

TRENDS IN
ARCHIVES
PRACTICE

BORN-DIGITAL DESIGN RECORDS

Edited by Samantha Winn

SAA Preview



**SOCIETY OF
American
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INTRODUCTION

About *Born-Digital Design Records*

SAMANTHA WINN

The Society of American Archivists' (SAA) Architectural Records Roundtable (ARR), renamed Design Records Section (DRS) in 2017, first mobilized in 1985 to build on the momentum of the Cooperative Preservation of Architectural Records project (CoPAR). Aiming to foster camaraderie, provide a community of practice, and support scholarship among archival workers caring for design records, the DRS celebrated its twenty-fifth anniversary at the 2015 SAA Annual Meeting in Cleveland. Founding member Tawny Ryan Nelb recounted milestones in the section's history and called for a new wave of scholarship to document the advancements in archival practice regarding records of the built environment.

This call resonated strongly with the Design Records Section leaders. In 2015, Aliza Leventhal began her first term as section co-chair. I joined her in 2016 as junior co-chair, and we began working on various publication proposals with the 2016–2017 steering committee. The following modules represent the culmination of one such initiative. Like many section members, I first encountered born-digital design records

in the field. In 2014, I began as a collections archivist for Virginia Tech's International Archives of Women in Architecture (IAWA). The management of born-digital design records from ingest to access was among the stickiest challenges of my tenure. It also guided the future of Virginia Tech University Library's approach to digital assets management and data preservation. For every successful project and program, I remain indebted to the cutting-edge research of Design Records Section members, critical insights from the IAWA board and other industry leaders, and a bevy of interdisciplinary troubleshooters from within and beyond the university.

Written and informed by some of the leading voices in the management of born-digital design records, these modules represent the collaborative output of many current and former DRS steering committee members and taskforce leaders, industry partners, and pioneers in the application of computer-aided design. The modules deal with the unique technical landscape of born-digital design records; emerging best practices in the accession, preservation, and emulation of these materials; and functional case studies from a variety of academic, corporate, and museum-based archives. With historical overviews, use cases, practical tool registries, sample workflows, and robust glossaries of terms, these modules are designed to appeal to archival workers in a variety of institutional contexts, including business archives, architectural firms, museums, universities, and government offices. The modules provide archival workers of all experience levels with an accessible introduction to the management of digital design records.

The authors of these modules constitute a deep roster of theoretical and practical expertise across multiple industries and institution types. In Module 24, "Navigating the Technical Landscape of Born-Digital Design Records," architect Kristine Fallon partners with Aliza Leventhal, former DRS leader and former corporate archivist with Sasaki Associates, and Zach Vowell, principle investigator for Software Preservation Network, to document technical concepts and dependencies for the successful management of born-digital design records. Laura Schroffel of the Getty Research Institute, Jody Thompson of Georgia Tech, Emily Vigor of the University of California Berkeley's Environmental Design Archives, Euan Cochrane of Yale University, and Aliza Leventhal capture the state of practice in Module 25, "Emerging Best Practices in the Accession, Preservation, and

Emulation of Born-Digital Design Records.” Finally, Aliza Leventhal and Zach Vowell partner with Stefana Breitwieser of the Icahn School of Medicine’s Arthur H. Aufses, Jr., MD Archives; Alex Jokinen of the Canadian Center for Architecture; and Mireille Nappert of HEC Montréal in Module 26, “Case Studies in Born-Digital Design Records,” to present a series of explanatory case studies which tie together recommendations of the prior two modules.

Milestones in the Management of Born-Digital Design Records

Custodians of traditionally analog design records can refer to guidelines and best practices which emerged directly from or alongside the early work of CoPAR and the DRS, including Schrock and Cooper’s *Records for Architectural Offices: Suggestions for the Organization, Storage, and Conservation of Architectural Office Archives* (1992), Porter and Thornes’s *A Guide to the Description of Architectural Drawings* (1994), the International Council on Archives’ *A Guide to the Archival Care of Architectural Records: 19th–20th Centuries* (2000), and Waverly B. Lowell and Tawny Ryan Nelb’s landmark 2006 book, *Architectural Records: Managing Design and Construction Records*.

Meanwhile, design professions have operated in digital environments for decades, with early computer-aided design (CAD) explorations dating back to the early 1960s.¹ By the turn of the twenty-first century, the vast majority of design records were born digital. In her 1998 review of computing in design, Kristine Fallon reported that “more than 85 percent of design firms” had licenses for Autodesk’s CAD systems by the mid-1990s, representing both the broad adoption of CAD technology in design and the dominance of Autodesk’s proprietary software. Similarly, in their 2015 thesis, “Preservation and Access of Born-Digital Architectural Design Records in an OAIS-Type Archive,” Tessa Walsh reported that building information modeling

¹ Kristine Fallon, “Early Computer Graphics Developments in the Architecture, Engineering and Construction Industry,” *IEEE Annals of the History of Computing* 20, no. 2 (1998): 21–23, <https://doi.org/10.1109/85.667293>.

(BIM) systems were employed by more than 70 percent of North American architects and contractors in 2012.²

Archival workers have discussed the management of born-digital design records for nearly as long as firms have produced them, anticipating the challenges such records would bring when the pioneering generations of CAD/BIM users retired.³ In 1994, the Canadian Centre for Architecture partnered with the Joint Committee on Canadian Architectural Records and Research (JCCARR) and SAA's Architectural Records Roundtable to host a Working Conference on Establishing Principles for the Appraisal and Selection of Architectural Records.⁴ *American Archivist* dedicated its Spring 1996 special issue to architectural, engineering, and construction records, featuring significant coverage of the 1994 Working Conference and its sponsoring entities.

In his comprehensive history of the conference proceedings, Nicholas Olsberg, ARR chair from 1992 to 1994, warned that “only a fraction of the world’s archives have electronic records programs or expertise” and expressed concern that archivists were particularly unprepared to address the logistical and legal challenges of providing access to born-digital design records.⁵ Olsberg called on archivists to develop case studies “to evaluate the effect of electronic techniques on the nature, permanence, and accessibility of essential documentation of the design process.”⁶ In “Architectural Archives in the Digital Era,” architecture professor and scholar, William J. Mitchell reported on the

2 Tessa Walsh, “Preservation and Access of Born-Digital Architectural Design Records in an OAIS-Type Archive,” Monograph. Simmons College, 2015, 6–7, <https://spectrum.library.concordia.ca/985426>.

3 This history has been documented most extensively by Ann R. E. Armstrong, “Architectural Archives/Archiving Architecture: The Digital ERA,” *Art Documentation: Journal of the Art Libraries Society of North America* 25, no. 2 (2006): 12–17, <https://doi.org/10.1086/adx.25.2.27949434>; Kathryn Pierce, “Collaborative Efforts to Preserve Born-Digital Architectural Records: A Case Study Documenting Present-Day Practice,” *Art Documentation: Journal of the Art Libraries Society of North America* 30, no. 2 (2011): 43–48, <https://doi.org/10.1086/adx.30.2.41244064>; Anne Barrett, “Born-Digital Architectural Records: Defining the Archivable Record,” University of North Carolina at Chapel Hill, 2012, <https://doi.org/10.17615/m3x3-mg52>; Laura Tatum, “Documenting Design: A Survey of State-of-the-Art Practice for Archiving Architectural Records,” *Art Documentation: Journal of the Art Libraries Society of North America* 21, no. 2 (2002): 25–31, <https://doi.org/10.1086/adx.21.2.27949204>; and Walsh, “Preservation and Access of Born-Digital Architectural Design Records.”

4 For a comprehensive discussion of the Working Conference behind the scenes, see Nicholas Olsberg, “Documenting Twentieth-Century Architecture: Crisis and Opportunity,” *American Archivist* 59, no. 2 (1996): 128–135, <https://doi.org/10.17723/aarc.59.2.987g764618231248>.

5 Olsberg, “Documenting Twentieth-Century Architecture,” 132–133.

6 Olsberg, “Documenting Twentieth-Century Architecture,” 133–135.

rapid adoption of digital records in architectural practice.⁷ Mitchell warned that “the combined problems of immense volume, unstable storage media, and obsolete software and hardware add up to some very tough problems for the archivist to deal with,” noting further challenges with conflicting intellectual property interests.⁸

Despite these early insights, practitioners struggled to implement scalable solutions or standard practices. In a 2002 survey published in *Art Documentation*, Laura Tatum argued that American archivists were so focused on providing electronic access to digitized materials that they were simply “not yet dealing with the issue of digitally-born information.”⁹ Although Tatum lauded individual efforts by archival consultant Tawny Ryan Nelb, her analysis found that most advancements came out of architectural and archaeological practice. She cited the long-term contributions of William J. Mitchell and presentations by architects and architectural technologists at the 2000 *Architectural Records Conference by the Conservation Center for Art and Historic Artifacts*.¹⁰ John Burns, Bradley Hörst, and Tony Aeck spoke from their experiences in architectural firms and historical preservation offices.¹¹ Recognizing that born-digital design records meet different needs throughout their lifecycle, Aeck called for a “strategic alliance” between design professionals and preservation fields.¹²

Moving Toward Solutions

The first decade of the twenty-first century saw a renaissance of cross-disciplinary collaborations. In 2004, the Department of Architecture

7 William Mitchell, “Architectural Archives in the Digital Era,” edited by Nicholas Olsberg. *American Archivist* 59, no. 2 (1996): 201–202, <https://doi.org/10.17723/aarc.59.2.506h724783065016>.

8 Mitchell, “Architectural Archives in the Digital Era,” 203–204.

9 Tatum, “Documenting Design,” 25.

10 Tatum, “Documenting Design,” 27–28.

11 John A. Burns, “The Digital Revolution and Architectural Records: HABS/HAER at the Threshold of the Twenty-First Century,” Philadelphia, PA, 2000, https://web.archive.org/web/20050427171201/http://www.ccaha.org/arch_rec/lecture.php?lec_id=burns_digital; Bradly Hörst, “Guidelines for Managing and Preserving Electronic Files in an Architectural Firm,” Philadelphia, PA, 2000, https://web.archive.org/web/20050501082606/http://www.ccaha.org/arch_rec/lecture.php?lec_num=22; Tony Aeck, “Current and Emerging Documentation and Archiving Methods in Architectural Practice,” Philadelphia, PA, 2000, https://web.archive.org/web/20050427170812/http://www.ccaha.org/arch_rec/lecture.php?lec_id=aeck_current.

12 Aeck, “Current and Emerging Documentation and Archiving Methods.”

of the Art Institute of Chicago published *Collecting, Archiving and Exhibiting Digital Design Data*, a landmark study conducted by Kristine Fallon Associates that established some of the first concrete and scalable recommendations for cultural heritage organizations.¹³ ISO 82045-5:2005, “Application of metadata for the construction and facility management sector,” was adopted in July 2005.¹⁴

In 2007, several implementation teams met in Paris to showcase their progress toward preserving born-digital design records. Highlighted projects included the AIC’s Digital Archive for Architecture System (DAArch), which sought to implement the recommendations of the 2004 Art Institute/Fallon Associates study.¹⁵ Other projects which gained traction in this decade included the European Union’s SHAMAN project (Sustaining Heritage Access Through Multivalent Archiving) and MIT’s FAÇADE (Future-proofing Architectural Computer-Aided Design) project, funded in part by Institute of Museum and Library Services (IMLS) and conducted from 2006 to 2009.¹⁶ These were followed by FAÇADE2, a joint collaboration between MIT and Harvard, and DURAAARK (Durable Architectural Knowledge) in Europe.¹⁷ Although these initiatives laid significant groundwork for future solutions by examining essential functions, building workflows, and testing technical requirements, no single system emerged as a transferrable, sustainable, and scalable platform for the preservation of born-digital design records.¹⁸

In August 2012, SAA’s DRS established a dedicated taskforce—the Digital Design Records Taskforce, originally named the CAD/BIM Taskforce—to investigate the future of born-digital design records. Recognizing the progression of architectural practice and the growing adoption of digital design records as contractual documents, the taskforce aimed to identify research and advocacy needs, build relationships with experts in adjacent fields, and establish best practices

13 Kristine Fallon Associates, Inc., “Digital Design Data: Project Update, October 2007.” As of this publication, the full report is available at <https://web.archive.org/web/20180926091355/http://www.artic.edu/collections/digital-design-data>.

14 It was withdrawn in January 2016. 14:00-17:00, “ISO 82045-5”

15 David Peyceré and Florence Wierre, eds., *Architecture and Digital Archives, Architecture in the Digital Age: A Question of Memory* (Gollion: Infolio, 2008).

16 Alex Ball, “Preserving Computer-Aided Design (CAD),” 1st ed. Digital Preservation Coalition, April 1, 2013, 21–22, <https://doi.org/10.7207/twr13-02>.

17 Harvard Library Lab, “FAÇADE2,” <https://osc.hul.harvard.edu/liblab/projects/facade2>; “DURAAARK – Durable Architectural Knowledge,” <http://duraark.eu>.

18 Walsh, “Preservation and Access of Born-Digital Architectural Design Records,” 12–14.

for preservation and emulation of born-digital design records.¹⁹ One of the group's first initiatives was an ambitious bibliography of born-digital design record history.²⁰ Subsequent projects included international surveys of digital design holdings in the United States, Canada, and United Kingdom; an updated bibliography of foundational, interdisciplinary resources; panel presentations at SAA Annual Meetings and Research Forums; and special publications through SAA, including these modules.

Expanding and Developing Resources

In recent years, many conversations and resources have evolved within individual institutions, like the Canadian Centre for Architecture (CCA), as well as through collaborations such as the ones facilitated by the Software Preservation Network (SPN) and Digital Design Records Taskforce (DDRTF). The CCA has demonstrated significant capacity for developing transferable tools and workflows,²¹ and has made many of its in-house digital preservation tools free and open-source.²² The SPN, which maintains significant ties with the DDRTF, has hosted research forums, exploratory grants, and communities of practice for the preservation and emulation of software in cultural heritage institutions.

Three additional forums have provided significant platforms for advancement and collaboration in recent years. "Designing the Future Landscape: Digital Architecture, Design and Engineering Assets," a meeting that took place in November 2017, reflected the most significant gathering of design professionals and cultural heritage

19 Society of American Archivists, "Digital Design Records Taskforce," <https://www2.archivists.org/groups/design-records-section/digital-design-records-taskforce>, captured at <https://perma.cc/7G95-34T7>.

20 Aliza Leventhal and Ines Zalduendo, "Draft Bibliography on Studies Dealing with Legal, Technical, and Curatorial Issues Related to Born-Digital Architectural Records," Digital Design Records Task Force, Society of American Archivists, 2013, https://www2.archivists.org/sites/all/files/AR%20Taskforce_Born%20Digital%20StudiesBibliography_AL+IZ_FinalDraft_revised.pdf, captured at <https://perma.cc/X748-EH5M>.

21 Canadian Centre of Architecture (CCA), "Coping with Complex Digital Objects" documents CCA's innovations in digital preservation and archaeology between 2013 and 2016. For further discussion of tools developed for digital design records, see Tessa Walsh, "Data-Driven Reporting and Processing of Digital Archives with Brunnhilde," *Practical Technology for Archives* 1, no. 8 (2017), <https://digitalcommons.ilr.cornell.edu/pta/vol1/iss8/1>.

22 The majority are available from <https://github.com/CCA-Public>.

professionals on the question of born-digital design records since the 2000 *Architectural Records Conference by the Conservation Center for Art and Historic Artifacts*.²³ In April 2018, Harvard University hosted the IMLS-funded forum, *Building for Tomorrow: Collaborative Development of Sustainable Infrastructure for Architectural and Design Documentation*.²⁴ In April 2020, the Digital Preservation Coalition hosted the United Kingdom-based virtual briefing day, *Building a Digital Future: Challenges & Solutions for Preserving 3D Models*, during which speakers from a range of backgrounds and experiences described preservation challenges and solutions developed in a variety of digital contexts.²⁵

The first two of these historic gatherings provided fuel for the writing of these modules in 2018, which aim to capture the state of archival practice at the beginning of a new decade. The authors of these modules have outlined the norms of record production in design professions, explained fundamental technical challenges for the transfer and preservation of these records, and demonstrated adaptable workflows from a variety of institutional contexts. Other recent publications of note include

- reports from the multi-institution emulation research cohort, Fostering a Community of Practice (FCOP), hosted by SPN from 2018 to 2020, which covers a variety of topics, including the University of Virginia's work with born-digital design records;²⁶
- the article “An Archive of Interfaces: Exploring the Potential of Emulation for Software Research, Pedagogy, and Design” by Daniel Cardoso-Llach, Eric Kaltman, Emek Erdolu, and Zachary Furste, who facilitated a cross-discipline exploratory course leveraging EaaSI as a potential pedagogical tool for

23 Aliza Leventhal, *Designing the Future Landscape: Digital Architecture, Design & Engineering Assets*, Washington, DC: Library of Congress, 2018, <https://loc.gov/preservation/digital/meetings/DesigningTheFutureLandscapeReport.pdf>, captured at <https://perma.cc/GC8Y-LLVF>.

24 Ann Whiteside, “Building for Tomorrow Forum Report,” September 2018, https://projects.iq.harvard.edu/files/buildingtomorrow/files/building_for_tomorrow_-_forum_report.pdf, captured at <https://perma.cc/7E4Q-LN4C>.

25 Digital Preservation Coalition, “Building a Digital Future: Challenges & Solutions for Preserving 3D Models,” April 2020, <https://www.dpconline.org/events/past-events/preserving-3d-digital-engineering-models-a-briefing-day>.

26 Fostering a Community of Practice, <https://www.softwarepreservationnetwork.org/fcop>.

teaching architecture, architectural history, and technology history;²⁷

- the Fall/Winter 2021 issue of *American Archivist* (volume 84, issue 2), which features a special section on architecture and design records, including born-digital design records;²⁸
- the 2021 Digital Preservation Coalition Technology Watch Report *Preserving Born-Digital Design and Construction Records* by Aliza Leventhal and Jody Thompson, which provides archival professionals, active designers, and facilities managers with context to consider preservation approaches that account for both the technical and cultural components of the broad range of complex digital objects created throughout the course of designing, implementing, and maintaining a built space.²⁹

Significant opportunity remains for future research, however. The community still needs viable preservation frameworks that can be implemented at scale, particularly for records and data produced in cloud-based environments. We also need a better understanding of how researchers will use these materials in the future. It is our hope that this publication will mark progress toward standardization and best practices that can be implemented by a broad spectrum of archival workers.

27 Daniel Cardoso-Llach, Eric Kaltman, Emek Erdolu, and Zachary Furste, “An Archive of Interfaces: Exploring the Potential of Emulation for Software Research, Pedagogy, and Design,” *Proceedings of the ACM on Human-Computer Interaction* 5, no. 2 (2021): 1–22, <https://dl.acm.org/doi/10.1145/3476035>.

28 Special Section: Design Records, guest editor Karen Trivette, *American Archivist* 84, no. 2 (2021), <https://meridian.allenpress.com/american-archivist/issue/84/2>.

29 *Preserving Born-Digital Design and Construction Records*, Digital Preservation Coalition Technology Watch Report, 2021, <http://doi.org/10.7207/twr21-01>.



Samantha Winn managed the *International Archives of Women in Architecture* at Virginia Tech from 2014 to 2020. She co-chaired the *Society of American Archivists' Design Records Section* from 2016 to 2018 and served on the *Digital Design Records Taskforce*. In 2020, she joined the University of Arizona's School of Information as a PhD student, where she focuses on comparative archival practice, information ethics, and climate change.

MODULE 24

NAVIGATING
THE TECHNICAL
LANDSCAPE OF
BORN-DIGITAL
DESIGN RECORDS

KRISTINE FALLON, ALIZA LEVENTHAL, AND ZACH VOWELL

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MODULE 25

EMERGING BEST PRACTICES IN THE ACCESSION, PRESERVATION, AND EMULATION OF BORN-DIGITAL DESIGN MATERIALS

JODY THOMPSON, EUAN COCHRANE, ALIZA LEVENTHAL,
LAURA SCHROFFEL, AND EMILY VIGOR

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MODULE 26

**CASE STUDIES
IN BORN-DIGITAL
DESIGN RECORDS**

ALIZA LEVENTHAL, STEFANA BREITWIESER,
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