

Сандық трансформация институттық сын ретінде: архивтердің болашағына көзқарас



«Жаңа Архив» журналының редакциясы архивтану, құжаттану, архив ісі, деректану, тарих және құқық салаларындағы жетекші сарапшылардың пікірлерін оқырмандарға таныстыруға арналған жарияланымдар сериясын жалғастыруда. Бүгін редакцияның сұрақтарына әлеуметтанушы, тарихшы және архивист, Америкалық физика институтының (American Institute of Physics (AIP, АҚШ) бас ғылыми қызметкері д-р Trevor Owens жауап береді.

AIP – 1931 жылы физика ғылымын дамыту, сондай-ақ физика және оған іргелес ғылым салаларындағы білімді қолдау мен тарату мақсатында құрылған беделді коммерциялық емес ұйым. Ол физикалық қоғамдарды біріктіреді, жоғары дәйексөзделетін ғылыми журналдарды шығарады, конференция материалдарын жариялайды және физика саласындағы дәйексөз келтіру стандарттарын әзірлейді.

Т. Оуэнс AIP ұйымындағы әлеуметтанушылар, тарихшылар, кітапханашылар мен архившілерден тұратын топтарға жетекшілік етеді. Олар зерттеулер мен талдаулар арқылы физика ғылымдарының дамуына ықпал етіп, ғылыми мұраны тереңірек түсінуге және болашақтағы прогреске ықпал етуге бағытталған жұмыстар жүргізеді.

AIP-ке келгенге дейін Т. Оуэнс Конгресс кітапханасында (Library of Congress) цифрлық қызметтер директоры лауазымын атқарған, сондай-ақ Музей және кітапхана қызметтері институтында (Institute of Museum and Library Services (IMLS) және Рой Розенцвейг атындағы Тарих және жаңа медиа орталығында (Roy Rosenzweig Center for History and New Media) жұмыс істеген. Осы қызметтерінің арқасында ол ғылым тарихын зерттеу, кітапханалар мен архивтерді басқару, сондай-ақ әлеуметтік ғылымдар саласындағы қолданбалы зерттеулер жүргізу бойынша мол тәжірибе жинақтады. 2023 жылы ол AIP-тің тарих, кітапханалар және архивтер саласындағы бағдарламаларының болашақтағы дамуының стратегиялық көрінісін әзірлеумен айналысқан AIP сараптамалық комиссиясының мүшесі болды.

Т. Оуэнс – бірнеше ғылыми еңбектердің авторы. Олардың қатарында «Mecha-Archivists: Envisioning the Role of Software in the Future of Archives». Talk presented at the Radcliffe Workshop on Technology and Archival Processing (Harvard University, 2014); «The Theory and Craft of Digital Preservation: An Introduction» (Johns Hopkins University Press. Baltimore, MD, 2018); «A Good Jobs Strategy for Libraries (Library Leadership & Management. 35 (3). 2021); «After Disruption: A Future for Cultural Memory» (University of Michigan Press. Ann Arbor, MI, 2023) еңбектері бар.

Қазіргі таңда цифрлық трансформация құжаттық мұраны сақтау, сипаттау және пайдалану тәсілдерін түбегейлі өзгертіп отыр. Дәстүрлі түрде сақтау орны ретінде қабылданған архивтер біртіндеп ақпаратты басқарудың жоғары технологиялық орталықтарына айналады. Мұнда электрондық жүйелер, деректерді өңдеу технологиялары және дереккөздерге қолжетімділіктің жаңа форматтары маңызды рөл атқарады. Осындай жағдайда архивтану, ақпараттық технологиялар және деректерді басқару салаларындағы құзыреттерге ие мамандардың кәсіби сараптамасы ерекше маңызға ие.

Жарияланып отырған сұхбатта сарапшы архивтік жұмыстың тәжірибесін бүгінгі өзінде өзгертіп жатқан технологиялық шешімдер, жаңа буын мамандарына қажетті құзырет-

тер және цифрлық ортаның қарқынды дамуы жағдайында архивтердің алдында ашылып отырған мүмкіндіктер туралы ой бөліседі. Т. Оуэнстың көзқарасы кейбір қалыптасқан тәсілдермен толық сәйкес келе бермейді. Сондықтан ол тек архив саласының мамандарын ғана емес, сонымен қатар цифрландыру дәуірінде құжаттық мұраны басқару мәселелерімен айналысатын барлық мамандардың қызығушылығын тудырады.

2026 жылдың маусым айында Қазақстан Республикасы Президентінің архивінде өтетін «Digital Archive. ЕХРО» атты III Халықаралық архившілер конгресі қарсаңында сарапшының құжаттарды сипаттау мен іздеу барысында жасанды интеллектіні қолдану, сондай-ақ ұлттық цифрлық мұраны басқарудағы мүмкіндіктер мен тәуекелдер туралы ой-пікірлері ерекше қызығушылық тудырады.

Цифровая трансформация как институциональный вызов: взгляд на будущее архивов

Редакция журнала «Жаңа Архив» продолжает серию публикаций, в которой знакомит своих читателей с мнением ведущих экспертов в области архивоведения, документоведения, архивного дела, источниковедения, истории и права. Сегодня на вопросы редакции отвечает социолог, историк и архивист, главный научный сотрудник Американского института физики (American Institute of Physics (AIP, США) д-р Тревор Оуэнс.

AIP – авторитетная некоммерческая организация, созданная в 1931 г. для развития физической науки, поддержки и распространения знаний в области физики и смежных дисциплин. Она объединяет физические общества, выпускает высокоцитируемые научные журналы, публикует материалы конференций и разрабатывает стандарты цитирования в физике. Т. Оуэнс осуществляет руководство группами социологов, историков, библиотекарей и архивистов AIP, которые занимаются вопросами развития физических наук посредством исследований и анализа, направленных на улучшение понимания наследия и содействие будущему прогрессу.

До прихода в AIP Т. Оуэнс занимал должность директора цифровых услуг в Библиотеке Конгресса США, работал в Институте музейных и библиотечных услуг (Institute of Museum and Library Services (IMLS) и Центре истории и новых медиа им. Роя Розенцвейга (Roy Rosenzweig Center for History and New Media). Благодаря этому он приобрел обширный опыт и знания в области исследований истории науки, руководства и управления библиотеками и архивами, а также прикладных исследований в области социальных наук. В 2023 г. он был членом экспертной комиссии AIP, занимавшейся разработкой стратегического видения будущего программ AIP в области истории, библиотек и архивов.

Т. Оуэнс – автор трудов «Mecha-Archivists: Envisioning the Role of Software in the Future of Archives». Talk presented at the Radcliffe Workshop on Technology and Archival Processing (Harvard University, 2014); «The Theory and Craft of Digital Preservation: An Introduction» (Johns Hopkins University Press. Baltimore, MD, 2018); «A Good Jobs Strategy for Libraries (Library Leadership & Management. 35 (3). 2021); «After Disruption: A Future for Cultural Memory» (University of Michigan Press. Ann Arbor, MI, 2023).

Цифровая трансформация сегодня кардинально меняет способы сохранения, описания и использования документального наследия. Архивы, традиционно воспринимавшиеся как пространство хранения, постепенно становятся высокотехнологичными центрами управления информацией, где важную роль играют электронные системы, технологии обработки данных и новые форматы доступа к источникам. В этих условиях особую значимость приобретает профессиональная экспертиза специалистов, обладающих необходимыми компетенциями в области архивоведения, информационных технологий и управления данными.

В публикуемом интервью эксперт рассуждает о том, какие технологические решения уже сегодня меняют практику архивной работы, какие компетенции становятся необходимыми для специалистов нового поколения и какие перспективы открываются перед архивами в условиях стремительного развития цифровой среды. Взгляд Т. Оуэнса не во всем совпадает с общеустоявшимися подходами. Этим он привлекает не только представителей профессионального сообщества архивистов, но и всех, кто занимается вопросами управления документальным наследием в эпоху цифровизации. В преддверии III Международного конгресса архивистов «Digital Archive. EXPO», который пройдет в июне 2026 г. на площадке Архива Президента Республики Казахстан, интересны размышления эксперта об использовании ИИ для описания и поиска, а также о возможностях и рисках для управления национальным цифровым наследием.

Digital Transformation as an Institutional Challenge: A Perspective on the Future of Archives

The editorial board of the journal “Zhana Archive” continues its series of publications introducing readers to the opinions of leading experts in archival science, records management, archival practice, source studies, history, and law. Today, the editorial board’s questions are answered by sociologist, historian, and archivist Trevor Owens, Chief Research Scientist at the American Institute of Physics (AIP, USA).

AIP is a leading non-profit organization founded in 1931 to advance the physical sciences and to support and disseminate knowledge in physics and related disciplines. It brings together physical societies, publishes highly cited scientific journals, produces conference proceedings, and develops citation standards in physics. T. Owens leads teams of sociologists, historians, librarians, and archivists at AIP who work on advancing the physical sciences through research and analysis aimed at improving understanding of the field’s heritage and supporting future progress.

Before joining AIP, T. Owens served as Director of Digital Services at the Library of Congress, and worked at the Institute of Museum and Library Services (IMLS) and the Roy Rosenzweig Center for History and New Media. Through this work, he gained extensive experience in the study of the history of science, as well as in the leadership and management of libraries and archives, and in applied research in the social sciences. In 2023, he served as a member of an AIP expert commission that developed a strategic vision for the future of AIP programs in history, libraries, and archives.

T. Owens is the author of several works, including «Mecha-Archivists: Envisioning the Role of Software in the Future of Archives». Talk presented at the Radcliffe Workshop on Technology and Archival Processing (Harvard University, 2014); «The Theory and Craft of Digital Preservation: An Introduction» (Johns Hopkins University Press. Baltimore, MD, 2018); «A Good Jobs Strategy for Libraries (Library Leadership & Management. 35 (3). 2021); «After Disruption: A Future for Cultural Memory» (University of Michigan Press. Ann Arbor, MI, 2023).

Today, digital transformation is fundamentally changing the ways in which documentary heritage is preserved, described, and used. Archives, traditionally perceived as spaces of storage, are gradually becoming high-tech centers for information management, where electronic systems, data processing technologies, and new formats of access to sources play an increasingly important role. In this context, the professional expertise of specialists possessing competencies in archival science, information technology, and data management is becoming particularly significant.

In the published interview, the expert reflects on which technological solutions are already transforming archival practice, which competencies are becoming essential for a new generation of specialists, and what prospects are opening up for archives in the rapidly developing digital

environment. Owens' perspective does not always coincide with established approaches. For this reason, it attracts the attention not only of the professional archival community but also of everyone engaged in the management of documentary heritage in the era of digitalization.

On the eve of the III International Congress of Archivists "Digital Archive. EXPO", which will be held in June 2026 at the Archive of the President of the Republic of Kazakhstan, the expert's reflections on the use of artificial intelligence for description and search, as well as on the opportunities and risks associated with managing national digital heritage, are of particular interest.

1. About the "craft" of digital preservation: *In your book "The Theory and Craft of Digital Preservation" (2018), you focus on the long-term sustainability of data. What hidden threats to digital archives remain most relevant in an era of rapid change in formats and technologies?*

When we talk about threats to digital preservation, the issues that tend to come first to mind are technological. Archivists often worry about whether a file format will become obsolete, how many copies of files should be maintained, or how frequently fixity checks should be run to ensure that files have not been altered. These are all important technical and practical questions. However, in my experience the most significant threats to digital preservation are not technological but organizational.

In *The Theory and Craft of Digital Preservation*, I argue that digital preservation is primarily a problem of organizational and resource management planning rather than a problem of technology. The long-term survival of digital collections depends on whether organizations can sustain the staffing, funding, and institutional commitment required to maintain them over time. Technologies change quickly, but well-supported institutions can adapt to those changes.

The hidden threat to digital archives, then, is not primarily technological change. It is the risk that organizations underestimate the long-term commitments required to sustain digital collections. Successful digital preservation programs therefore focus not only on technical infrastructure but also on building durable institutions, stable workflows, and clear policies that can persist through inevitable technological transitions.

Beyond this, there is a broader social dimension to preservation. The long-term future of digital archives ultimately depends on whether the communities they serve continue to value them. Archives persist because stakeholders – governments, funders, researchers, and the public – are willing to invest resources in maintaining them. In the final chapter of *The Theory and Craft of Digital Preservation* I discuss how preservation ultimately rests on these ongoing commitments of support. I explore this idea further in my more recent book, *After Disruption: A Future for Cultural Memory*, where I argue that the future of archives depends on their ability to demonstrate value, cultivate trust, and remain meaningful to the communities whose histories they preserve.

2. Strategic priorities for the development of archives: *As the first researcher at the American Institute of Physics and with experience working at the Library of Congress, what do you think should be a priority for the national Archives in the first 5 years of its digital transformation?*

I cannot speak directly to the particular issues that archivists in Kazakhstan may be facing. You and your colleagues will naturally be far better positioned to understand the specific institutional, legal, and cultural contexts shaping your work. However, drawing on my experience working in the United States, as well as my experience as a Fulbright Specialist working with the National Library of Kosovo on its digital strategy, I would suggest that the first years of digital transformation should focus on building sustainable institutional foundations.

In many discussions of digital transformations, the emphasis falls heavily on selecting new technologies or implementing new software systems. While those choices matter, but they can

often obscure the need to focus time and effort on more fundamental questions regarding how to ensure that an institution has the long-term capacity to sustain digital collections and services. Digital preservation and digital access are ongoing processes, not one-time projects. For this reason, it is critical that institutions continually prioritize building durable policies, workflows, and staffing models that can continue to operate through inevitable technological change.

A first priority in this context, is ensuring that archives clearly demonstrate their value to the communities they serve. Archives exist within broader social and political ecosystems. Their long-term sustainability depends on whether researchers, policymakers, educators, and the public see them as meaningful and worth supporting. In *After Disruption: A Future for Cultural Memory*, I argue that cultural heritage institutions need to focus on creating opportunities for stakeholders to find meaning, connection, and belonging through engagement with collections. Institutions that cultivate those relationships are more likely to maintain the long-term support necessary for preserving digital heritage.

A second priority is investing in the people who make archival work possible. Digital archives ultimately depend on skilled staff who can design workflows, manage systems, and continually adapt to new forms of information. In my work on organizational strategy in libraries and archives, I have argued that institutions should focus on creating “good jobs” for staff – roles that provide stability, opportunities for learning, and the authority to improve workflows and systems. When staff are empowered and supported, organizations become far more resilient in the face of technological and organizational change.

In short, digital archives work must focus less on specific technologies and more on building strong institutions: organizations that demonstrate public value, invest in their staff, and develop policies and workflows that can sustain digital collections over the long term.

3. Digital forensics and integrity: *Kazakhstan is increasingly dealing with “digital” and “electronic” documents. How can digital archivistics tools (like the ones you’ve worked with) help ensure the legal authenticity of these documents so that future generations can trust them as historical evidence?*

The integrity of digital collections ultimately rests on the same foundation that has always supported archival trust: clear documentation of provenance and careful control of the chain of custody. What changes in the digital environment is that we have new technical tools that allow us to document and verify those processes in more precise ways.

A key practice is the creation of fixity information when digital materials are received. Fixity data—often generated through cryptographic hash values—creates a unique fingerprint for a file at a specific moment in time. By recording this information when a file is accessioned and periodically checking it later, archives can verify that the file has not been altered. This process provides strong evidence that the digital object being preserved today is identical to the one originally received.

In an ideal workflow, archives also receive fixity information from the records creator or transferring institution. When both the sender and the archive generate and compare these values, it becomes possible to verify that the files received are exactly the ones that were transmitted. Many digital preservation systems and open-source tools now support these processes as part of routine ingest workflows.

It is important to emphasize, however, that these technologies support rather than replace archival practices. Tools alone do not ensure authenticity. Trust emerges from well-designed policies, documented workflows, and careful recordkeeping about how materials were received, processed, and managed over time.

Even in situations where sophisticated tools cannot yet be implemented, simpler checks – such as verifying file counts, file sizes, and directory structures – can still provide useful evidence that content has remained stable. Over time, integrating these checks into systematic workflows allows

archives to build a documented record demonstrating that digital materials have been responsibly stewarded.

4. The problem of selection and evaluation: *Due to the "tsunami" of digital data, the old methods of manual processing/evaluation become impossible. In conditions of data redundancy, how can archives effectively assess the value of a document, while maintaining an objective and representative picture of the era for future historians?*

It is important to begin by recognizing that archives have never preserved everything. In fact, archives have never preserved most things. The historical record has always been shaped by processes of selection and as a result, deselection. When we begin from this understanding, the tsunami you mention is far more manageable. Our task is not to save everything but to ensure that the most meaningful and representative materials, which we have the capacity and resources to handle, are preserved with care.

The digital environment changes the scale of the problem, but it does not fundamentally change the underlying task. Archivists still need to make decisions about value, context, and representation. What does change is the way those decisions are implemented. Because digital materials often exist in large homogeneous sets and structured forms, archivists frequently need to think about selection and processing at scale.

In *The Theory and Craft of Digital Preservation*, I describe this shift as moving from working with tweezers to working with a shovel. Something which those aware of that More Product Less Process approach to working with archives will already be familiar with. In analog archives, while we wanted to largely work with materials at higher levels of structure, it is still often necessary to examine individual items one at a time. With digital collections, the time required to evaluate each individual file may be far greater than the time required to preserve it. In many situations it is therefore more effective to collect and stabilize larger bodies of material and apply processing and preservation actions across them in batch.

The computable nature of digital information makes this possible. Nearly all digital files contain embedded metadata, and tools can be used to generate derivative files, normalize formats, or extract information across thousands or millions of files at once. Technologies such as web archiving illustrate this approach particularly well, enabling archives to capture large portions of online content and then analyze or describe them later.

However, the core issue of appraisal remains largely unchanged. Archivists must still make thoughtful decisions about what they collect and why and they must make sure that they are thinking about the potential harm that could come from over collecting materials as well. In all of this, one of the most important practices relates to transparency. Archives need to clearly document and articulate their collecting policies and selection criteria so that future researchers can understand what has been preserved and what has not. That clarity allows historians to interpret archival collections with a fuller understanding of how the historical record was shaped.

5. Professional development and skills: *One of the main problems in Kazakhstan is the gap between traditional archival education and the requirements of digital management. Based on your work in the field of digital curatorial education, what key competencies should an "archivist of the future" possess?*

The shift toward digital archives does require archivists to develop new technical knowledge, but I think it is helpful to think about this in terms of several broad areas of competency rather than any single technical skill. Broadly, I think there is more continuity in terms of being a good archivist than change, but there are some important aspects of change that come from the increasingly central role of digital technologies in archival practice.

First, archivists need a strong level of digital fluency. This means understanding the basic structure of digital information – how files, file systems, storage media, and networks function.

Archivists do not necessarily need to become software engineers, but they do need to understand how digital information is created, organized, and stored in order to make informed preservation decisions. Without that base level digital fluency about the nature of digital information we are unable to be certain about the facts and integrity of our data.

Second, archivists benefit from developing some level of computational literacy, particularly the ability to work with data and automate tasks through scripting. Digital collections often involve thousands or millions of files, and many preservation and processing actions must therefore occur at scale. Familiarity with command-line tools and scripting languages can allow archivists to automate routine tasks, analyze collections, and design efficient workflows. As artificial intelligence tools and large language models increasingly assist with scripting and automation, this kind of foundational understanding will likely evolve and become different but in some ways it will become even more important. Archivists will need to understand the underlying structure of digital materials in order to evaluate whether automated tools are producing reliable results.

Third, and often overlooked, archivists increasingly need strong skills in project and program management. Digital preservation involves implementing systems, designing workflows, evaluating tools, and coordinating work across teams. Archives are constantly adapting to new technologies and new forms of records. As a result, archivists must be able to scope projects, document workflows, test new tools, and continually refine processes as technologies evolve.

In many ways, the “archivist of the future” will be someone who combines traditional archival principles – such as appraisal, provenance, and context – with these additional forms of technical and organizational literacy. The core mission of archives remains the same, but the tools and environments in which that work takes place continue to evolve.

6. Life expectancy compared to rapid technological changes: *Many archival institutions fear the rapid obsolescence of equipment and formats. From your point of view, how can we create future-oriented archives in an era when technology changes every 3-5 years?*

All institutions worry about rapid technological change, but those changes are particularly vexing for archival institutions as they need to persist forward digital records that accrete from those changes as they occur over time. Hardware fails, software becomes obsolete, and file formats come in and out of fashion. However, the key to building future-oriented archives is not trying to stop or outlast technological change. Instead, it is designing preservation systems that can adapt to that change over time.

One of the points I stress up front in *The Theory and Craft of Digital Preservation* is that a repository is not a piece of software. Software cannot preserve anything on its own. A repository is the combination of financial resources, hardware infrastructure, staff expertise, and institutional policies that together ensure long-term access to digital materials. Any specific software platform used to manage digital collections is temporary.

For this reason, digital preservation workers should always assume that systems will change. Archives need to be prepared to migrate collections and metadata from one system to another as technologies evolve. This means selecting systems that allow institutions to export their data, documenting workflows carefully, and maintaining clear control over files and metadata outside of any single software platform.

It is also important to recognize that there is no software that “does” digital preservation automatically. Digital preservation is an ongoing organizational activity that involves monitoring collections, refreshing storage media, migrating systems, and updating workflows over time. The goal is not to create a system that lasts forever, but to create institutions and processes that can successfully carry collections forward through many generations of technology.

When archives focus on building that kind of institutional resilience – staff expertise, documented workflows, and flexible infrastructure – they become far better positioned to preserve digital heritage even as the technologies around them continue to change.

7. Artificial intelligence (AI) and large-scale collections: *With the exponential growth of archival collections in Kazakhstan, there is growing interest in using AI and machine learning for automated description and discovery. Based on your research, what are the biggest opportunities and ethical risks for archives when implementing AI tools to manage national digital heritage?*

Artificial intelligence is rapidly becoming one of the most widely discussed issues in libraries and archives. This is true for a wide range of other fields but given the central role that information management and processing play in the practices of archives, it makes sense that these discussions are happening here too. While the technologies are evolving quickly, we can already see both significant opportunities and important risks in how they might be applied to archival collections.

On the opportunity side, AI tools have considerable potential to assist with the processing, description, and discovery of large digital collections. Archivists have already been experimenting for more than a decade with machine learning and natural language processing to support activities such as entity extraction, transcription, language translation, and clustering of documents. Large Language Models extend these capabilities by making it easier to generate summaries, assist with metadata creation, and help users explore collections through conversational interfaces.

At the same time, it is critical that the implementation of these tools remain grounded in archival expertise and professional judgment. In a talk I gave more than a decade ago titled *Mecha-Archivists: Envisioning the Role of Software in the Future of Archives*, I argued that software should be understood as augmenting archival work rather than replacing it. Archivists and subject experts must remain responsible for designing workflows, setting standards, and determining how automated outputs are evaluated and used.

The most significant reputational risk in this area relates to trust. Archives derive their authority from the reliability and integrity of the records they preserve and the descriptions they provide. Many contemporary AI systems, particularly Large Language Models, are designed to generate plausible language rather than verified facts. If archives begin to populate descriptive metadata or access systems with unverified or fabricated “AI Slop”, they risk undermining the trust that users place in archival institutions.

For this reason, it is essential that any use of AI in archival workflows be carefully documented, reviewed, and evaluated. Automated outputs should be treated as suggestions or starting points rather than authoritative descriptions.

Finally, archivists should also pay close attention to how AI is changing the ways people search for and interpret information. Many users are increasingly turning to conversational interfaces rather than traditional search systems. Archives will need to consider how their collections can remain visible and accessible within these emerging information environments. If archival collections are not integrated into the tools people use to discover knowledge, there is a real risk that valuable historical sources will become less visible in public understanding.

We sincerely thank you, Mr. Trevor Owens, for taking the time to provide such thoughtful and detailed answers to our questions. We wish you continued professional success and many new and exciting projects and research endeavors.