



The Digital Imperative: Envisioning The Path To Sustaining Our Collective Digital Heritage

SUMMARY OF RESEARCH FINDINGS & OPPORTUNITY ASSESSMENT

November 2021

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ACKNOWLEDGEMENTS

The authors would like to express their sincere gratitude to the heritage professionals interviewed for this project, who so generously donated their time and shared their experiences with us.

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EXECUTIVE SUMMARY

In 2021, ICCROM embarked on a journey to understand the needs, challenges, and goals of heritage professionals whose work relates to sustaining digital heritage. The aim of this inquiry is to develop a proposal for a programme—tentatively called Sustaining Digital Heritage—that could help fill gaps in existing opportunities for capacity development offered on this topic. In order to learn directly from practitioners, interviews were conducted with over 30 heritage professionals from across the globe. Each interviewee was asked to share their perspective on:

- What is digital heritage?
- What does sustaining digital heritage mean?
- How does their work relate to digital heritage?
- What challenges do they face in relation to sustaining digital heritage?
- What skills and capacities are needed to sustain digital heritage?

This report shares the findings of these discussions and identifies professional development opportunities that could help practitioners develop skills and capacities to sustain digital heritage.

Definitions: digital heritage and sustaining digital heritage

One of the key goals of this research was to understand practitioners' definitions of key terms: digital heritage, and sustaining digital heritage. The majority of interviewees agreed that digital heritage is something that takes digital form, either because it is natively digital (born-digital) or was digitized from a physical source. Several noted that digital heritage is more than just the assets, but also the environment in which those assets are experienced. Sustainability of digital heritage was then described as the activities that go into the active maintenance of digital objects, environments, and contexts, in order to ensure ongoing access.

Digital heritage responsibilities and challenges

Another goal of this research was to learn what is involved in sustaining digital heritage, from the interviewees perspective, and what current challenges they face in this work. The interviews surfaced a number of critical activities and concerns:

1. **Producing future-proofed digital heritage content** that is created with the long term in mind (e.g., digitization and born-digital content creation). Challenges include dealing with large quantities of content, and ensuring that content is of sufficient quality to be usable in the future.
2. **Collecting born-digital heritage content.** Interviewees noted that they are struggling with decisions around what to collect and what to keep, given the immense volume of digital content being produced today.
3. **Managing data and digital assets**, by ensuring they can be located, understood, interpreted, and used appropriately today and over time. Challenges include lack of

operational infrastructure (tools, network connectivity), the need for sophisticated asset management technologies, and the need to create large volumes of metadata.

4. **Making digital heritage accessible and usable...** Providing open access, ensuring interoperability, and engaging with audiences are among top priorities for sustainability.
5. **...While respecting rights and acting ethically.** While open access is an ambition, many feel inhibited by the unknowns around intellectual property rights, and ensuring ethical treatment of creator communities.
6. **Preserving digital content over time** so that it will remain accessible in future technological environments. Challenges include maintaining a reliable storage environment, keeping up with the demands of data migration as technologies change over time, and ensuring data security.
7. **Managing digital operations**, including managing timelines and budgets, working with stakeholders, and managing teams. A particular challenge in this area is working with technologists—many interviewees struggle to communicate their needs to these key partners, and feel that technologists often don't understand the unique needs of the heritage domain.
8. **Developing and continually updating skills** as technologies change and evolve. This is a particular challenge for heritage organizations with limited budgets and staffing.
9. **Garnering and maintaining ongoing support** for all of the resource-intensive activities outlined above. Many feel that decision-makers fail to recognize the critical need for ongoing funding, and that note that partnerships aren't always equitable.

A model for sustaining digital heritage

Given the myriad of responsibilities and challenges outlined by interviewees, it is clear that in order to sustain digital content, one must create a sustainable programme. To do this, heritage practitioners must develop multi-disciplinary capacities and be able to apply them strategically. We envision a model for sustainability that emphasizes incremental development and prioritization of effort in a way that is responsive to stakeholder and user needs. Our suggestion is that sustaining digital heritage requires that professionals go beyond the domain specific skills (e.g. digitization, digital preservation) and adopt interdisciplinary thinking that will allow them to:

- **Adopt a service mindset** - Build digital heritage programmes that are focused on delivering ongoing value to people (not just data), including decision-makers, end-users, and content creators.
- **Right-size digital operations** - Build digital heritage programmes that are responsive to the priorities of stakeholders, are manageable within available resources, and effectively leverage the best of what technology partners can offer.
- **Deliver value** - Engage directly with users to find ways to deliver content in ways that are meaningful to them.
- **Demonstrate impact** - Make digital heritage a priority for decision-makers by showcasing the impact of value creation.

Skills and capacities needed for sustaining digital heritage

To build sustainable programmes, heritage professionals would benefit from learning from other disciplines, including design thinking, programme/project management, and IT business analysis.

Reviewing the current landscape of professional development offerings, we found that while existing trainings cover many of the foundational skills involved in digital preservation, digital strategy, data management, and access, these topics are currently siloed (e.g., digital preservation courses do not cover topics related to access, etc.) and lack the larger, multidisciplinary strategic perspective we suggest is necessary to sustain digital heritage.

We propose that ICCROM develop a Sustaining Digital Heritage programme that focuses on bringing together multiple disciplines, partners, and existing resources in order to develop the digital leaders of tomorrow and help ensure the sustainability of our collective digital heritage.

1. INTRODUCTION

There is a new continent made of bits, powered by machines, accessible by anyone, anywhere. Every industry has a home here, including heritage. There is a rush to populate and be part of this space that has become woven into every part of our lives, from business and banking, to entertainment and education.

What do heritage organizations do in this land? Most do one or more of the following:

- **Engage with users, patrons, and audiences.** The digital environment allows heritage organizations to meet people where they already are learning, exchanging, and creating information. It allows them to reach wider audiences than they can in the physical world, and provide access to more data and artifacts than ever before.
- **Maintain content.** For content that was natively created in the digital domain, it must often be preserved in the same environment. Similarly, older machine-dependent content originally created on now-obsolete technologies are migrated to the digital domain in order to be maintained for future use.
- **Innovate.** Bringing heritage content into the digital domain enables new insights and innovations, both to the heritage itself, as well as to the audiences that engage with heritage. 3D laser scanning offers a new way to study and interact with a site. Massive sets of collections data can be analyzed to generate new insights into the composition of the collection. And artificial intelligence will free up time by automating tasks.

As exciting as it is, there is also a lot of anxiety and hesitation around engaging in the digital world. It grows quickly, at exponential scales that are difficult for the human mind to conceive of. It is decentralized, which requires placing trust in institutions and computers that we may not have a relationship with (and there are nefarious actors compounding this problem). And the skills required to operate in this space are new and quickly evolving. The pace of change that this world undergoes makes catching up feel out of reach.

For many heritage institutions, the prospect of maintaining a digital presence that serves both audiences and artifacts often feels *unsustainable*. Sustaining digital heritage feels like an imperative—digital is clearly here to stay—but simultaneously an impossibility.

What is unique about this world that makes sustainability feel so different from what heritage professionals are accustomed to? And how can sustainability be achieved in this expansive environment? This report presents the findings of an investigation into the needs, challenges, and goals of heritage professionals in their quest to sustain digital heritage, and offers insights into the opportunities for capacity development.

About this report

This report is the product of a study conducted by the International Center for the Study of the Preservation and Restoration of Cultural Property (ICCROM) that aims to understand the challenges, needs, and goals of heritage professionals working to sustain digital heritage. The objective of this project is to understand the possible scope of a proposed Sustaining Digital Heritage programme at ICCROM, and how it could fill existing gaps rather than duplicate efforts of other professional groups.

The research effort aims to identify:

- A prospective market for such a programme
- Constituent needs and goals
- Current capacity development offerings
- Opportunities for a future programme at ICCROM
- Key players and prospective partners

In this report, we share the findings from interviews with over 30 heritage professionals from around the world, and what concerns them about the sustainability of digital heritage. We then propose a model for sustaining digital heritage that responds directly to these needs. Next, we look at the current landscape of professional development training, to learn what opportunities there are for heritage professionals to gain digital skills that will help them with sustainability. Finally, we touch on ways ICCROM may be able to provide support for capacity development in this evolving and dynamic domain.

Background

The success of ICCROM's Safeguarding Sound and Image Collections (SOIMA) programme has shown that there is a strong and urgent need to build capacity for the preservation of sound and image heritage. From the programme's initiation in 2007 to the present, the production of sound and image content has made a fundamental shift to digital. To respond effectively to participants' needs through this evolution, the SOIMA curriculum made a parallel shift over time, to focus on sustaining digital sound and image heritage. What this programme also revealed, however, is the need is much broader than just images and sounds — our entire digital heritage is at stake. This includes sounds and images, but also text, datasets, web content, and emergent forms of culture, such as software-based art and immersive 3D experiences. The quantities are vast, the content complex, and the solutions are not well understood. Digital is now one of the dominant modes of cultural expression, straddling the lines between the tangible and intangible.

Project partners

This project is a collaboration between ICCROM, the Netherlands Institute for Sound and Vision (NISV), and AVP. These three organizations each offer unique perspectives and

strengths that make them ideal partners to tackle this challenge and craft a proposal for a new Sustaining Digital Heritage programme.

ICCROM is an intergovernmental organization, whose member states are facing increasing difficulty in sustaining their digital heritage. Within this network, there is a wealth of experiences and perspectives to draw on in order to study the needs.

NISV is a world-class public preservation, archiving, and education institution. They are a leader in digital innovation and preservation that brings deep research and development expertise to solution building.

AVP is a consultancy that uses human-centered design methods to solve data management challenges in a variety of sectors, including cultural heritage, media and entertainment, corporate, and government. AVP brings a methodological approach to this initiative, as well as years of experience creating contextual solutions to sustaining digital heritage.

2. METHODOLOGY

Interviews

In order to learn from heritage professionals around the world and identify opportunities that could support their digital heritage needs and goals, project team members interviewed over 30 heritage thought leaders, practitioners, and service providers from across the globe. Each interview followed a consistent format, covering the following topics:

- How does the interviewee define "digital heritage"?
- How does their work relate to digital heritage/information?
- What challenges do they face in relation to digital heritage?
- What capacities and skills are needed to sustain digital heritage? How do they currently develop those skills and capacities?
- What are their goals and vision for digital heritage?
- How do they define "sustainability of digital heritage"?

The distribution of regions represented by the interviewees can be seen in the following chart:

Regions represented

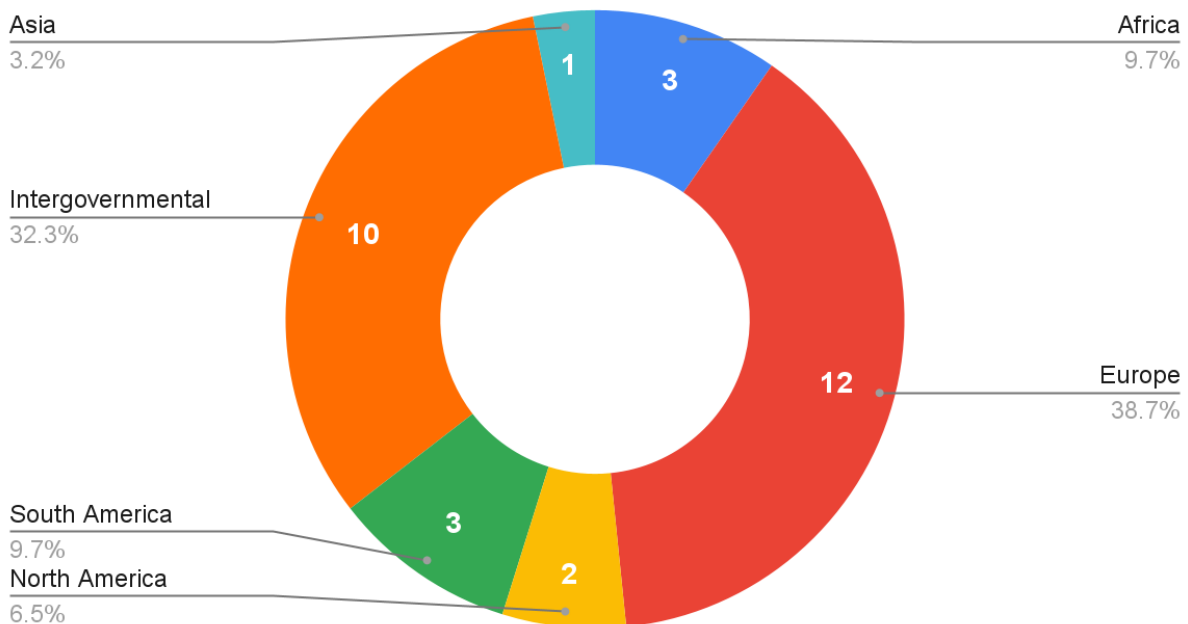


Figure 1. Regions represented by interviewees

More specifically, interviewees represented the following countries:

- Argentina
- Belgium
- Egypt
- France
- Ghana
- India
- Ireland
- Italy
- Kenya
- Netherlands
- Turkey
- United Kingdom
- United States of America

The types of organizations represented by the interviewees included:

- Museums
- National archives and libraries
- Audiovisual archives
- Research centres, including those that work to digitally document the natural world and built heritage
- Non-profits
- Software development firms
- Grant makers
- Private digital heritage startups
- Intergovernmental Organizations

Note that any quotes in this report attributed to interviewees are anonymized to respect the privacy of these individuals who so generously gave their time to this project.

Focus group session

We asked five of the interviewees from different organizations and regions to return for a group session where they were asked to envision a future state where digital heritage is sustained, and to describe:

- What are the characteristics of this future?
- Who is there and what are they doing?

Finally, the group was asked for their thoughts on what a sustaining digital heritage programme from ICCROM could address.

Analysis of the professional development landscape

We also reviewed the landscape of existing offerings available today that help organizations and communities develop capacity for sustaining digital heritage in order to understand what gaps might exist. This research was limited to a survey of continuing education and professional development trainings, workshops, and short-term courses (of 1 year or less) offered in **the past two years**. General conference presentations and panels, and university-level courses were not considered within scope of this exercise. We analyzed the topics covered by these offerings in order to identify where potential gaps may exist.

This research presents only an initial survey into the varied landscape of professional development in digital heritage. More research is needed to identify training opportunities in additional languages (our survey is heavily biased toward English- and Dutch-language offerings) and other forms of capacity development.

3. WHAT IS DIGITAL HERITAGE?

To develop a shared understanding of the digital landscape in which heritage professionals are working today, we asked each interviewee to share their definition of digital heritage, and then to describe what sustainability of digital heritage means to them. Their responses are summarized as follows.

Digital heritage

We found that there were three groups of responses to the question: "How do you understand digital heritage?" There were no detectable relationships among interviewees and the answers they gave for this question (in other words, we didn't notice that intergovernmental organizations had a distinct set of responses that differed from archives, for example).

Many respondents focused on the form of digital heritage:

- 16 out of 25 interviewees (2/3) defined "digital heritage" as both: a) digitised or otherwise digitally represented physical cultural heritage and b) heritage objects that are "born digital," in that order.
- Six interviewees defined digital heritage as heritage that is natively/born digital.
- Three defined it as "heritage that has been digitised."

The definition of digital heritage as both natively digital and digitised heritage seems to have broad consensus amongst interviewees.

Some interviewees thought about the definition in other ways beyond simply the form it takes. They discussed digital heritage as something that has value to individuals, families, and communities, and recognized that answering "What is digital heritage?" is as complex as answering "What is heritage?" One interviewee noted that digital heritage by default is simply a result of the actions and decisions of heritage professionals: "Whatever we leave behind for the next generation that is digital." Others felt that digital heritage is more than just assets, but also the environment in which those are created and experienced by users (e.g., augmented reality, immersive art), often in real time (e.g., social media posts immediately becoming heritage assets).

Sustainability of digital heritage

Many of the interviewees defined sustainable digital heritage as essentially digital preservation (maintaining accessible objects over time). This includes activities such as active management of preserved objects (curation, format migration); preserving the context of digital objects; and updating technology at regular intervals to prevent obsolescence.

Another group of interviewees described activities that pertained to sustaining a digital heritage *program* over time, such as adequate training for staff, elevating digital heritage in

various communities, and committing to FAIR (findable, accessible, interoperable, and reusable) and equitable principles.

Finally, several interviewees tied sustainable digital heritage to its impact on the environment. The storage and preservation of digital objects can use a lot of energy for both power and cooling, and a commitment to access requires that these machines are nearly always available. Energy demands are quickly becoming an important consideration when scoping a commitment to digital heritage.

The authors observed that a secure source of funding was not mentioned by anyone as part of the definition of sustainability of digital heritage, although this does surface as a key concern during other parts of the interviews, as discussed below.

4. SUSTAINING DIGITAL HERITAGE ACTIVITIES

In this section, we summarize the activities that go into sustaining digital heritage as raised by the interviewees, and explore the needs, goals, and concerns they have around these different aspects of their work.

Please note that there are countless sub-topics that relate to each of the sections below. Here, we are only highlighting those that emerged as themes or patterns in our conversations. Top concerns — those that were raised by a large segment or majority of interviewees — are identified by a star (★) and highlighted in **orange**.



Figure 2. Overview of activities involved in sustaining digital heritage, as described by interviewees.

1. Produce future-proofed digital heritage content

Over the past two decades, there has been a strong impulse by the heritage sector to “digitize.” We can think of digitization in the heritage space as either the creation of new digital content or the migration of older forms of content to the digital domain.

Interviewees expressed numerous reasons for digitization. Sometimes it is to engage with visitors and patrons in new ways. Sometimes it is because older, machine-dependent media can no longer be maintained and require migration to digital for conservation purposes. Sometimes it is to document an endangered site. And, other times it is to innovate and gain new insights into physical heritage.

Regardless of the reason, it is important to recognize that many heritage professionals are digital content creators, frequently responsible for capturing and documenting the world in digital form. Many interviewees we spoke to are documenting physical heritage sites and objects, using techniques such as 3D laser scanning, photogrammetry, and photography. Others are capturing audio, video, and image field recordings. Still others are creating digital versions of endangered analog video and audio content.

As creators, heritage professionals feel it is important to adopt a long-term mindset. Even if digitization is not for conservation purposes, and instead is a way of engaging with audiences, digitization and digital content creation is an investment — they don't want to have to do it again. Therefore, content must be future-proofed to meet certain quality standards so that it can be maintained for ongoing use.

Concerns and goals raised by interviewees relating to this topic include the following:

- **Quantity** - While many interviewees feel it is essential to digitize nearly “everything,” several noted feeling overwhelmed by this prospect. Interviewees suggested that training and guidance in selection are important.
- **Quality** - Some concern was raised that the quality of content creation does not always meet expectations for longevity. They expressed a desire for standards and training in topics such as audio and video field recording, 3D laser scanning, and photogrammetry.

2. Collect digital heritage content

Collecting is, of course, one of the primary activities of many heritage institutions. The act of collecting is often what transforms a simple everyday object into heritage. Acquisition infuses a certain type of meaning into objects.

Born-digital content has been on the minds of many heritage institutions for the past decade or two. Some digital heritage pioneers have been collecting born-digital heritage content since the 1990s. Others are still hesitant to wade into this territory, or are approaching cautiously. Most organizations are somewhere in between.

The reality is, digital content is quickly becoming an important part of heritage collections, whether it is digitized or born-digital. After all, there is nothing inherent to the term “heritage” that limits it to the physical world.

In our conversations with heritage professionals, one theme dominated this topic:

- ★ **Volume**. Deciding what to collect, and what to keep, weighs heavily on the minds of many people we spoke to. For some, there is a strong urge to save everything, but this is at odds with the recognition that this is not realistic. Comments such as “we cannot and will not keep everything” were not uncommon in our discussions.

Heritage professionals are struggling with what to collect and what to keep. And they are not sure who should decide the answers to those questions.

3. Manage data and digital assets

The actions of data and digital asset management are concerned with ensuring that digital content can be located, understood, interpreted, and used appropriately. Enabling the use of digital content, whether by staff or the public, requires a coordinated effort that involves people, standards, policies, technologies, workflows, and more.

As data volumes grow, so does the task of the data or digital asset manager. Keeping digital assets organized, described, findable, and usable is a monumental task for heritage institutions in the digital age. Files must be acquired and ingested into the right systems. They must be organized. Access permissions must be applied. And lots of metadata — documenting description, provenance, rights, significance, technical attributes, relationships to other objects — must be created, much of it manually. In digital environments, not having metadata can be equivalent to data loss, especially as volumes grow.

The heritage professionals we spoke with highlighted a few key issues relevant to this topic:

- **Operational infrastructure** - Many organizations struggle to find even the basic technological infrastructure required to manage digital operations. In some regions of the world, the lack of network connectivity and strong technical communities are major inhibiting factors to the development of a digital program.
- **Management systems** - Once a certain volume is reached, hard drives and spreadsheets no longer suffice as asset management tools, and there is an urgent need for more sophisticated systems to help manage digital information. The ability to choose, configure, and launch such a system is an in-demand skill.
- ★ **Metadata** - The key to managing digital assets is metadata, and lots of it. Keeping up with the demand for more metadata is a challenge for many interviewees. Ensuring the quality, completeness, and consistency of that metadata is another.

4. Make digital heritage accessible and usable...

Access to heritage was a priority topic for nearly all interviewees. Ensuring that digital heritage is available to audiences is, for many heritage professionals, the key reason for embarking into the digital sphere in the first place. For most, it is imperative: "It is not enough to be collecting and preserving. The most important thing is to make materials easily accessible."

Our conversations on this topic surfaced a variety of interests and concerns:

- **Open access** - The digital universe provides an opportunity for heritage institutions to open up their collections broadly and freely. This is a goal of many interviewees

that we spoke to. However, concerns around intellectual rights plague this conversation. We revisit this topic in the next section below.

- **Findability** - Some interviewees noted that it is not enough to just put digital content online. The user experience, particularly the ability for users to search, browse, and discover digital content in large repositories, is also a critical concern. Specialized skills are needed to address this requirement effectively.
- **Interoperability** - In the networked environment, the opportunity to create connections between datasets is limitless. Interviewees are excited about connecting their collections with other data and information across the web.
- **Audience engagement** - For a few interviewees, true access goes beyond simply putting content online, and requires focused effort to engage with audiences in meaningful ways. This involves gaining an understanding of different audience segments in order to interact with them on relevant platforms and channels. It also requires having some marketing skills in order to promote and connect with users. These interviewees recognize that access isn't something you do once and call it done. It's a continuous process of engagement, outreach, and innovation.
- **Delivering value** - A handful of interviewees are thinking beyond "access" to *value*, recognizing that it is the continuous delivery of value that allows them to be sustainable. The challenge is identifying what value users are looking for from heritage institutions, and continually meeting that need.

5. ...While respecting rights and acting ethically

The ability to use technology to open heritage data and digital assets to the world is an exciting opportunity. And, although providing open and innovative access is a top priority for the heritage professionals we spoke to, concerns around intellectual property rights and ethics loom large.

Several people we spoke to deal with audiovisual material, which is particularly thorny territory where rights are concerned. Quite often there is a web of underlying rights associated with the content: the director/creator, the musicians, the people depicted, and more. Furthermore, it is not uncommon for rights to be poorly documented in heritage settings. Collections often are acquired with very little documentation, and it can be time consuming and costly to track down accurate rights information.

Here are some additional insights into these concerns:

- * **Intellectual property rights** - Many of the interviewees we spoke to struggle to understand who owns the copyright to certain content, and what other rights are associated. They are unclear what rights they have to provide access, what rights patrons or researchers have to use the content, and where to turn to find answers. If someone wanted to license content, for example for a film or journalistic use, they don't always know how to clear the rights for this use. This issue is complicated by

the fact that intellectual property laws vary between countries, and the legal implications of opening up access in a global digital environment are unclear.

- **Ethics** - Another related concern for heritage professionals is ensuring that access is provided in an ethical way that respects, acknowledges, and serves the communities that created the content, or who are represented in the content. Some groups, such as indigenous communities, may not want their artifacts or content shared by a museum. Many organizations have collections that were acquired under circumstances that may not have respected original creators, but the provenance of these collections is often sparsely documented.

The concern for avoiding a legal or ethical violation often trumps the desire to share, leaving the organization feeling paralyzed in reaching their access goals.

6. Preserve digital content over time

One of the primary responsibilities of heritage professionals is to be good long-term stewards of the collections in their care. Standards and best practices for the preservation, conservation, and restoration of physical heritage have long been established, and have been documented and disseminated widely. While the foundational principles from preservation in the physical world carry over into the digital domain, the practices themselves largely do not.

Digital brings along with it an entirely new set of concerns, which fundamentally changes the task of the preservationist. If the goal is to maintain the object to ensure its longevity, the digital environment forces that maintenance activity into high gear. The phrase “active management” is often used to describe the task of digital preservation.

One key difference between digital and physical preservation is the nature and rate of deterioration are fundamentally different. How do you preserve an object that is the product of an environment that is subject to constant change? How do you keep up with those changes? How do you protect against new types of threats — format obsolescence, software changes, migration errors, storage malfunction — that have no parallel in the physical world? The digital object feels fragile, and the risk of loss feels high.

Some of the top concerns raised by interviewees on this issue include:

- **Digital preservation best practices** - Although the field of digital preservation has matured over the past fifteen years or so, and best practices are established at this point, this is still new territory for many people working in the heritage domain. The need for education in the fundamentals, and updated training in the latest developments, remains constant.
- **Storage** - One of the fundamental components of good preservation practice is storage, including the use of reliable storage media, ensuring stable backups and redundancy, and storage health monitoring. Getting a stable storage infrastructure in

place is a struggle for many organizations. Keeping up with the rapidly growing volumes of content compounds the problem. And managing the hardware, firmware, and software that make up the storage environment requires skills that many heritage organizations do not have readily on hand.

- * **Migration** - Digital migration takes many forms. Format migration is required when a file format is at risk. Storage migration is required when the storage system has reached its end of life or can no longer accommodate the volume of data. And data migration is required when new software and databases are needed to keep up with changing asset management and access requirements. All of these migrations introduce a tremendous amount of risk to data and digital objects. Here again, the skills required to plan, execute, manage, and ensure the quality assurance of these migrations have not yet been developed in many heritage institutions.
- **Data security and privacy** - Long-term preservation also involves ensuring that digital heritage is secure, and not subject to theft or nefarious misuse. Digital collections also often contain personal identifiable information (PII), the privacy of which must be respected.

7. Manage digital operations

Running a digital operation is complex. There are numerous activities occurring simultaneously, and numerous stakeholders involved, all of which necessitates constant planning, communication, measurement, and monitoring. New projects need to be budgeted and planned to fit within resource constraints. Technology projects are executed using new frameworks such as Agile, which operate on cycles of iterative development. Enterprise technologies are led by a new breed of product management professionals. Success in technological environments is measured in concepts like key performance indicators (KPIs) and objectives and key results (OKRs).

Many of these concepts are foreign to heritage professionals. They are skills more likely to be taught in business school than in library science or museum studies programs. Yet heritage professionals are encountering these unfamiliar concepts, frameworks, and modes of operation as they move into the digital world.

The interviewees we spoke with emphasized the following digital operations challenges:

- **Project and program management** - Heritage professionals often aren't trained project or program managers, and yet, they recognize this is a critically needed skill in the digital environment. A successful digitization or digital asset management operation requires careful scoping, budgeting, timeline planning, workflows, and resource allocation, especially to work within the constraints that heritage organizations are frequently required to.
- * **Working with technologists** - One of the chief complaints of the heritage professionals we spoke with was the challenge of working with technologists. There was a strong sentiment amongst interviewees that their technology counterparts do

not understand the heritage domain and its unique needs. Concerns such as, "cultural sensitivity for heritage materials is missing with IT people," and "we speak different languages," were raised repeatedly. At the same time, many realize that they are not equipped to articulate their needs to technology experts. Several people we spoke to desire a stronger relationship with technologists, and recognize that education and training is needed on both sides.

One interviewee, who previously worked at a heritage institution and has recently transitioned to a software development firm noted that to work with technologists, heritage professionals, "don't necessarily need to understand the technology," but that they do need to understand their own stakeholders needs and be able to articulate goals so that they can be translated into a digital solution.

8. Develop and continually update digital skills

It is clear that the skill sets of heritage professionals must evolve in order to sustain digital heritage. New roles are needed, and along with those, new types of expertise. Many heritage professionals we spoke with see a future where sustaining digital heritage is woven into all university courses for heritage professionals, as well as programs for content creators (i.e., "film schools should teach film preservation"). However, they can't wait for a new generation of educated digital professionals to enter the workforce — professional development in this domain is needed now. And this will become an ongoing need, so that skills can be sharpened as the digital world evolves. The digital heritage professional must have the mindset of a life-long learner.

Here are some of the main issues interviewees raised on this topic:

- **Limited staffing** - Heritage institutions are notoriously short-staffed. Adding additional, skilled staff is currently a non-starter for many organizations.
- **Brain drain** - Interviewees shared that finding people with digital skills to work in heritage institutions is a real challenge. "Heritage professionals that do gain IT skills are hired by other sectors," is as true of a statement in the United States as it is in Ghana. To deal with this situation, some interviewees are getting creative: digitally fluent interns are teaching the permanent staff before they leave. While this isn't a sustainable solution, it can help. And some see it as a good thing that more people that have an understanding of and appreciation for heritage work are going to be working in other sectors, particularly technology. This can help with the problem of communication with technologists noted previously.
- ★ **Ongoing training** - Obtaining ongoing training presents a daunting challenge for some of the interviewees we spoke with — they don't know what they don't know about digital, so they aren't sure where to start. They also worry that they do not have resources, time, or funds, to support training their staff. However, they also see an opportunity in the recent shift to online learning that has been accelerated by the

global coronavirus pandemic, and are excited about the possibilities that this transition brings.

9. Garner and maintain ongoing support

As the previous sections have illustrated, the digital heritage environment is a busy one, complete with people, technologies, and processes. And as we have touched on previously, these tasks are continuous; there is no concept of “done” in sustaining digital heritage. Keeping up with digital content creation, managing data and digital assets, providing meaningful access to users whose expectations are constantly shifting, and preserving content for the long-term requires *ongoing* resources.

This is perhaps one of the greatest challenges that the interviewees we spoke with are facing. They noted several particular concerns related to this issue:

- * **Institutional recognition** - Many heritage professionals we spoke to are frustrated by a “lack of recognition by the management” and lamented that leadership in their organizations does not support the digital work they do. At a greater scale, there are concerns that governments and funders “don’t prioritize digital infrastructure for heritage.” And at the global scale, they are worried that the professional heritage networks like “ICCROM, UNESCO, ICOMOS, don’t understand the investment needed for safeguarding institutional memory.”
- * **Ongoing funding** - At this point it should go without saying that sustaining digital heritage requires ongoing funding. Keeping up with computing environment changes, paying monthly fees for cloud services, staffing an asset management operation, digitizing content, and upgrading skills requires annual capital and operational budgets with line items for these expenses. This nature of continuous, rather than project-based, funding is often at odds with how heritage institutions are budgeted. And for now, it is more than they can afford. Sustaining digital heritage is not necessarily cheap.
- * **Win-win partnerships (that aren’t exploitative)** - Many heritage institutions turn to external funders or partners to support digital initiatives. Grants and collaborations with other more well-resourced institutions have long been the norm for cultural organizations. However, for several interviewees we spoke with, particularly those in less resourced regions of the world, these relationships have at times been extractive. A common scenario is this: the funder or partner supports a digitization project, leaves a copy of the digital results behind, but takes a copy with them as well. The intention behind this approach is on the surface benevolent — the funder and the local institution both want to ensure the longevity of the content (after all, lots of copies keeps stuff safe, and geographical separation of digital copies is the gold standard in digital preservation). But the reality feels different to those on the ground. The originating organization is left with a copy, yes, but not the means to sustain their copy. The concern over what to do about “digital colonialism” weighs

heavily on the minds of many of the people we spoke to on both sides of this situation.

On the other hand, partnerships, including regional and global networks, are desired by interviewees, so that challenges and solutions can be shared in mutually beneficial ways.

5. A MODEL FOR SUSTAINING DIGITAL HERITAGE

What does it look like when digital heritage is sustained? In a focus group, five interviewees were asked to share their vision for such a future state. The characteristics of this future collectively envisioned by this group includes:

- A shared understanding of what digital heritage is
- A shared understanding of the value of digital heritage, by decision-makers, funders, and the public
- Resource allocation and funding toward digital heritage
- Affordable infrastructure, accessible to all, regardless of resourcing levels
- Standards for long-term preservation, adaptable to different organizational contexts
- Open access to collections and data in a way that enables these to be findable, contextualized, shareable, and reusable, while respecting rights and acting ethically toward creator communities
- Collections and access inclusive of diverse creator and user communities
- Skilled and knowledgeable heritage professionals, who collaborate through international networks and partnerships

In this envisioned future, numerous stakeholders participate in sustaining digital heritage, including:

- Cultural heritage professionals
- Institutional leaders
- Governments
- Private industry, particularly the information technology sector
- Content creators
- Professional associations and networks
- NGOs
- Educational institutions
- Funders

How do we reach such a state? In this section, we suggest a model for sustaining digital heritage that takes an incremental approach to building a meaningful and manageable digital program that accounts for the activities and concerns of the interviewees, as summarized in figure 3, and described in detail in this section.

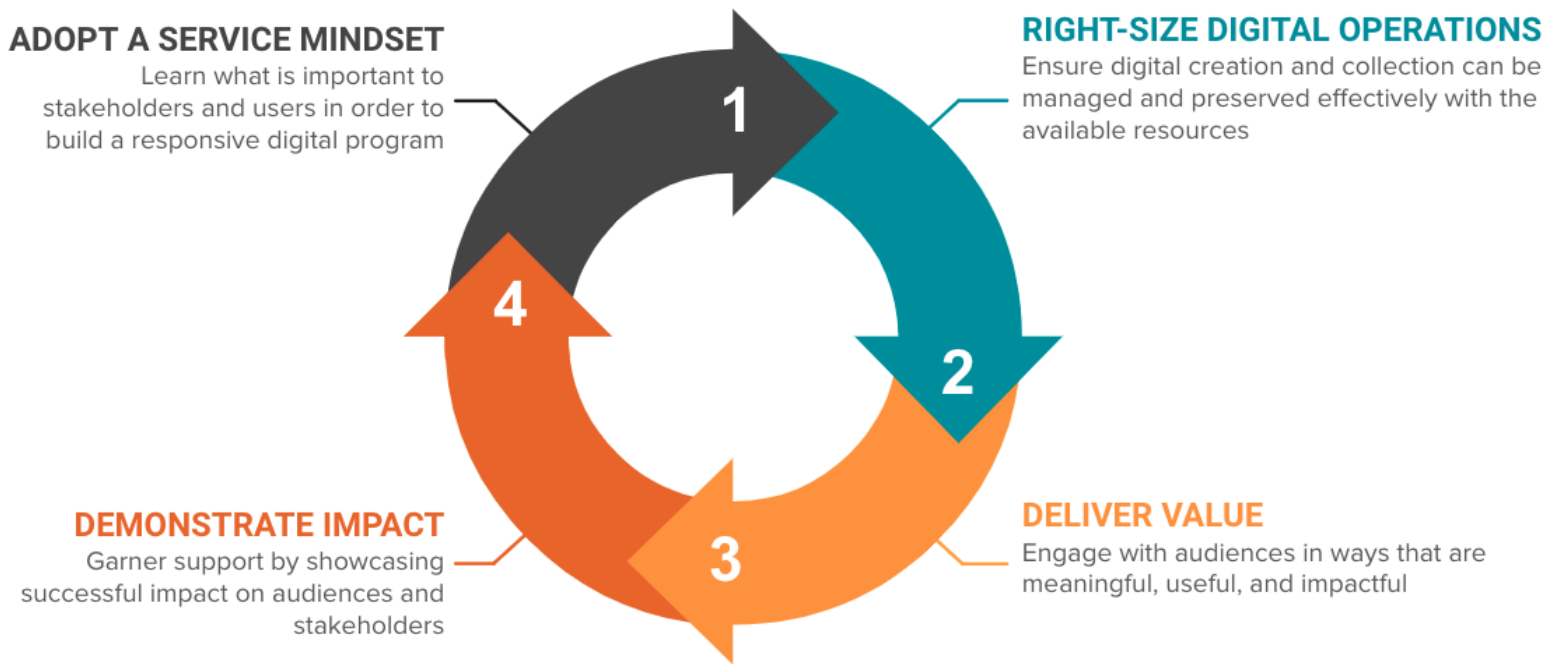


Figure 3. Proposal for a model for sustainable digital heritage.

This model responds to the frustrations, challenges, and opportunities expressed by interviewees as they work to create, collect, preserve, and provide access to digital heritage. All of these activities require ongoing resources, and interviewees all share that they require support from internal and external organizations in order to obtain these resources. They want the funders and decision-makers to see the importance of the work they do, the costs involved, and the never-ending need for more to keep up with growing volumes. They also want communities—including technology, creators, and users—to participate in sustaining digital heritage.

But this recognition and support won't happen by magic. Sustaining is by definition a process. It is never done. And to marshal the awareness and resources required to sustain, heritage organizations need to engage with these diverse communities, deliver value to audiences, and demonstrate that value to decision-makers. This cannot be a linear process (i.e., first we digitize everything then we preserve everything then we provide access to everything). It must be continuous and cyclical, building momentum, scope, and scale over time. Heritage professionals cannot and should not try to save, manage, and provide access to everything simultaneously. Knowing where and how to devote attention is a critical skill needed in the digital age.

In this section we describe each component of the sustainability cycle as illustrated in the diagram above, and how they weave together to build an evolving loop. We can think of this

as a **sustainability flywheel**.¹ Underlying this model is a recognition that each organization's context is unique. The stakeholders are different, the collections are different, and the users are different. This means we can't simply look at what our sister institutions are doing and copy them. Best practice is to look closely at our own context and respond accordingly. We describe how to do this below.

Recommendation 1: Adopt a service mindset

Many heritage professionals are trained to create, manage, conserve, and deliver content — a mindset that focuses on serving the needs of objects or data. But content is only meaningful if it delivers ongoing value to people — something our interviewees clearly recognized when asked what sustainability looks like. This means that sustainability in the digital world requires establishing a balance between serving data and serving people.. Establishing a service mindset helps to ensure that both of these needs are met.

Heritage professionals are experts in the materials and content they deal with. They know the sub-categories, unique characteristics, and inherent fragilities of these materials. They can tell you why this group of objects is different from another group, and why they require specific care and handling. A similar understanding is needed of the people who will support heritage programs, who create heritage content, and who use and derive value from digital heritage. A service mindset starts by gaining a deep understanding of these groups to know who you are serving and what they need.

There are several potential groups that heritage organizations may serve to consider:

- **Decision-makers and funders** - Those that have the power and means to allocate resources toward digital programs. These groups are typically focused on strategic priorities, and want to see results that deliver on these goals. Heritage professionals must take time to learn what are those priorities and results, so that they can deliver accordingly.
- **Internal end-users** - Non-collections staff at heritage organizations are often the primary users of digital heritage, from exhibitions and reference, to marketing and fundraising. Knowing what their needs, goals, and priorities are can help with the development of a service that responds directly.
- **External end-users** - Serving the public and or specific communities are the reason most heritage organizations exist. These groups are often varied and diverse. Primary school students, scholars, donors, and visitors, for instance, are very different groups. Understanding what each of their relationships are to digital heritage, what is important to them, and how they expect to interact is essential to enabling effective

¹ A flywheel is a mechanical device that builds kinetic energy to stay in motion. This concept was applied to business and non-profits by Jim Collins in his book *Good to Great* (2005), which suggests that the most successful organizations incrementally build and maintain momentum that enables continuous progress toward goals.

use, and to building a program that supports that use from the inside out (we will revisit this topic more in recommendation #3).

- **Creators** - Interviewees expressed a goal of ensuring that heritage collections are inclusive and considerate of creators. To achieve this, it is critical to learn directly from creator communities.

And there are certainly others. Sustainability requires bringing together an understanding of all of these groups in order to develop a service that addresses them all. This is not always the mindset that we observed in our interviews. End users were discussed primarily in the context of access (and not considered in collection development, for instance), and stakeholders primarily with a grumble that they don't understand the needs of heritage professionals (but not in the context of aligning with their priorities). Rather than simply focus on ways we can help them understand us, heritage professionals need to *understand them*. This two-way dialogue is critical to reaching the end state vision that is inclusive of these stakeholders.

Knowing what is important to stakeholders and users informs what you collect, what you digitize, what you preserve, how you describe and tag things. For example, knowing what is more important to users — a static, digitized image of an original newspaper, or the textual content of the articles made available through their preferred device or channel, with names, places, and events linked to authoritative external information — can inform digitization and data creation efforts.

Engaging directly with representatives from each group helps us understand how and why they interact with digital heritage. It helps us know what priorities funders have and how we can align with those. It helps us know which collections or objects are most important to them right now. It allows us to know which metadata is most useful for answering the questions that users have about the content. It provides insights into which tools are most useful for access. This understanding allows heritage professionals to implement the policies, procedures, and technologies within their digital operations (recommendation #2), which provides the foundation to delivering a service to users (recommendation #3), and which provides the insights into the priorities of key decision-makers (recommendation #4).

Maintaining an evolving understanding of, and a goal of delivering value to users helps with setting priorities, which in turn helps create a manageable digital operation. This should be a key underpinning of a heritage organization's digital sustainability strategy.

Recommendation 2: Right-size digital operations

We heard repeatedly from interviewees that volume is one of the biggest challenges they face. Data scale and growth is understandably a key concern, after all, the organizations are

experiencing a 42% annual increase in the growth of data, but only capturing and using a small fraction of that volume.²

It is difficult to be faced with the enormity of the challenge sustaining digital heritage and not feel the need to try to do everything. Collect everything. Digitize everything. Catalog everything. Make everything accessible. But the truth is, sustainability requires prioritization. We can't do everything at the same time, all the time, forever. Attempting to do so can often lead to suboptimal results and overwhelming backlogs.

A right-sized digital operation creates scope and scale that can be managed with available resources, that is aligned with the needs and goals of stakeholders and users, and that can demonstrate impact to funders and decision-makers. In other words, heritage organizations need to be sure they don't bite off more than they can chew at any given time when it comes to sustaining digital. Right-sized operations don't completely ignore everything that is not in scope. They prioritize available resources, so that attention is paid to where it delivers the most value, as identified through the user and stakeholder engagement. The rest can be returned to later, as long as we do the minimum needed to preserve the opportunity.

Right-sizing means using your strengths, then leveraging the expertise and resources of others to help establish a manageable operation. In today's digital economy, resources and expertise increasingly are distributed, providing economies of scale and energy efficiency. Many of the resources that organizations traditionally used to manage themselves are now outsourced to companies and partners that specialize offering these functions as a service. Storage, servers, networking have become like utilities. Similarly, in the last decade, software has transitioned away from something that you purchased, installed, and maintained yourself, to a service that is managed, updated, and delivered by others. There are upsides and downsides to this reality, but current trends indicate that this is not likely to change.

These services can be provided by private companies or public partnerships, such as with universities that have large data centers. Projects with computer science schools can help with large-scale data processing, or the development of simple scripts to automate workflows. Participating in hackday events can be a great way to introduce your organization's digital content to the local technical community, and find opportunities for collaboration.

To build a manageable operation, and to effectively identify and collaborate with partners and service providers, heritage professionals need to articulate their needs and goals in a way that translates into solutions. This requires technical literacy to understand the difference between functional, performance, data, and technical requirements, and to be able to document and prioritize these in a specific, measurable, achievable, relevant, and

² Goodwin, Phillip, et al. "Rethink Data: Put More of Your Business Data to Work—From Edge to Cloud." IDC and Seagate, July 2020. Accessed 27 October 2021 from <https://learn.seagate.com/web-rethink-data-infobrief>

time-bound way (SMART)³. Additionally, heritage professionals need to be able to understand and evaluate service offerings (particularly technology services) against needs, resources, and policies.

In sum, right-sizing operations means building the capacity to set priorities, define and limit scope, then leverage available resources (in-house and externally) to be able to effectively manage digital heritage content and collections.

Recommendation 3: Deliver value

Quite often, when heritage professionals discuss providing access, they make assumptions about what this should look like. But delivering value means providing access in a way that is meaningful to each unique group of users. What does “access” even mean to these different groups? What do they want to do with heritage content? Before we turn to building access solutions, it is critical to spend time understanding why each user group might want to access heritage collections, what is important to them about those collections, and how and where they might expect to interact with them.

Many interviewees spoke of a goal of providing open access to all digital heritage. But access to “everything” may not be a goal for all user groups. Some may only care about a subset of content, and may not have an interest in digging through unrelated things to find what they are looking for. In today’s information-saturated landscape, curated collections of content, presented in a way that is relevant and meaningful to users, can sometimes be much more useful than infinite libraries. And yet, for other users, the opposite may be true. They may want access to all collections, but what they really care about is the data associated with those collections, so that they can analyze it to find new insights. For these users, access may mean being able to grab large scale and high quality data in a usable format (such as CSV or JSON) through bulk download or via APIs.

These are just a few use cases that could be uncovered after spending time engaging with users. There may be numerous others. Do users have limited sight, and would they benefit from alt-text and transcripts that could be used by screen readers? Would users like to purchase NFTs? Would they like the ability to create new content? The ability to share with others? The opportunity to contribute to crowdsourcing efforts? Or something else altogether?

Being inclusive means not making assumptions about people. It involves taking the time to learn about, empathize with, and understand the needs and goals of audiences. Once we understand who we are serving, what is important to them, and how they want to interact with heritage, we can begin to develop solutions that will deliver value by being able to answer questions like: What does access look like for each group? What do they need to know in order to re-use digital heritage?

³ https://en.wikipedia.org/wiki/SMART_criteria

Research efforts may reveal low-cost opportunities to create more digital engagement (e.g., social media posts, monthly newsletters) that can keep audiences returning over time. Larger access solutions should be built incrementally, prototyped, and tested with users to ensure they are delivering the desired value. After evaluating with users and learning what is working and what is not, incremental improvements can be made over time. User's needs and goals will continue to evolve. Heritage professionals that engage early to learn what is important to people, and often to evaluate how well a solution is performing, will be best equipped to evolve with them.

Returning to recommendation #2 — this is a great opportunity to work with external partners. Local business schools can collaborate to help conduct market and user research, and may be able to recommend simple consumer-friendly access solutions. Local design schools or firms can help develop and prototype more complex innovative access solutions. In sum, don't assume what access means to people or what it should look like. By working with, and being inclusive of diverse audiences, we can find surprising and often simple ways to deliver sustaining value.

Recommendation 4: Demonstrate impact

How do we make digital heritage a priority for stakeholders? This was a key question asked by interviewees that this model seeks to address. In recommendation 1 we started with stakeholders, learning what is important to them, and what a meaningful result would look like. From there a manageable operation that can respond to these priorities is developed, as described in recommendation 2. Access is provided to a group of users in a way that delivers significant value, as in recommendation 3. All of this can be tracked, measured, and presented to key stakeholders to demonstrate impact, and perhaps most importantly, to provide the opportunity to request specific additional resources that will maintain the momentum behind sustainability efforts..

To illustrate how these concepts come together, we'll use the example of one organization the author of this report has worked with. Like many of the people interviewed for this project, this particular organization was overwhelmed by enormous volumes of digital media—images, video, audio—coming in from field work. Unable to keep up, they were amassing large backlogs of content that needed to be ingested, organized, and tagged. As they were unable to tag everything, they kept all of these assets locked away. Users had to go through the collection managers to access anything, a time-consuming process. And although decision-makers were being told more resources were needed, they were not responding.

The organization decided to take a step back and assess their situation. To start, they engaged with leaders from across the organization to learn why media content was important to their mission, how leaders wanted to leverage media to serve strategic

priorities, and which content is most important to them. This revealed something eye-opening: their most important users only cared about certain content, and didn't care about having immediate access to the rest. Importantly, they didn't want access to content that didn't have certain metadata attached, specifically, the creator's name, the caption, and the rights. If a digital asset didn't have this information, they didn't need to know it existed.

This realization resulted in two fundamental shifts. First, it allowed the collection managers to create a collection policy that dramatically reduced the volume of media assets coming in. Previously, creators in the field sometimes delivered as many as 10,000 images and videos at one time. The new policy reduced this to a maximum of 35 of the best assets, which had to be delivered with specific metadata. Second, they developed a new approach to asset management. Instead of trying to organize, tag, and manage all assets equally, they shifted to identifying "selects" of the very best assets most aligned with institutional priorities, and focused on providing detailed metadata and rights information for only those. The remaining assets would still be ingested, but with very minimal, batch-level information, so that they are available in the less-common circumstance that someone needs them.

With these changes in place, the organization was able to build a self-service digital asset management system (DAMS) that provides staff and partners with immediate access to the curated collection. Although the system houses over one million assets, only 14,000 of those were selected, organized, cataloged, tagged with rights information, and made available to users at the time the system was launched.

Following this transition, the organization went from feeling overwhelmed by the flood of assets coming in and the crushing backlogs that were piling up, to delivering immediate value to their users by making available thousands of assets previously locked away. And perhaps most critically, they were able to demonstrate the impact of the value they had delivered to users. When decision-makers asked if they could do more, they were able to respond with a specific request for additional resources.

This organization is now in an excellent position to continue building out its digital collections program in a way that is responsive to priorities, right-sized to available resources, and that delivers ongoing value to users. They have started to build the momentum needed to sustain their organization's digital heritage, and are positioned to do even more, incrementally.

This is just one example. There are many other ways to demonstrate impact and value, depending on who the stakeholders are and their interests. The important thing is to return to the priorities of these groups as identified in recommendation #1, and demonstrate how sustaining digital heritage aligns with and supports those efforts.

From here, heritage organizations are positioned to continue to compound efforts, turning the flywheel little by little until it starts to maintain momentum on its own.

6. ANALYSIS OF CURRENT PROFESSIONAL DEVELOPMENT OFFERINGS

With this model for sustainability in mind, how well do the current professional development opportunities help prepare heritage professionals to sustain their digital content?

In order to answer this question, we looked at the landscape of trainings, courses, and workshops offered today. There were many avenues we could explore for this analysis, but for the purposes of this report, the scope of this analysis aligned with the types of capacity building that ICCROM currently offers. With this in mind, our analysis consisted of an examination of offerings that fell within the following scope:

- Continuing education training opportunities such as workshops and courses (i.e., did not include full-time, higher education degree courses, and did not include general conference presentations or panels);
- Training opportunities that are ongoing (i.e., ignores offerings that were offered one time only or where there are not indicators that it will be offered again);
- Topics covered by these offerings since 2019 only (i.e., ignores topics covered in earlier years of the same training).

Each of the offerings reviewed in our sample emphasized a specific aspect of sustaining digital heritage. For the purposes of this analysis, we have categorized these as follows:

Main topic / emphasis	# of offerings
Digital preservation	6
Digital strategy / digital transformation	5
Access	3
Data	2
Digital asset management	1

Together, the professional development offerings reviewed cover a wide range of topics relevant to sustaining digital heritage. The table below highlights the top themes that emerged across all offerings analyzed, which include key topics of interest to our interviewees.

Sub-topic	# of offerings
audience engagement	7
metadata	5
storage	4
preservation planning	4
file formats	4
business planning & fundraising	4
AI	4
intellectual property rights	3
impact	3
access strategies	3
open source tools	2
open access	2
leadership	2
ingest	2
digitization	2
copyright	2
asset management	2

However, taking a closer look, we find that the topics covered depend on the emphasis of the course. For example, figure 4 below shows that if we compare training opportunities focused on digital preservation with those focused on digital strategy, we see very little overlap in topics.

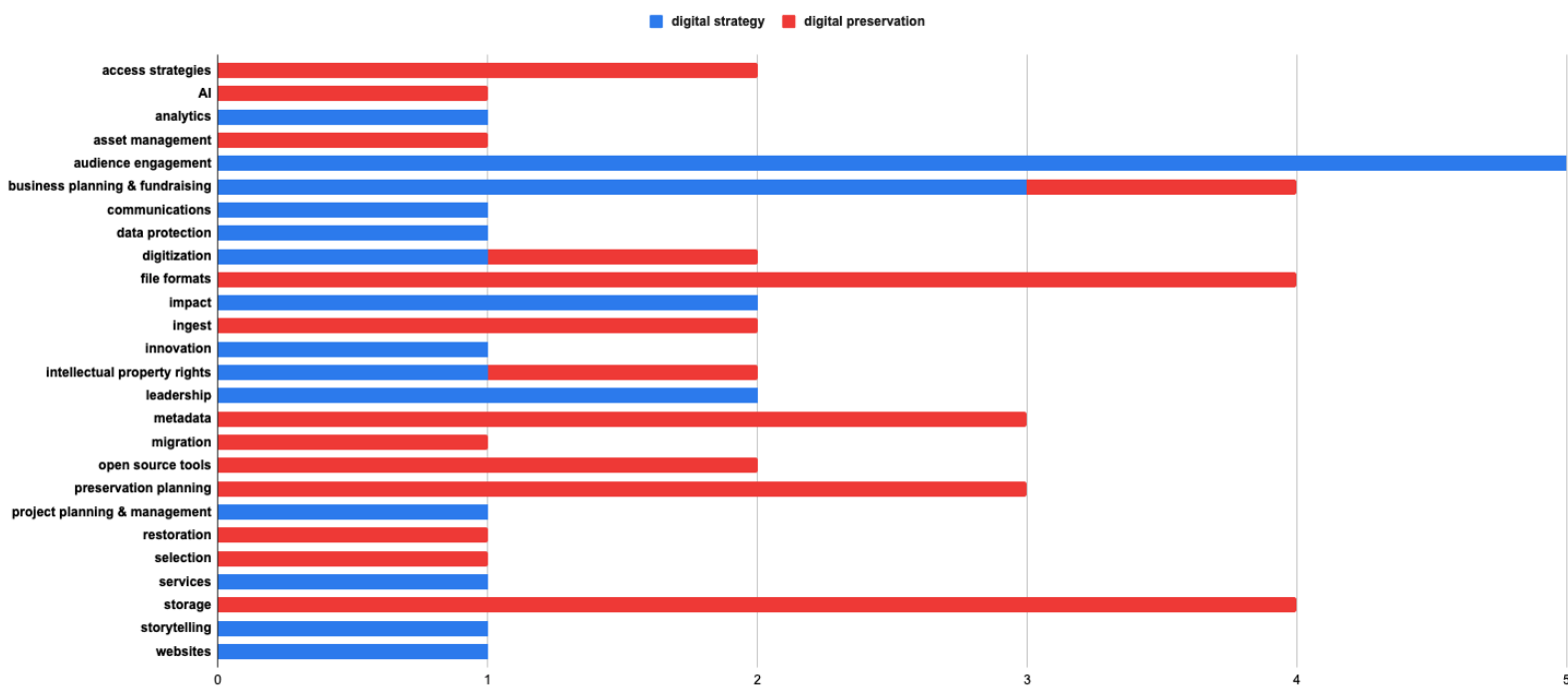


Figure 4. Analysis of topics addressed by professional development offerings focusing on digital preservation vs. digital strategy.

Although all the topics that concern interviewees and more are covered in the wealth of training offered today, we did not find a programme that brings them all together in a way that develops capacity for holistic, strategic thinking about sustaining digital heritage. There are courses on digital preservation, courses on access, and courses on digital strategy, but we did not find a learning opportunity that covers all of these subjects in the sample analyzed. Additionally, there are capabilities discussed in the model for sustainability in the previous section of this report, which may be thought of as outside the heritage domain, such as IT business analysis, marketing, and design thinking, that are not obviously⁴ covered by these existing offerings. In short, there seems to be a divide in the emphasis of different offerings..

We feel that these existing courses play a critical role in the development of digital heritage professionals by helping people build the expertise needed for sustainability of content. However, it remains our strong opinion that digital leaders must bridge these subspecialities in order to create a holistic, ongoing approach to sustaining digital heritage. At this time, we have not found an offering that covers all aspects in the comprehensive and interconnected way that seems to be needed.

⁴ Our analysis was limited to review of topics covered as presented on the websites of each professional development offering.

7. OPPORTUNITIES FOR ICCROM

As highlighted throughout this report, sustaining digital heritage requires numerous coordinated activities, from creating and collecting, to preserving and providing access. Our proposal for sustaining these activities involves weaving them together into a holistic approach that builds an organization's digital capabilities through the lens of services that are valuable to users and aligned with priorities of stakeholders. This requires interdisciplinary thinking that bridges traditional heritage subspecialties and adds additional skills for the digital age that are often found in other industries.

We see an opportunity for ICCROM to create a programme that brings these concepts together to help organizations sustain their digital heritage. Indeed, when asked what such a programme from ICCROM could offer, the focus group shared the following ideas:

- A bridge between different disciplines and sub-specialties of digital heritage
- Correlation of concepts that have traditionally been compartmentalized
- A model for building a digital strategy that is adaptable to diverse organizations—with different types of content and differing stages of digital maturity
- Digital literacy that enables heritage professionals to fluently converse with stakeholders such as IT
- An awareness and understanding of what digital heritage means and involves, and facilitation of digital transformation, especially for heritage organizations that have not yet begun to make this transition

With these ideas in mind, we could imagine a such a programme would ideally have the following characteristics:

- **Comprehensive** - The programme should offer opportunities for heritage professionals to learn the interdisciplinary aspects involved in sustaining digital heritage, and the critical thinking skills to bring these together to deliver impact.
- **Modular** - The programme should be designed to attract participants at multiple levels of experience and expertise, allowing them to develop knowledge and skills in specific topics over time, with the option of building toward a certificate by having completed multiple modules.
- **Collaborative** - Working with partners provides an opportunity for ICCROM to build an umbrella programme that brings together the relevant concepts for sustaining digital heritage while leveraging the expertise of other professional development entities that can most effectively deliver training opportunities relevant to the areas they are strongest in, such as digital preservation or audience engagement.
- **Virtual** - A digital-first learning environment natively helps build digital skills. A remote offering that combines synchronous and asynchronous learning, through digital platforms, has the added benefit of providing a means to engage with people in various locations, while reducing the need for costly travel.

- **Cohort-based** - Like ICCROM's current programmes, an ideal training opportunity brings together a group of people working together over the same timeframe toward the similar goals, who can motivate each other, learn from each other by providing feedback, and provide accountability to one another.

We believe that a programme with these characteristics would appeal to heritage professionals from a variety of specialties, at varying levels of career development. Those earlier in their career or wishing to develop more expertise in a specific skill may choose to focus on a single module. Others may wish to focus on building their digital leadership skills by completing multiple modules and receiving a certificate.

There are numerous models of online learning today that could provide inspiration for this programme. Some of the most successful have the same characteristics as those described above, allowing learners to grow in a way that responds to both immediate and long-term needs.

We imagine that such a programme would address key topics already covered by related offerings, such as digitization, storage, and access. However, it would also include concepts and skill sets from other industries such as project management, design, and software development. This interdisciplinary, hybrid approach will help participants gain skills designed to help build their digital confidence, and open up new opportunities to engage and explore.

Looking through the lens of the sustainability model shared above, the hard and soft skills required may include the following:

Foundational Skills - critical to all stages	
Design thinking / human-centered design	For prototyping and testing solutions that responds directly to the needs of users
Program and project management	To develop skills in scoping, budgeting, task management, and time management
1. Adopt a service mindset	
User research	For developing an understanding of and empathy with users
Market research	To build skills in identifying and understanding characteristics of different groups
2. Right-size digital operations	
IT business analysis	To help with translating between business needs and technology solutions and collaboration with technologists

Agile	A software development project management framework that is widely adaptable to many other scenarios, which offers concrete methods for articulating requirements to technologists
Digital storage and cloud computing basics	To help practitioners gain an understanding of “-as a service” offerings, particularly for storage, computing/servers, and software.
Information security basics	To help practitioners assess risks of a particular technology solution, and understand how to safeguard information security and privacy
3. Deliver value	
User research	For developing an understanding of and empathy with users
Market research	To build skills in identifying and understanding characteristics and behaviors of different groups as well as changes in technology
Content strategy	The strategic process of creating, publishing, and promoting content that promotes and serves organizational objectives
Intellectual property rights	To help practitioners gain confidence in their ability to open access responsibly and ethically
Marketing	To support outreach to various audiences, and increase engagement
4. Demonstrate impact	
Fundraising / proposal writing / grant writing	To help practitioners learn how to pitch proposals to decision-makers and funders
Business analysis	To assess and share organizational and societal impact
Basic data analysis and reporting	Spreadsheet fundamentals that can help with tracking, measuring, and reporting the progress of a project or program, as well as analyzing collections data

These topics could be integrated into modules on core digital heritage topics (such as digital preservation) and priority concerns of interviewees (such as managing copyright). They could also be recommended as standalone topics, with suggested resources or platforms from where they could be learned. Taking these recommended courses could contribute to a certification.

Although this is an ambitious proposal for ICCROM's Sustaining Digital Heritage programme, in practice it can and should be built incrementally over time (similar to the recommendations laid out in the report). This study represents the outcome of an initial user engagement exercise, and has resulted in a preliminary proposal for the program. Next, a right-sized effort can be developed, which best leverages the available resources. For example, the first iteration could start with recommending a series of existing courses, to help give heritage practitioners some direction of what skills to learn, and where they can be acquired. After developing this offering and deploying it, the end result can be tested to understand what was the impact, and where the programme could go from there. Further developments can be made, tested, and demonstrated, so that the program begins to build and sustain momentum over time.

As a next step, project team members will be working together to build on these concepts to develop a more detailed proposal for ICCROM's sustaining digital heritage program, and begin to develop a prototype that can be tested with interviewees.