1963, 50 years prior to 2013. Their discussions with the administration had treated this effort as if the investments in their holdings would begin with digitization. They had failed to recognize the investment made in these collections going back to 1963.

The Archives and Special Collections were founded with the deposit and acquisition of a large collection, containing approximately 20,000 audiovisual items. Between 1963 and 2013 they acquired 80,000 additional audiovisual items. Since 1963 the University had invested in staff, real estate, construction, utilities, specialized temperature and humidity controls, management, administration, moves, rehousing, equipment, supplies, consulting, acquisitions, and more.

The Working Group decided to estimate the past investment that the University had placed in their physical audiovisual materials. They explored various methods of deriving this number. One method involved allocating a percentage of the operational and capital budgets between 1963 and 2013 to the audiovisual holdings. Another involved estimating an average cost per item per year for each year since the Archive was established. A final involved trying to identify

audiovisual specific expenses, such as specific staff or projects. The first method proved to be the most reasonable and Anon University arrived at a number of approximately $11,000,000 that had been expended on the AV holdings to date since 1963. In addition to the current holdings, the University was acquiring an average of 1600 items per year. At this rate of growth, if the University paid an average of $2 per item per year (factoring in staffing, facilities, collection management, etc. over that time) the total investment on legacy physical audiovisual items between 1963 and 2028 would be approximately $14,500,000.

Based on the consensus that reformatting will be largely impractical or impossible after 15 years, if the University took no action to digitize and provide a basic digital preservation storage environment for these items they would effectively throw that 65-year investment of $14,500,000 out the window, having received little to no benefit given that the holdings were largely inaccessible during that time. The cost of inaction in this case would result in the loss of 124,000 items in their care in addition to $14,500,000. This significant portion of the funding expended in the Archives and Special Collections would be deemed fruitless, a wasted cost.

The Working Group's prior calculations on project cost came to approximately $148 per selected item to digitize and provide a basic digital preservation environment through 2028. Expending these funds would effectively result in the saving of this past investment, yielding a return. The $14,500,00 invested between 1963 and 2028 in the physical audiovisual holdings is allocated over 78,650 items (65% of the 124,000 items in holdings by 2028, minus the 3,000 items digitized as of 2013). This means that the average investment would be approximately $184 per item. For each item they spent $148 on to digitize and store over the next fifteen years, they would recoup $184 of past investment, yielding a return of approximately 24% through 2028. A difference of 124% compared to losing the $184 invested in that item.

Armed with this information the Working Group went to work creating detailed financial models based on this concept and took it to the administration. They also reiterated the concerns around reputation and mission. While the budgets of the administration had not changed and they wanted to dive into details of the financial analysis, they ultimately agreed in concept that the fiscally responsible thing to do was to avoid throwing decades of investment out the window. However the administration wanted options and asked the Working Group to come up with three scenarios representing digitization of 100%, 50%, and 25% of the current estimated 63,050 items and to report on the implications of each. They asked them not to consider the growth of the archive and to assume investment would be limited to 63,050 items through 2028.

The Working Group performed the requested analysis, providing scenarios for digitizing the current preservation worthy items, and offered the following summary:

	100% Digitized	**50% Digitized**	**25% Digitized**
Budget	$9,305,311	$5,586,361	$2,826,959
Content Lost	0	31,525	47,287
Investment Lost	$0	$6,256,797	$9,510,880
Investment Saved	$12,765,400	$6,508,603	$3,254,520

They provided this information to the administration along with supporting arguments regarding the positive and negative intellectual and reputation implications of each scenario.

Armed with a more robust argument the administration was inspired to reach out to the President and the Board to seek funding for an initiative to digitize their priority holdings.

Although their goal for funding was the original $9,305,311, the funding commitment they received was for $650,000 per year for 5 years starting in 2014 with consideration for a funding commitment past the initial 5 years in 2018.

The Cost of Inaction Calculator

Although this is a hypothetical story, it is clear that incorporating the COI model and analyses into the decision making process around digitization of legacy physical audiovisual media helps organizations understand the implications and make well-informed decisions. Providing objective financial metrics and quantifying the loss of media and content helps make the case for taking more immediate action while also helping to avoid a paralyzing all-or-nothing mindset by enabling insights into the choices available.

To date there has been no way for organizations to quantify the financial and intellectual cost of inaction in order to supplement traditional arguments and bridge the gaps between caretakers or archivists and executives or administrators.

AVPreserve has recently released a free and open web application named the Cost of Inaction Calculator that enables organizations to analyze and report on the implications of various scenarios representing different levels of action. The application can be found at **https://coi.avpreserve.com**.

The calculator prompts users to enter the following parameters, also shown in figure 1:

- Last year of magnetic media
- Number of objects in collection
- Collection's audio-video percentage
- Investment to date for media
- Annual cost per media item moving forward
- Digitization cost per item
- Year you will start digitizing items
- Annual digitization budget
- Storage service (dictates annual storage cost)
- Annual decrease in cost of storage
- Annual increase in cost of digitization

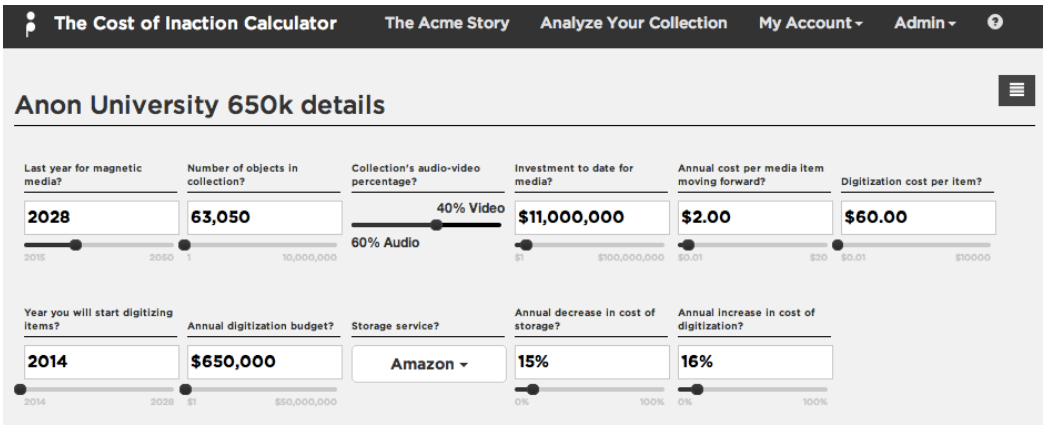


Figure 1: Collection parameters for entry

The help menu offers information on how to interpret and adjust these parameters accordingly, as well as the assumptions behind them.

There are two sections where reporting is provided, both in charts as well as tabular data. The first is called the Collection Analysis report and provides results based on the collection details entered by the user as follows:

- Year
- Media
- Content Saved
- Excess Items Digitized
- Investment Made
- Content Lost
- Investment Lost
- Investment Saved
- Digitization Expense
- Storage Expense
- Digitization + Storage Expense
- Investment Saved per $1 of Expense
- Quality of Selection

The data reported shows the cumulative progression of implications over time as seen in figures 2 and 3.

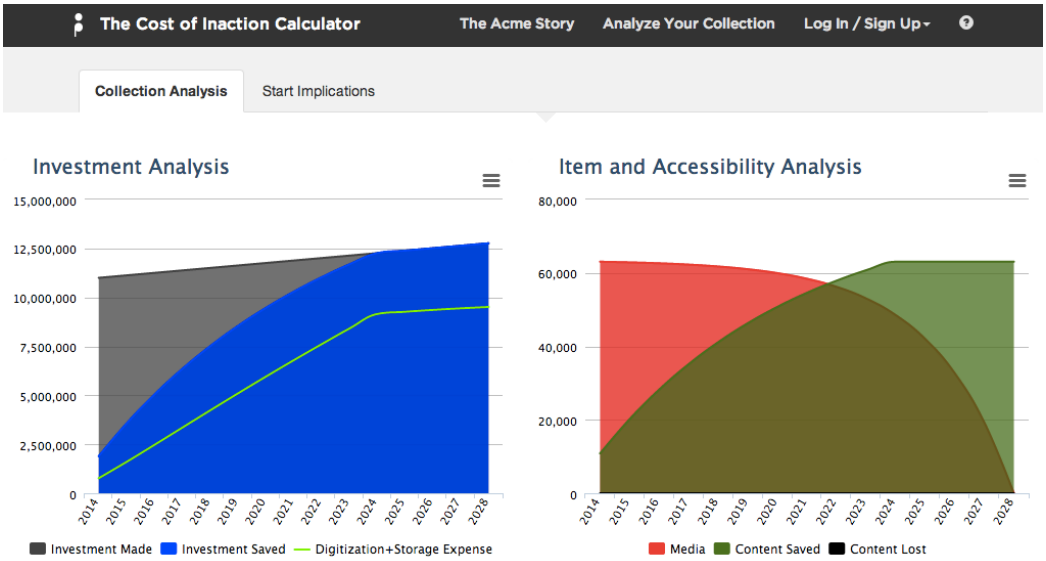
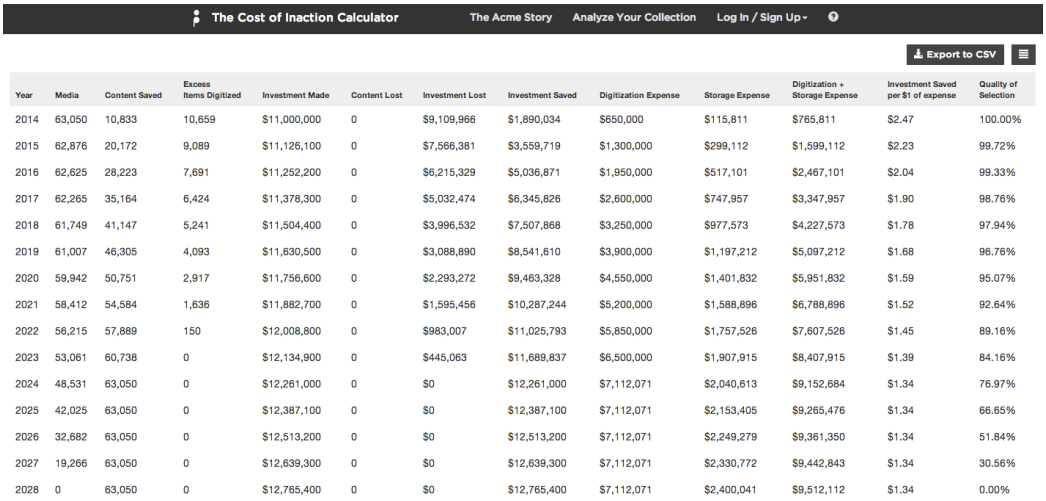


Figure 2: Collection Analysis charts



Year	Media	Content Saved	Excess Items Digitized	Investment Made	Content Lost	Investment Lost	Investment Saved	Digitization Expense	Storage Expense	Digitization + Storage Expense	Investment Saved per $1 of expense	Quality of Selection
2014	63,050	10,833	10,659	$11,000,000	0	$9,109,966	$1,890,034	$650,000	$115,811	$765,811	$2.47	100.00%
2015	62,876	20,172	9,089	$11,126,100	0	$7,566,381	$3,559,719	$1,300,000	$299,112	$1,599,112	$2.23	99.72%
2016	62,625	28,223	7,691	$11,252,200	0	$6,215,329	$5,036,871	$1,950,000	$517,101	$2,467,101	$2.04	99.33%
2017	62,265	35,164	6,424	$11,378,300	0	$5,032,474	$6,345,826	$2,600,000	$747,957	$3,347,957	$1.90	98.76%
2018	61,749	41,147	5,241	$11,504,400	0	$3,996,532	$7,507,868	$3,250,000	$977,573	$4,227,573	$1.78	97.94%
2019	61,007	46,305	4,093	$11,630,500	0	$3,088,890	$8,541,610	$3,900,000	$1,197,212	$5,097,212	$1.68	96.76%
2020	59,942	50,751	2,917	$11,756,600	0	$2,293,272	$9,463,328	$4,550,000	$1,401,832	$5,951,832	$1.59	95.07%
2021	58,412	54,584	1,636	$11,882,700	0	$1,595,456	$10,287,244	$5,200,000	$1,588,896	$6,788,896	$1.52	92.64%
2022	56,215	57,889	150	$12,008,800	0	$983,007	$11,025,793	$5,850,000	$1,757,526	$7,607,526	$1.45	89.16%
2023	53,061	60,738	0	$12,134,900	0	$445,063	$11,689,837	$6,500,000	$1,907,915	$8,407,915	$1.39	84.16%
2024	48,531	63,050	0	$12,261,000	0	$0	$12,261,000	$7,112,071	$2,040,613	$9,152,684	$1.34	76.97%
2025	42,025	63,050	0	$12,387,100	0	$0	$12,387,100	$7,112,071	$2,153,405	$9,265,476	$1.34	66.65%
2026	32,682	63,050	0	$12,513,200	0	$0	$12,513,200	$7,112,071	$2,249,279	$9,361,350	$1.34	51.84%
2027	19,266	63,050	0	$12,639,300	0	$0	$12,639,300	$7,112,071	$2,330,772	$9,442,843	$1.34	30.56%
2028	0	63,050	0	$12,765,400	0	$0	$12,765,400	$7,112,071	$2,400,041	$9,512,112	$1.34	0.00%

Figure 3: Collection Analysis tabular data

The second section is called the Start Implications report and it answers four primary questions:

1. If I start digitizing in year *x*, how much will I need to spend per year to digitize all items that have not been permanently lost already?

2. If I start digitizing in year *x*, how much more money will I spend than if I start digitizing in year *y*?

3. If I start digitizing in year *x*, how much more investment will I lose than if I start digitizing in year *y*?

4. If I start digitizing in year *x*, how many more items will I lose than if I start digitizing in year *y*?

This report provides results based on a subset of the pertinent collection details provided by the user as follows:

- Year Digitization Started
- Annual Digitization Budget Required
- Total Spent by 2028
- Investment Lost
- Spent + Lost by 2028
- Spent + Lost Difference
- Content Lost
- % More Spent + Lost
- % More Content Lost

Figures 4 and 5 demonstrate the Start Implications reporting.

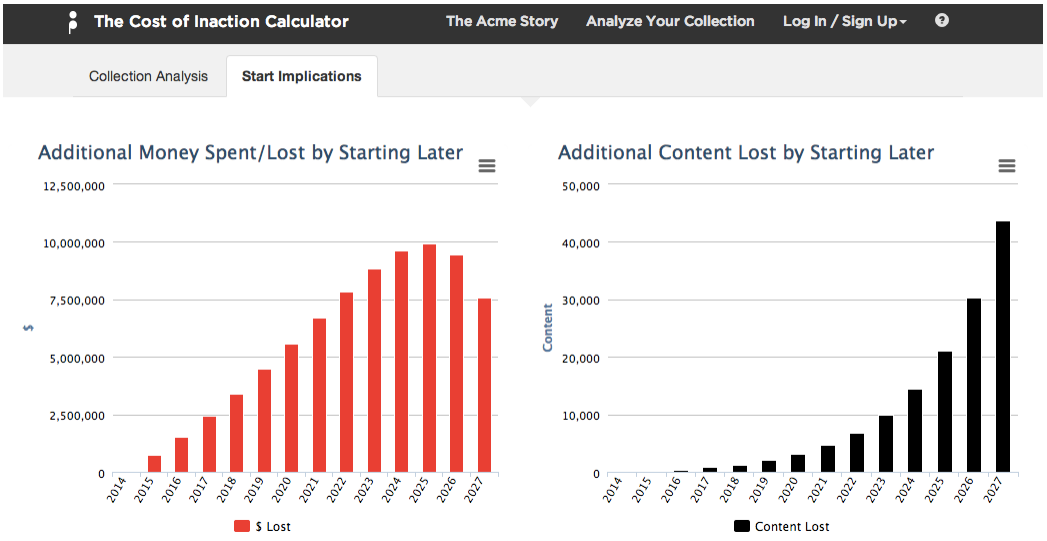
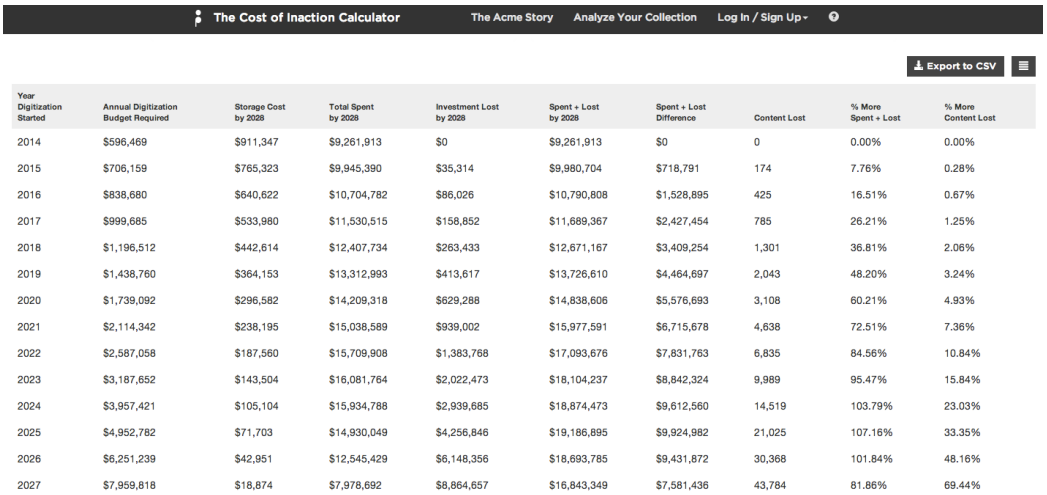


Figure 4: Start Implications charts



Year Digitization Started	Annual Digitization Budget Required	Storage Cost by 2028	Total Spent by 2028	Investment Lost by 2028	Spent + Lost by 2028	Spent + Lost Difference	Content Lost	% More Spent + Lost	% More Content Lost
2014	$596,469	$911,347	$9,261,913	$0	$9,261,913	$0	0	0.00%	0.00%
2015	$706,159	$765,323	$9,945,390	$35,314	$9,980,704	$718,791	174	7.76%	0.28%
2016	$838,680	$640,622	$10,704,782	$86,026	$10,790,808	$1,528,895	425	16.51%	0.67%
2017	$999,685	$533,980	$11,530,515	$158,852	$11,689,367	$2,427,454	785	26.21%	1.25%
2018	$1,196,512	$442,614	$12,407,734	$263,433	$12,671,167	$3,409,254	1,301	36.81%	2.06%
2019	$1,438,760	$364,153	$13,312,993	$413,617	$13,726,610	$4,464,697	2,043	48.20%	3.24%
2020	$1,739,092	$296,582	$14,209,318	$629,288	$14,838,606	$5,576,693	3,108	60.21%	4.93%
2021	$2,114,342	$238,195	$15,038,589	$939,002	$15,977,591	$6,715,678	4,638	72.51%	7.36%
2022	$2,587,058	$187,560	$15,709,908	$1,383,768	$17,093,676	$7,831,763	6,835	84.56%	10.84%
2023	$3,187,652	$143,504	$16,081,764	$2,022,473	$18,104,237	$8,842,324	9,989	95.47%	15.84%
2024	$3,957,421	$105,104	$15,934,788	$2,939,685	$18,874,473	$9,612,560	14,519	103.79%	23.03%
2025	$4,952,782	$71,703	$14,930,049	$4,256,846	$19,186,895	$9,924,982	21,025	107.16%	33.35%
2026	$6,251,239	$42,951	$12,545,429	$6,148,356	$18,693,785	$9,431,872	30,368	101.84%	48.16%
2027	$7,959,818	$18,874	$7,978,692	$8,864,657	$16,843,349	$7,581,436	43,784	81.86%	69.44%

Figure 5: Start Implications tabular data

The COI Calculator allows saving of multiple scenarios in order to perform comparative analysis and to come to a better understanding of the implications of different decisions. It also allows exporting of the charts and tabular data as well as sharing links to scenarios. For instance, to view and explore the Anon University scenarios see the following links:

100% scenario:
https://coi.avpreserve.com/viewcollection/MTMzM0Y1MzQwMzk0

50% scenario:
https://coi.avpreserve.com/viewcollection/MTMxM0Y1MzQwMzk0

25% scenario:
https://coi.avpreserve.com/viewcollection/MTMyM0Y1MzQwMzk0

$650k scenario:
https://coi.avpreserve.com/viewcollection/MTMwM0Y1MzQwMzk0

Conclusions

The Cost of Inaction has been a missing link in the discussion and analysis surrounding the funding of audiovisual digitization and preservation efforts. Recognizing and being able to articulate this concept helps bridge a gap between caretakers and administrators and offers an effective financial metric that is a meaningful addition to historic arguments based on cultural and intellectual significance. Adding this data point—COI— to ROI provides a 360 degree perspective, looking both at past investment and the return on savings of that investment with future expense, while recognizing that the window of possible return is limited based on the obsolescence and degradation of audiovisual media. There is a cost of inaction, and every organization should come to an understanding of that cost in the formation of a digitization and preservation strategy in order to help make well-informed decisions. While the scenario painted in this article focuses on a University, this rationale is just as true for all organizations holding collections of physical legacy audiovisual media. Use the Cost of Inaction Calculator to help identify what the implications are for your organization at https://coi.avpreserve.com.

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