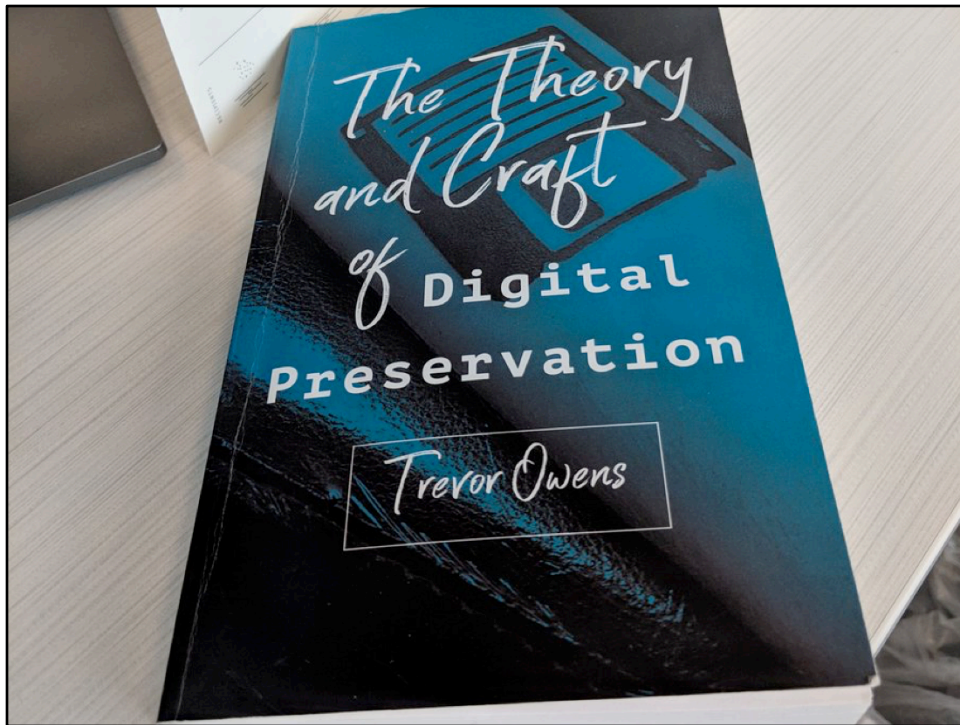


Many thanks for this opportunity to share some ideas and thoughts as part of the Stone lecture series. Given the impressive run of speakers that have given lectures as part of this series it's a bit of a humbling experience to be a part of this. Thank you for tuning in.

The original idea for this was that it would be a face-to-face talk scheduled for roughly a year ago. But the COVID-19 pandemic intervened. It intervened so strongly that here we are a year later and the event, like so many parts of our lives at this point, is virtual.

My talk today, Caring for Digital Collections in the Anthropocene, is connected directly to issues that are highlighted by how the pandemic has further fissured, stressed, and challenged us.

I should note up front, that this is just me talking. These ideas are just Trevor's thoughts. I'm not speaking on behalf of any organization I'm affiliated with, not for my day job, not that I teach for, not for the orgs that I'm a board member for etc.



This talk begins where my most recent book ends. I wrote *The Theory and Craft of Digital Preservation* in 2016 and 2017. The book is largely about contextualizing the work of digital preservation in the ongoing traditions of preservation that span back throughout, really, all of human civilization and about offering some practical and pragmatic ideas about how to approach the craft of ensuring long term access to information.

The book ends focusing on the importance of thinking about the future.

Preservation is itself really access in the future. So it's important to be able to theorize about the future and plan for how to mitigate risks it presents. So it ends up being important to think about the future, to think like a futurist and this is a somewhat scary time to think about the future.

Much of my talk today draws from that last chapter of my book.

I'll spend a bit of time in this talk first thinking through a few near term technology changes that are going on. My goal in doing so isn't so much to talk about those changes but to model how to approach thinking like a futurist. From there, I will expand out a bit more to talk about what I see as the larger scale challenges that we need to be thinking about as memory workers.



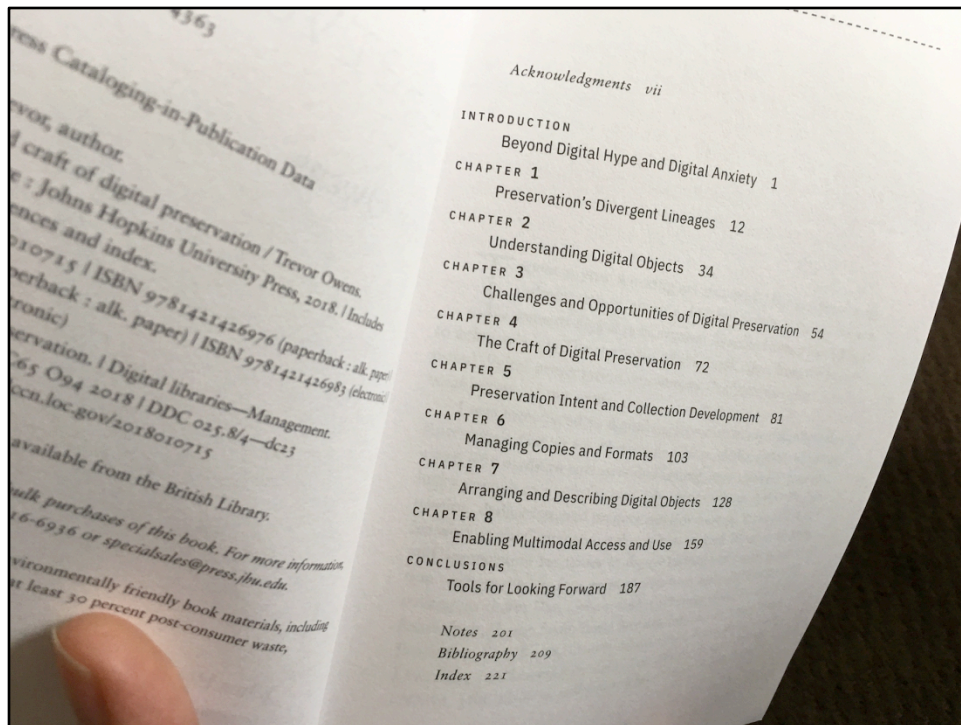
The first and last terms in my title are the most important parts.

I've chosen to frame this talk around both notions of care, a core concept in work with collections but an increasingly critical framework for thinking about our ethical obligations to each other and the world.

Given that we are thinking about the future, I've also brought up the notion of the Anthropocene in the title. This concept for naming the era of geologic time we now occupy, has increasingly become a key notion for thinking about the future of our world.

The bit in the middle, about digital collections, I imagine to widely relevant and of interest to those of you tuning in. At this point, much if not most of our cultural, creative, political, works and records are born digital. At the same time, mass digitization has begun to make more and more of the analog historical record usable in digital form. Libraries, archives, and museums are gearing up more and more for the responsibility to acquire, preserve, and enable use of this digital and digitized content. That is what I'm talking about in terms of digital collections in this talk.

Caring for and preserving that material requires us to be thinking a good bit about the future of technology and our society and world.



Caring for digital collections, and doing digital preservation, is not an exact science. It is a craft in which experts must reflexively deploy and refine their judgment to appraise digital content and implement strategies for minimizing risk of loss. At least, that is the case I have sought to make my book.

You can see the structure of it here.

The case I make in the book is that the craft of digital preservation is anchored in the past. It builds off the records, files, and works of those who came before us and those who designed and set up the systems that enable the creation, transmission, and rendering of their work.



At the same time, the craft of digital preservation is also the work of a futurist. We must look to the past trends in the ebb and flow of the development of digital media and hedge our bets on how digital technologies of the future will play out.

In the context of this kind of futurist thinking, my hope is that this can offer insights into a few near-term technology trends and shifts that may be relevant to digital preservation but also, more broadly, demonstrate approaches through thinking through the potential impact of any technology trend.

There are numerous emerging technologies and tech trends that are relevant to thinking through the future of digital preservation and caring for digital collections. I will briefly review two such trends: emerging user interface paradigms and the shifting rates of increase in storage capacity. After discussing these two trends, I will visit trends that I see as misdirections for thinking about the future. For each of these technologies, the details about them are potentially relevant, but, more significantly, the thought process for considering them illustrates how to consider and evaluate signals and trends in technology as a digital preservation practitioner. After consideration of near-term emerging technology trends, I will zoom out and offer a few broader observations about challenges in charting the future of digital technologies for work in cultural heritage institutions.



Since their wide-scale rollout into the market with iPhones, touch interfaces have quickly transitioned to be the primary interface by which users around the globe interact with computers. This transition is an excellent opportunity to check our assumptions about the future use of digital content.

If the trend continues, we could move into a situation where things like keyboards just aren't part of the default setup for computing environments. In that case, various kinds of digital content that assumed their use would need to be adapted to be made usable. In many cases, tablet devices are building in virtual keyboards that offer a vision of what might come: more and more layers of virtualized interfaces to technologies.

The changes that touch-based computing bring may be the first of a series of novel interface paradigms. Virtual reality (VR) devices, like the Oculus, are moving what had been decades of the imagination into a viable consumer technology. What opportunities will there be for providing access to content in a VR environment? At the same time, what sorts of ethical considerations might come into play around placing someone in a more embodied and direct experience with content?

The most conceptually challenging of the new computing environment interface modes is voice. Tools like Amazon Alexa and Google Echo are now starting to show



Over the last thirty years we have become accustomed to the idea that every few years we should be able to buy significantly larger volumes of digital storage for lower and lower prices.

Our experience as consumers has been that if you bought a new computer every five or six years, that new computer would come with a dramatic increase in storage capacity.

I clearly remember at one point getting a computer that had eight gigabytes of storage and saying, “How would I ever fill that up?” Of course I did. We all did. With more and more storage space, more and more larger files became possible.

The pace of nearly exponentially dropping costs of storage is explained in Kryder’s Law. Named for the chief technology officer of Seagate, the concept focuses on the idea that one could expect drives to store 40 percent more data in the same amount of physical space every subsequent year as a result in advances in storage technology.

For a number of years this rate of change has stalled out. The core take-away from this shift is that digital storage is not likely to keep getting cheaper like it has in the past. Importantly, the pace of growth for the creation of digital content has not



There will never be an app for digital preservation and digital collections care. Much the same as there will be no app for more pressing challenges facing society like social justice, economic equity, civil rights, poverty, or a better environment. However, the rapid pace at which computing has changed our lives sometimes makes it seem like some app could drop tomorrow that would “solve” long-standing social, political, and economic issues.

Don’t bet on linked data, blockchains, QR codes, bitcoin, or artificial intelligence to offer or suggest new ways to solve our problems. Similarly, don’t wait until the next fancy new open source repository system is finished to get started doing digital preservation. Technologies will not save us from needing to get your metaphorical digital boxes off the floor before the flood comes.

In keeping with much of the discourse of computing in contemporary society, there is a push toward technological solutionism that seeks to “solve” a problem like digital preservation and digital collections care.

The point of my book is that there isn’t a problem so much as there are myriad local problems contingent on what different communities value.

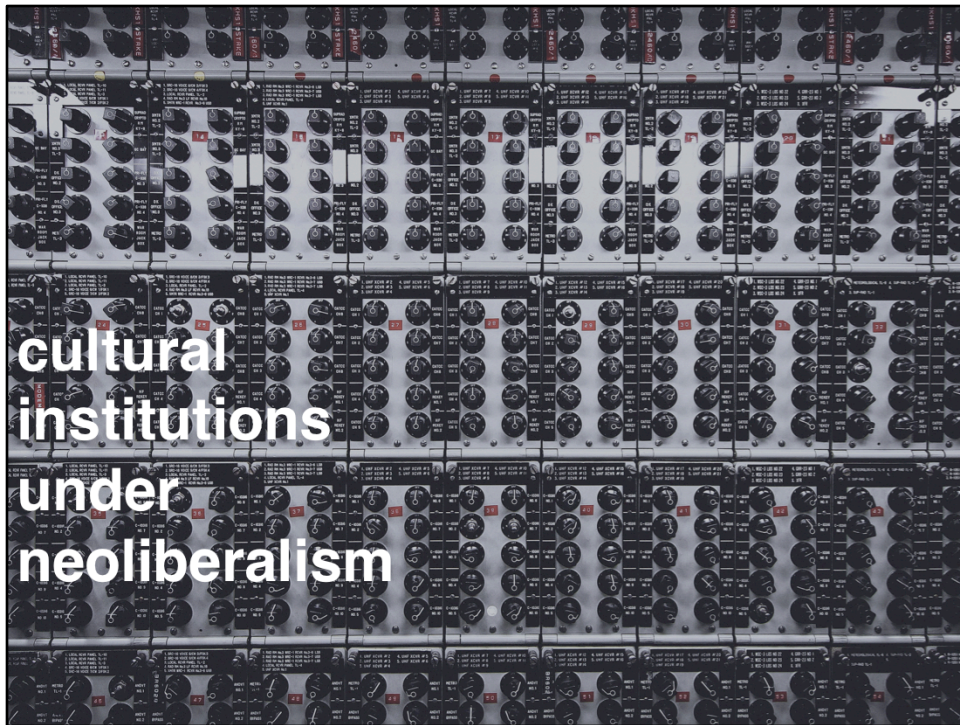
One of the biggest problems in digital preservation and digital collections care is that there is a persistent belief by many that the problem at hand is technical. Or that



What I personally want for the future of digital technology is largely irrelevant. Our society provides and provisions resources for imagining our technological future not to our communities, or our teachers, librarians, archivists, historians, sociologists, or scientists. All of us work in the shadows of two casts of characters who are empowered to dream of a future and manifest it as reality through the application of resources.

The defense industry and Silicon Valley are the two institutions that get to really imagine the future and have the resources to manifest their visions of possible worlds and technologies in the realities. The web, data mining, facial recognition, cryptography, data storage systems: all of these systems and infrastructures come to us from the minds and the largess of flows of venture capital into Silicon Valley and federal spending from the US government into military R&D. These points are true for shaping the future in the United States and abroad. Without radical and seemingly unlikely changes in how we allocate global resources, this is unlikely to change.

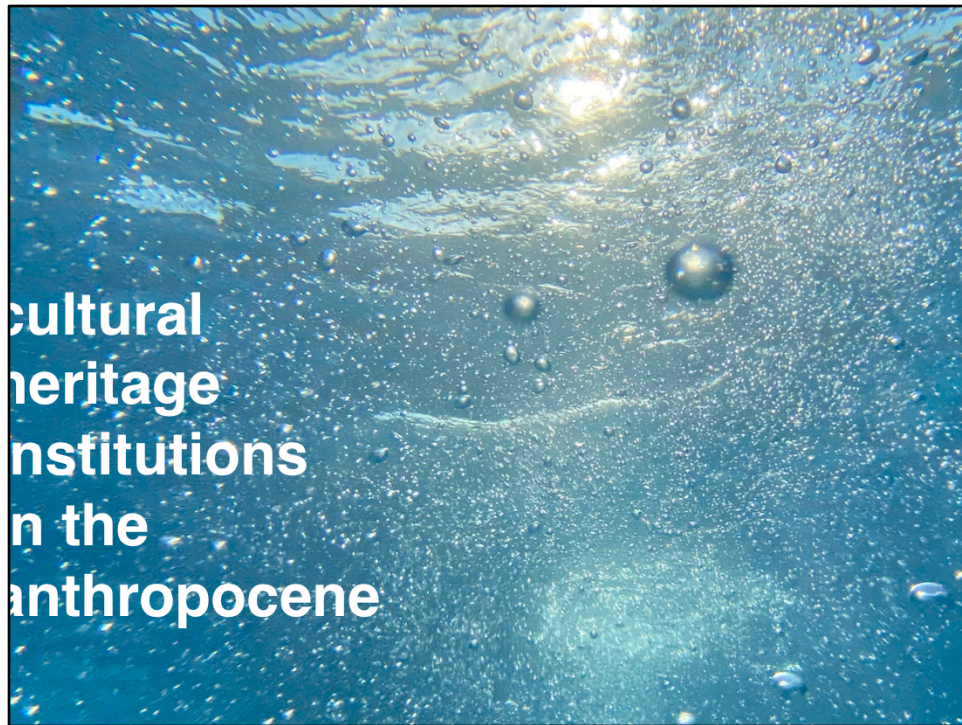
The result is that archivists, historians, humanists, and all other sectors of civil society aren't granted the resources to steer any of the fundamental decisions about what kind of future technology is worth bringing into reality. It's a bit bleak, but I think it's best to see things more clearly for what they are. This has some pragmatic



“Do we need libraries in the age of Google?” is the kind of absurd question that is possible only in a society that has been seduced by the siren’s calls of late capitalism. How is it culturally possible that this question is asked? The concept that a for-profit company founded less than twenty years ago could entice people to question the social, civic, and economic function that more than 100,000 libraries provide to people across the United States alone exemplifies a growing sickness in the zeitgeist. No. Ad revenue for search will not create a national infrastructure for collecting, preserving, and providing access to knowledge, wisdom, and lifelong learning.

I don’t mean to pick on or blame Google here. The problem is just as much our own lack of belief in our institutions as it is our belief in the idea that the success of the development of computing technology can result in a complete rewiring of society. Silicon Valley’s notions of disruptive innovation occupy so much of our cultural imagination in large part because they have an ergonomic fit with a long-standing social impulse to divest in social, civic, and public goods. This technological utopianism comes at the same time as we experience the long-running history of neoliberalism.

Under the logic of neoliberalism, nearly all aspects of society are imbued with the logic of the marketplace. States find themselves with fewer and fewer resources to maintain libraries and archives. At the same time, companies have swooped in to



The twentieth century brought with it something far more novel than the emergence of digital media. It brought about the ability for humanity to radically alter our world to the point that it could become completely inhospitable to us. We have entered a new age, the Anthropocene. In astrobiologist David Grinspoon's terms, it's not entirely clear whether this is going to be an era, an epoch, or an event. Will we come to recognize the power of technology and science and become stewards of our fragile, pale blue dot? Or, will we haphazardly continue along a collision course toward our own potential near extinction? Only time will tell, but in general, the outlook does not look so good.

Anthropogenic global climate change is happening. The science is settled. In the next half century we are going to see dramatic changes to our global environment, and the results of this will have sweeping impacts on all sectors of society, cultural heritage institutions included. For context, just in the United States, more than half of the major cities are less than ten feet above sea level. Many cultural heritage institutions may be literally under water in the next century.

KEEPING HISTORY ABOVE WATER

ABOUT NEWS CONFERENCES PROGRAMS & PARTNERSHIPS

ABOUT Gull Rocks

Keeping History Above Water began as a simple idea for a conference to be hosted by the Newport Restoration Foundation (NRF) in Newport, Rhode Island in the spring of 2016. In the years since, *Keeping History Above Water* has expanded to include a variety of activities related to climate and cultural heritage across Rhode Island and around the world. Conferences hosted in vulnerable regions across the country are a centerpiece of *Keeping History Above Water*.

BE IN TOUCH

Keeping History Above Water is Restoration Foundation. For info contact us at:

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NEWPORT AND BEYOND

Keeping History Above Water: Newport was one of the first national conversations to focus on the increasing and varied risks posed by sea level rise to historic coastal communities and their built environments. Importantly, it was not a conference about climate change, but about what preservationists, engineers, city planners, legislators, insurers, historic home owners and other

This is an issue that librarians, archivists, and museum professionals are responding to proactively through initiatives like **Archivists Respond to Climate Change** and **Keeping History above Water**. It's worth noting that the National Parks Service has also issued guidance on scenario planning for historical sites, which is a useful tool for any cultural heritage institution to use to plan for continuing your mission in the face of a changing environment. Throughout all of this work, it remains clear that we are likely to see more and more natural disasters occur around the world, which makes it all the more critical for cultural heritage institutions to be developing plans for how to respond to disasters in their communities and ideally how to lend a hand in disasters that occur in others.

In this context, it becomes increasingly important for cultural heritage institutions to explore ways to become more environmentally sustainable. The revolving cast of ever sleeker new computing gadgets in the privileged minority world is predicated on deeply problematic labor conditions in the majority world, the exploitation of natural resources, and environmentally and socially problematic factories.



Beyond that, it's not just the problems of producing computing technologies but also the problems of where they end up when they have been quickly discarded. E-waste is having significant detrimental effects on human health in the majority world, in countries like China and India. In this context, it is important for digital preservation practitioners to commit to establishing green practices. This can and should involve thinking about the carbon footprints of equipment such as servers, and the ways that institutions can become better at engaging in practices to reduce e-waste.

When we consider the heating and cooling costs both in terms of carbon footprint and the cost of electricity, we might want to make different decisions about storage media. Indeed, several cultural heritage institutions are beginning to explore these issues. Along with this change, assuming that the Kryder rate does continue to level off, there could well be opportunities to focus on investing in longer-lived storage systems that could be more efficient in terms of energy consumption and result in less e-waste. In this space, digital humanities efforts like the minimal computing that looks to ways to use more sustainable computing technologies and systems become sites of significant value for the future of digital preservation.

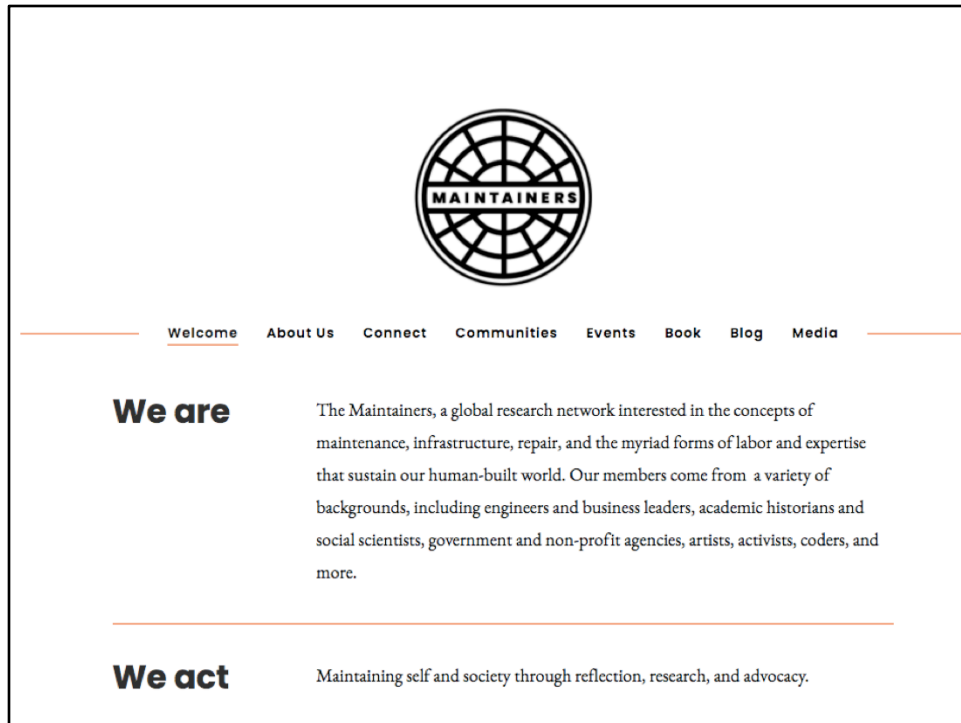
I want to conclude on the subject that gives me hope. I think we have been largely misled about where innovation occurs in our world. While wealth and power are stacked up to offer a small set of privileged folks to design our future, a very different

“take erosion, breakdown, and decay, rather than novelty, growth, and progress, as our starting points in thinking through the nature, use, and effects of information technology and new media.”

Jackson, Rethinking Repair

In the essay “Rethinking Repair,” Stephen Jackson asks us to “take erosion, breakdown, and decay, rather than novelty, growth, and progress, as our starting points in thinking through the nature, use, and effects of information technology and new media.” This line of thinking leads us to see the capacity of human civilization to absorb and respond to dramatic changes as the site of innovation. Through discussion of the ship-breaking industry in Bangladesh, Jackson demonstrates how a source of global waste and detritus of abandoned ships becomes a resource that is broken down to its parts and circulated back into the global economy.

In this context, it’s not the continual forces of “disruptive innovation” that we need to be focused on. Those are the very forces that have brought the world to the brink. In contrast, we should re-focus our attention on the forces of maintenance and repair that emerge in the wake of these so-called innovators.



Indeed a community of scholars and practitioners has emerged around the idea of recentering maintenance in our understanding of the future. Cultural heritage institutions could stand to benefit considerably from a recentering of this mindset in our culture. However, with that noted, we have nearly as much to gain by focusing on recentering this in our own conceptions of our institutions' roles and functions. All too often the ideologies that underlie digital technologies begin to rub off on our thinking about the work of digital preservation. Central to our understanding of the future of cultural heritage institutions must be the realization that preservation, digital or otherwise, is about committing financial resources and empowering current and future generations of professional librarians, archivists, and museum professionals to build and maintain the social and civic infrastructure roles that our institutions serve to the world. We can't predict the future, but we can invest in it.



Martha Anderson, formerly the managing director of the Library of Congress National Digital Information and Infrastructure Program, who I was lucky to have as a mentor and a guide in developing my craft, described digital preservation as a relay race. Digital preservation and caring for digital collections is not about a particular system, or a series of preservation actions. It is about preparing content and collections for the first in a great chain of hand-offs. It's also the work of people. It's critical for us to work to build out networks of care that sustain the people that care for collections. We cannot predict what the future digital mediums and interfaces will be, or how they will work, but we can select materials from today, work with communities to articulate aspects of them that matter for particular use cases, make perfect copies of them, and then work to hedge our bets on digital technology trends to try and make the next hand-off as smoothly as possible. That is what it means to practice the craft of digital preservation.

In the last half century or so, librarians, archivists, curators and other memory workers have developed a set of approaches we can use to ensure long term access to digital information. We've figured out how to manage and check and carry forward digital information across that whole period of growth and development. The next century of work to care for and ensure access to digital collections presents new and daunting challenges. We need to continue to make the case to secure the resources to employ memory workers to figure out and solve these problems in the face of