Inviting Knowledge: Enhancing Archival Discovery through Information Design

David J. Williams

Information design—incorporating research in graphic design, typography, visualization, and usability—is a user experience practice directly applicable to contemporary museums, libraries, and archives. Information design principles and guidelines improve engagement at every point of service, effectively and efficiently complementing the mission of knowledge organizations. This historical survey explores information design in the context of contemporary user experience design, and provides an overview of information design principles and guidelines developed over 40 years of research and professional application. Applying elements of information design to archival finding aids enhances usability, while also preserving descriptive and contextual structures.

Introduction

Librarians and archivists are often called upon to practice design. Such activities can take various forms, from creating maps and signs to arranging services and spaces.[1] From an organizational perspective, every policy or service created in a library can be regarded as a design decision.[2] These design activities often occur in environments subject to budgetary constraints and data-driven accountability.[3] When dedicated creative professionals are unavailable, librarians and archivists—regardless of training—are frequently called upon to contribute to the usability of their services, facilities, and instructional materials.

Concurrently, growth in the distribution of goods and services over the internet fueled corresponding growth in the field of user experience (UX) design, a comprehensive, holistic, and iterative practice devised to ameliorate every interaction with a product or service. As organizations with multiple avenues of interaction—both online and in-person—libraries and archives are ideally suited for designing and testing the full range of experiences they provide. However, a rigorous UX program is not always convenient for libraries because it requires commitment of resources and time.

In the absence of UX specialists, integrating UX into libraries and archives can begin with a review and evaluation of the language, text, and visual elements found throughout the organization, following the principles and guidelines of information design. Information design, a component of UX, features well-established principles and guidelines, low barriers to entry, and enhanced usability. This historical survey outlines the evolution and integration of several UX topics, revealing their practical and conceptual interrelationships, and offering a model for

David J. Williams, MA, MLS, is Digital Initiatives and Special Collections Librarian at William Paterson University of New Jersey, email: williamsd110@wpunj.edu. ©2024 David J. Williams.

expanding the practice of information design into the development of archival finding aids. Familiarity with information design and its relationship to other design practices will inspire measurable improvements in usability while paving the way for future UX activities.

The User Experience Ecology

Although the term "user experience" may have previously appeared in different contexts, engineer and cognitive psychologist Donald Norman is widely credited with popularizing the term in 1993 during his tenure with Apple Computer,[4] where he advanced the philosophy of human-centered design and later adopted the broader, usability-focused concept of user-centered design.[5] Concurrently, Jakob Nielsen, an engineer and human-computer interaction specialist with Sun Microsystems, became one of the leading researchers in the emerging field of web usability. Human-computer interaction, derived from human factors engineering and cognitive psychology, grew in influence following the widespread availability of personal computing technologies and the rapid growth of the internet as a fundamental channel for exchanging goods, services, and information. Nielsen brought his interface design proficiency and interactivity expertise to the web, emphasizing the need for repeated and dedicated usability testing.

Nielsen defined usability as the condition of being easy to learn, remember, and use, resulting in few errors and high user satisfaction. The International Organization for Standardization (ISO) regards usability as a quality of successful goal achievement. Norman added the concepts of familiarity and obviousness, through which a designed object suggests its usage by offering "perceived affordances." These definitions were expanded to include the essential qualities of user experience design, in which individual goals are part of a larger, holistic process.[6] In 1998, Nielsen and Norman formed a consulting partnership, the Nielsen Norman Group, positioning themselves as the leading authorities in research-based UX. Their discoveries resulted in a concise definition of the term: "'User Experience' encompasses all aspects of the end-user's interaction with the company, its services, and its products."[7] Additional definitions—from concise to broad—were advanced, with the consensus centering on the "holistic" nature of user experience. As web usability expert Steve Krug observed, "UX sees its role as taking the users' needs into account at every stage of the product life cycle, from the time they see an ad on TV, through purchasing it and tracking its delivery online, and even returning it to a local branch store."[8]

With roots in product development and web design, UX rapidly evolved into both a dynamic professional practice and a comprehensive research discipline.[9] Like many conceptual fields, UX reflects the convergence of multiple practices, applying them to every aspect of an organization's products and services.[10] Today, UX specialists are increasingly contributing to public and academic libraries as core members of public service departments. The success of UX design has led to the development of numerous accredited and highly regarded academic programs, as shown in Table 1.

Information Design Practices

Although designing informational displays is a fundamental communication activity, as a field of research and professional practice, the formal origins of information design can be traced to the 1970s. Academic researchers in Europe and the United Kingdon envisioned a supportive discipline, with professional government and business sector practitioners apply-

TABLE 1		
User Experience Degrees and Programs Currently Offered in the United States		
School	**Degrees Offered**	**Relevant Courses**
Academy of Art University	Master of Fine Arts	Interaction Design, Product Design, User Experience, Visual Design
Art Center College of Design	Bachelor of Science, Master of Fine Arts	Design, Interaction Design, Human Factors, Design Psychology, Data Visualization, Human Computer Interaction, Product Design, Design Research, Writing for Interaction
Bentley University	Master of Science	Human Factors, Information Architecture, Testing and Assessment, User-Centered Design, Visualizing Information
California College of the Arts	Certificate in Interaction Design	Cognitive Science, Human Computer Interaction, Graphic Design, User Interface Design
California State University, Fullerton	Certificate of User Experience and Customer-Centered Design	Design Thinking, Product Design
Carnegie Mellon University	Bachelor of Science, Master of Science, Master of Professionals Studies, PhD	Cognitive Science, Communications, Design, Human Computer Interaction, Human Factors, Interaction Design, Usability
DePaul University	Master of Science	Content Strategy, Human-Computer Interaction, Information/Data Visualization, Interaction Design, Information Architecture, Usability Evaluation, UX Strategy
Drexel University	Bachelor of User Experience and Interaction Design	Cognitive Psychology, Content Management, Design, Design Thinking, Digital Media, Interaction Design, Human Factors, User-Centered Design, User Experience Design, User Interface Design, User Research
George Mason University	Master of Arts, PhD	Cognitive Science, Human Factors, Psychology, Statistics
Georgia Tech	Master of Science	Communications, Human Computer Interaction, Industrial Design, Psychology
Indiana University	Master of Science	Human Computer Interaction, Interaction Design
Kennesaw State University	Bachelor of Science	Design Thinking, Human-Centered Design, Interaction Design, User Interface Design, Visual Design
Kent University	Master of Science	Accessibility and Universal Design, Information Architecture, Interaction, Usability, User Experience Design
Michigan State University	Bachelor of Arts	Content Strategy, Digital Rhetoric, Experience Architecture, Graphic Design, Information Architecture, Interaction Design
New Jersey Institute of Technology	Bachelor of Science	Human Factors, Psychology, Usability, User Experience Design, Visual Design
New York University	Bachelor of Integrated Digital Media, Master of Integrated Digital Media	Digital Audio Production, Digital Media, Visual Design

TABLE 1		
User Experience Degrees and Programs Currently Offered in the United States		
School	**Degrees Offered**	**Relevant Courses**
Parsons School of Design	Bachelor of Fine Arts	Design
Philadelphia University	Master of Science	Cognitive Psychology, Digital Experience Design, Information Architecture, Interaction Design
Pratt Institute	Certificate in UX/UI Mobile Design	Accessibility, Content Strategy, Digital Analytics, Information Architecture, Information Visualization, Usability, User Experience Design
Purdue University	Bachelor of Computer Graphics Technology, Master of Computer Graphics Technology	Human Factors, Interaction Design, Usability, User Analysis, User-Centered Design, User Experience Design, Visual Design
Rutgers University	Master of Information, Master of Business and Science	Communications, Visual Design, User Experience Design, Usability, Information Architecture, Interaction Design, Informatics, Information Visualization
San Jose State University	Master of Science	Cognitive Psychology, Ergonomics, Human Computer Interaction, Interaction Design, User Interface Design
Santa Monica College	Bachelor of Interaction Design	Cognitive Psychology, Interaction Design, Product Design
Savannah College of Art and Design	Bachelor of Fine Arts	Communications, Graphic Design, Human Computer Interaction, Information Architecture, Interface Design, Product Design, Typography, User Experience Design
The University of Baltimore	Master of Science	Computers and Cognition, Information Architecture, Interaction, Interface Design
The University of Texas at Austin	Master of Science	User Experience Design
Touro College	Master of Arts	Design Thinking, Interactive Design, UI/UX Design
Tufts University	Master of Science	Computer Graphics, Computer Interface Design, Human Computer Interaction, Human Factors, Visualization
University of California	Bachelor of Cognitive Science	Cognitive Science, Communications, Design
University of California, Los Angeles	Certificate in User Experience Design	Accessibility Design, Design Thinking, User Experience Design, User Interface Design
University of Maryland, Baltimore County	Master of Science, PhD	Graphic Design, Human-Centered Computing, Systems Analysis and Design, User Interface Design
University of Miami	Master of Fine Arts	Human Centered Design, Human-Computer Interaction, Interaction Design, UX Research Methods
University of Utah	Certificate in Human Factors	Cognitive Psychology, Human Factors

TABLE 1		
User Experience Degrees and Programs Currently Offered in the United States		
School	**Degrees Offered**	**Relevant Courses**
University of Washington	Bachelor of Science, Master of Science, Master of Human-Computer Interaction and Design, PhD	Accessibility, Communications, Data Visualization, Human Centered Design, Human Computer Interaction, Information Visualization, Interaction Design, Product Design, Usability, User Centered Design, User Experience Design, Visual Literacy
University of Wisconsin	Bachelor of Science, Master of Science	Content Management, Data Science, Data Visualization, Human Factors, Technical Communications
Utah Valley University	Bachelor of Digital Media	Digital Product Design, Interaction Design
Winthrop University	Bachelor of Science	Information Systems, User Experience Design

ing their results to practical requirements such as traffic symbols and product labels.[11] In the United States, technical communications researchers—developing repair manuals and product documentation—began integrating elements from other disciplines and practices, particularly typography and graphic design.[12] These early practitioners referred to their work as "document design," commonly regarding the textual components as scaffolding through which graphics and other visual disciplines could be expressed.[13] Some writers and designers favored this term to distinguish their work from the information model developed by Claude Shannon, describing techniques for encoding messages within noisy communications channels.[14]

As the practice evolved, the concept of messages as fundamental units of information grew increasingly prominent, with content, language, and visual elements integral to message composition.[15] Information, as conceptualized in the practice of message design, was consistent with definitions developed in the fields of information science and communications.[16] Information was understood as being composed of facts and data that can be managed, transmitted, and imparted with meaning in the form of patterns and relationships possessing the capacity to inform.[17] Groundbreaking engineer and schematic designer Per Mollerup defined information design as "explanation design," the art of explaining facts with the aim of producing knowledge.[18] Combining elements of both practical theory and theoretical practice, information design incorporates ideas from many external disciplines.[19] As an academic discipline, information design is cross-disciplinary and integrative, characteristics shared with user experience design.[20] It is regarded by practitioners as an *information discipline*, comparable to Library and Information Science,[21] and is considered complementary to information technology (just as building technology is complementary to architecture).[22] Theoretically, information design is the process of facilitating understanding to help people achieve their goals,[23] and the task of the information designer is to transform data into high-quality information.[24] Functionally, information design is the way information is presented on a page or screen.[25] Essentially, information design adds *seeing* to reading.[26] Engineer and technical communications researcher George Hayhoe grouped information design practices according to technique:

1. Information design is a "design area," similar to interior design,[27] applying graphic design principles to information in order to communicate effectively.
2. Information design is a process, identifying, organizing, and composing information messages to achieve a goal.

3. Information design is a strategy, producing and improving internal communications, products, and services as part of an organizational mission.

All three interpretations are considered equally valid.[28] Pioneering information design researcher Rune Pettersson favored the second, empirical definition: "In order to satisfy the information needs of the intended receivers, information design comprises analysis, planning, presentation, and understanding of a message—its content, language, and form."[29]

As information design evolved beyond technical communications, practitioners began to assimilate research from other disciplines and fields. The practice expanded to include typography, color theory, and graphics.[30] Graphic design—incorporating layout, color, and visual elements—effectively amplifies information design. Visual design elements—increasingly regarded as building blocks of contemporary web design—improve the effectiveness of information by aesthetically augmenting content.[31] Symbols, pictures, and words communicate ideas and express visual relationships.[32] The similarities and shared goals of these varied practices and specialties contribute to the effectiveness of both information design and user experience design, becoming information design "sub-fields,"[33] and collectively forming the larger UX ecology illustrated in Figure 1. The *usability*, *instructional design*, and *wayfinding* domains are particularly useful to library and archives professionals.

FIGURE 1
The UX Ecology*
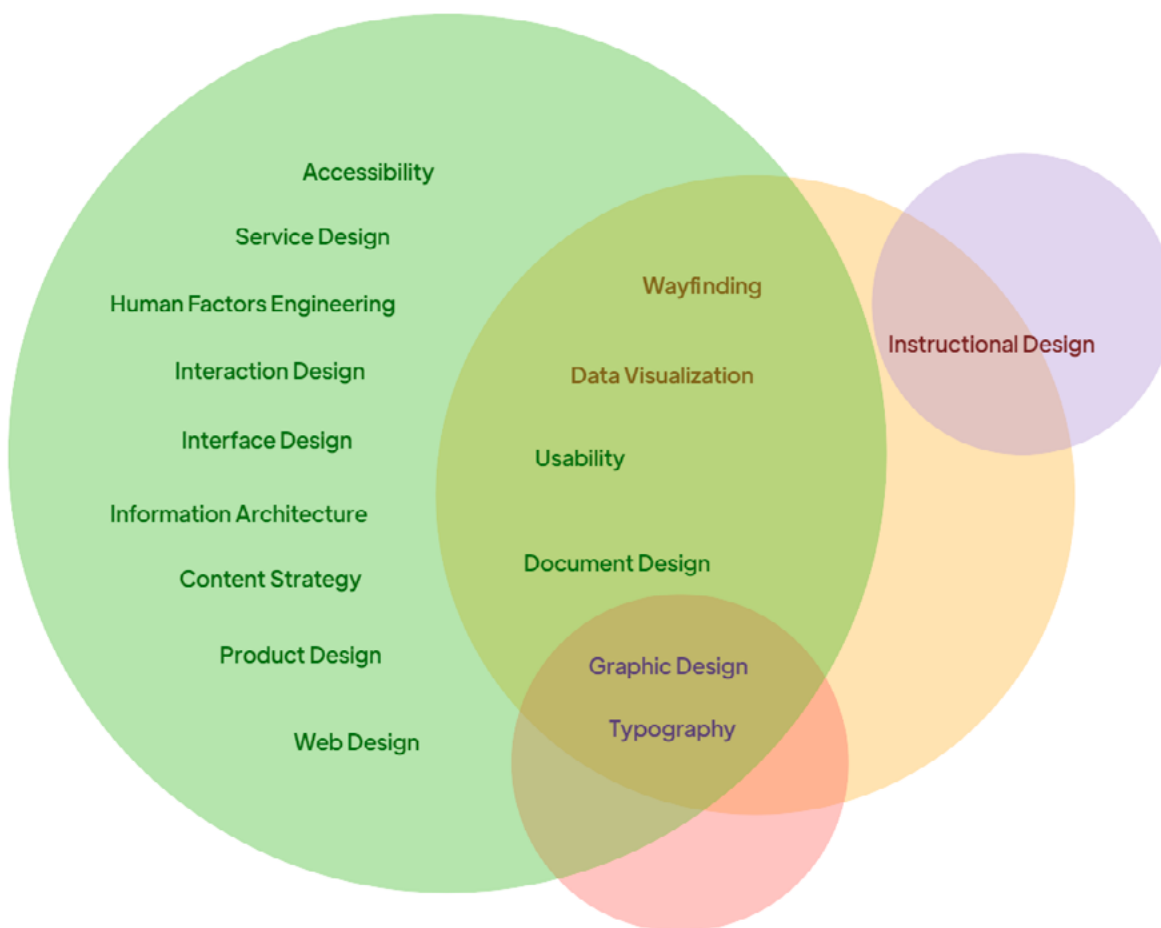
*green = user experience design; yellow = shared information design practices; red = specialties employed in commercial design; purple = instructional and learning systems development.

Usability

Usability is one of the more prominent component elements of user experience, and the principles and methods developed by web usability experts, including Nielsen and Krug, are generally applicable to all information design products and library communications.[34] Emphasis is placed on the ongoing nature of usability practice, and testing is considered a cyclical, iterative activity informing decision-making.[35] The optimal number of participants for qualitative usability testing was established as 15, but statistically meaningful qualitative testing was accomplished with as few as five participants, producing usable results and facilitating frequent and ongoing test iterations.[36] In business terms, these practices offer the added benefits of a low barrier to entry, as well as high return on investment.

In addition to classifying and developing information resources and services, the academic disciplines of library and information science have a long history of researching their effectiveness. However, libraries and archives with limited resources may find themselves unable to fully integrate UX into strategic planning. Usability, although a valuable assessment metric, is only a single element of the user experience.[37] Considering the scope of the practice, assessing the effectiveness of UX design can involve complex and specialized survey instruments. As media and technology supporting text has evolved beyond traditional concerns for print layout and typography, the criteria for evaluating visual communication usability has correspondingly increased in complexity.[38] Having evolved in parallel, both usability and usability testing are considered essential facets of information design and of UX.[39] Information design, embraced by practitioners as a component of UX, produced a collection of principles, guidelines, and best practices for enhancing the usability of information products and resources. Information design limits complexity to the effective and efficient delivery of discrete messages, thus facilitating assessment. In the field of technical communications, usability has always been part of an integrated program,[40] and information artifacts—such as physical products or services—can be measured in terms of usability.

Instructional Design

Although instructional design, as a research domain, can be traced back to cognitive and behavioral psychology experiments conducted during World War II, it is increasingly regarded as an information design specialization.[41] Many instructional design practices have been integrated directly into message design, including Smith and Ragan's three-phase model of analysis, strategy, and evaluation.[42] Both instructional and information design are concerned with discovering evidence-based principles for presenting verbal and visual information effectively. The primary distinction between the two practices is the emphasis on long-term outcomes for instruction compared to the immediate, short-term application of information. Either goal can be successfully accomplished by applying cognitive techniques that limit irrelevant materials and signals in favor of essential message processing, thus resulting in shared design methodologies.[43]

Wayfinding

UX researchers considered the benefits of expanding the practice to include both in-person services and physical spaces. This expansion proved particularly suitable for libraries, regardless of mission or membership, due in large part to the number of interaction opportunities present in a typical library environment.[44] Wayfinding is a specialized subset of environmental

graphic design (EGD) —a practice rooted in architecture and urban planning—that is applied to built environments. EGD incorporates signs, symbols (usually in the form of pictographs), and other elements of information design.[45] Wayfinding is a common undertaking in libraries, where the goal is to make resources easy to find and use.[46] Signs and symbols assist people both in accomplishing tasks effectively and achieving goals, grouped into four categories: identification, direction, orientation, and regulation.[47] The effective application of information design in signage complements EGD, showing users what they are seeking, and revealing things they do not know.[48] In instances of signs being governed by legislation supporting people with disabilities, typography and visual composition become important information design elements of EGD.[49]

Information Design Guidelines

Information designers, such as Pettersson, have concluded that identifying consistent and firm rules for information design is essentially impossible, since information design is a combined discipline that incorporates research from a variety of fields.[50] Despite this unavoidable complexity, the statistician and data visualization pioneer Edward Tufte considers the underlying principles of information design to be universal.[51] Either way, decades of research and application have, at least, helped to establish substantial guidelines for information design. Such guidelines reflect a general consensus among practitioners regarding the universal principles that are applicable to information design projects, and that are common to their many specialized applications.

Messaging

Understanding the intended audience is necessary for an information design solution to succeed.[52] An information set must be clearly understood by its user;[53] badly designed information artifacts—those that do not consider the intended audience and/or its requirements—frequently fail to reach the target user.[54] In information design, communication is not complete until the intended receiver understands the message.[55] The first step in message design is to identify the audience and define a message. Message design requires both gaining, and holding viewer, attention.[56] Both a user's understanding of a message, and the message itself, require evaluation when assessing its effectiveness.[57] Establishing and emphasizing the essential, decision-relevant meaning of information, referred to as the "gist" of the message, significantly improves evaluation and decision making.[58]

Plain Language

The main goal of information design is clarity of communication.[59] To achieve this goal, early information designers approached text from the perspective of *legibility*. However, legibility is a difficult term to define. Legibility could describe comprehensibility, or could refer to the ability to clearly distinguish characters and words, independent of their meaning.[60] Previous attempts to classify legibility resulted in numeric "readability" scores, using sentence length and syllables per word to measure the educational level required for text comprehension. These assessments proved popular—and were frequently integrated into word processing software—but eventually came to be regarded as antiquated, and based on flawed assumptions.[61] Abstract words, jargon, long and complex sentences, passive constructions, and stilted language obstruct reading.[62] Applying usability practices, document and information designers

developed guidelines for improving communication through written text, a practice labeled "plain language." Popularized in web design and formalized into government legislation,[63] plain language soon became a standard information design assumption, and has been accepted as a fundamental component of practice.[64]

Typography

Typography clearly affects the comprehension and transmission of written information. Understanding this impact requires a deep understanding of visual perception and cognition, with results that can be difficult to interpret.[65] Although the mechanics are unclear, researchers at Johns Hopkins University School of Medicine recently concluded that people interpret typefaces as having an emotional "tone," or personality, affecting how message content is processed. Precisely which characteristics impart these tones is unclear, but their effect is measurable.[66] Potentially impacting this quality are factors such as font design characteristics (e.g. the width and spacing of individual letters) which can influence reading acuity or text legibility.[67] Balancing readability and legibility is as much art as science. Typography is a design art that requires creativity and skill, and it may not be easy to measure or analyze. Web designer Jeffrey Zeldman is credited with the statement, "Ninety percent of design is typography. The other 90 percent is whitespace."[68] The growth of digital typography brings tools and techniques to a wider audience, creating numerous opportunities for research and experimentation.

The principal goal of typography, however, is effective communication, making it an essential information design practice. Many helpful guidelines exist to support this goal. For example, the observation that the brightness contrast between the text and background is—independent of color—central to legibility.[69] Additionally, text entirely in capital letters is difficult to read, because it provides fewer visual "cues" for identifying words, as individuals take in both the individual letters and overall "shape" of a word when reading.[70] The ornamental shaped elements designed into serif fonts, on the other hand, make them better for body text, rendering the words and letters easier to distinguish.[71] Beyond the discrete influence of typeface, the length of a text line affects readability. People read words in clusters, and move from one cluster to another. Lines of text that are too long slow the reading process.[72] Lines that are too close together lead to the reader's vision drifting to adjacent lines, breaking concentration.[73] Lists are easy to parse.[74] They are easier both to recall and to evaluate, and thus have a generally positive effect on conveying information.[75] Mathematical signs and symbols, however, are not as easy to parse as alphabetical characters.[76] The contrast achieved by different sizes, shapes, forms, and weights of text content creates a visual hierarchy that organizes a document, improves comprehension, and helps the author manage how readers will view it.[77] Chunking text elements into small, discrete pieces, and using clear, visible headings and graphics are key elements of technical communication accessibility, particularly for small displays.[78]

Visualization

Data visualization, the art of representing abstract data visually, is a popular practice in the fields of statistical analysis and the digital humanities. Tables outperform graphics when presenting small data sets, but visualization is an effective means for rendering large data sets into comprehensible and practical information.[79] Infographics, in the form of transit

maps and network diagrams, are essential tools for the expeditious interpretation of complex information. These practices create visual relationships and patterns among data, leading to knowledge acquisition.[80] Data visualization applied to message design places it solidly within the conventions of information design.[81] Converting text into visual presentations—such as lists, tables, and maps—is considered an important skill for information designers.[82] Well-designed statistical graphics, expressed using data visualization techniques, satisfy the goal of communicating complexity with clarity.[83]

Graphics

Aesthetic considerations for enhancing the experience and perception of a message may improve its effectiveness.[84] Information design does not ignore aesthetic principles, but they are not the primary focus. Nonetheless, well-structured content and visualizations are often deemed aesthetically pleasing.[85] Introducing aesthetics into a systematic visual style does communicate meaning, and applying style standards cohesively contributes to a harmonious experience. Even small stylistic decisions, such as text justification, can alter the meaning and message conveyed.[86] Carefully integrating words and pictures engages people more effectively than words or pictures alone.[87] Color, images, lines, symbols, and text should be integrated into a meaningful whole, instead of being treated as individual elements.[88] An example of this integration are pictographs—standardized visual elements commonly used in signage and EGD features—which are recognized and understood quickly.[89] However, animated pictographs, and animations in general, decrease recognition accuracy compared to static images.[90]

Images are easier to remember than text,[91] and we perceive the entirety of an image, its gestalt, beyond its individual parts.[92] Visual design applies the graphic design principles of unity, gestalt, space, hierarchy, balance, contrast, scale, and continuity to information displays.[93] Visual language, combining graphics and text, speaks to people holistically and emotionally.[94] Visual messages are superior when the content is emotional, immediate, and spatial.[95] The combination of an effectively articulated message—expressed clearly and presented with a harmonious consideration of visual and textual elements—is essential to contemporary information design.

Archival Finding Aids

Libraries and archives produce many information artifacts that support their operations and users. One example specific to archives and special collections is the finding aid. Finding aids are a specialized form of collection inventory designed to facilitate access to primary source materials, while maintaining intellectual control over their arrangement and representation. The U.S. National Archives and Records Administration defines finding aids as, "tools that help a user find information in a specific record group, collection, or series of archival materials." Examples include inventories, container and folder lists, indexes, registers, and institutional guides, which are formally and informally published.[96] The Society of American Archivists concisely defines a finding aid as "a description that typically consists of contextual and structural information about an archival source."[97]

In contrast to traditional library print collections, archival holdings often contain diverse materials that require structural flexibility. Finding aids reveal a collection's arrangement, which reflects how the contents are grouped and ordered. Depending on the source, materials can be organized based on the original order of accessioning, the subject areas covered, the material and media types, or other characteristics. Where the original order or provenance

is not provided, alphabetical, chronological, and subject-based arrangements are customary. The amount of detail recorded reflects the descriptive activities undertaken during initial and subsequent archival processing.

An effective finding aid should assist researchers in expeditiously locating materials, regardless of complexity, and ideally without requiring assistance or intervention.[98]

Finding Aid Evolution

Until recently, archivists regarded finding aids as supplemental to their practice, assuming that their professional intervention and assistance would be necessary for most users.[99] Although intended for all researchers, historians and genealogists are the primary consumers of archival collections. Traditional archivists brought knowledge of historical research methods to their practice, and historians are among those who find the structure and format of finding aids intuitive.[100] As the practice of developing finding aids evolved, the need for standards became apparent, starting with standardized archival descriptions. After surveying the materials and determining their arrangement, archivists developed shared terminologies to identify the elements, features, and relationships within a collection. These standards formed guidelines for composing finding aids, and were defined both by the International Council on Archives as the General International Standard Archival Description (ISAD(G)), and, in the United States, the Describing Archives: A Content Standard (DACS). However, these standards were not designed for display formatting, or as content guidelines. Their primary audience was the archival community and, as a result, they could be regarded as input, not output, standards.[101] Another way to interpret these earlier standards is that they describe collections, but do not provide access. Intellectual control is achieved by documenting provenance and providing context.[102] This was the finding aid's dual inheritance: standards for internal management and preservation were adapted and applied without modification for use by external users. Many archives did not initially consider the practice of adapting materials for outside visitors, leading to inconsistent labeling and terminology.[103] Consequently, even when institutions apply the same archival standards, the output of archival descriptions across institutions vary widely.[104]

Encoded Archival Description

By the mid-1990s, standards for describing and arranging archives and records were further codified and enhanced by the development of Encoded Archival Description (EAD), which was an initiative intended to provide similar control and discoverability to archival collections as Machine-Readable Cataloging (MARC) brought to library collections in electronic form.[105] EAD encourages coherence around established standards, and facilitates the exchange of collection information data between search and discovery systems.[106] However, adopting EAD is not sufficient if the implementation does not offer information that is understandable or helpful to users.[107] Surveys conducted in 2007 indicated that research communities using archival collections still preferred traditional print finding aids.[108] Ten years later, many researchers still expected access to printable copies of finding aids.[109] As online access to information expanded, users of archival and records collections began expecting a corresponding amount of self-directed item-level searching, regardless of arrangement.[110] Current trends suggest that item-level description and representation is presumed from digital archival technologies.[111] Increasingly, researchers anticipate seeing digital surrogates of documents and photographs associated with finding aid descriptions.[112]

Expectations are evolving, however, and enhanced online finding aids, which support remote discovery, may become the exclusive point of access to collections.[113] Unfortunately, the descriptive data archives provide are rarely user-friendly.[114] If finding aids are intended to provide end-users with efficient and effective access to collections without archival assistance, then adopting information design practices is highly recommended.

Finding Aid Usability

Early efforts to evaluate the usability of archival tools and resources, as recently as 2002, were considered inadequate.[115] At that time, usability training was rare even in archives that implemented EAD. The finding aids produced online using EAD were indistinguishable from earlier print versions.[116] These preliminary tests revealed that end-users were not interested in systems that reproduced archival structures.[117] Online users also demonstrated little patience for reading dense blocks of text typical of print finding aids.[118] In 2006, user-centered design—a flourishing practice popularized by Nielsen and Norman—was still uncommon in online archival resources.[119] Users increasingly expected web usability features in online archives, and they considered the simple transfer of print content to a screen interface suboptimal.[120] By 2008, online finding aids continued to mirror their print counterparts in both content and appearance, offering limited functionality, as well as minimal browsing and searching features.[121] Usability and information design received little attention. Novice users encountered dense paragraphs, few graphics, little white space or visual organization, confusing language, and professional jargon.[122] Institutions that implemented even modest user interface improvements, including online navigational "wayfinding" indicators, yielded significantly better user experiences.[123]

Novice and Nonexpert Finding Aid Interaction

The development of EAD was initially expected to facilitate access to archival collections for inexperienced users.[124] Online distribution granted access to more researchers, and collection information was no longer limited to expert archives users.[125] Educators at every grade level, and in a variety of disciplines, increasingly encouraged and expected novice student researchers to incorporate primary source archival materials into their assignments.[126] Non-experts, including secondary school students, are challenged to learn both new knowledge domains and the domain-specific metacognitive skills needed to analyze and internalize this knowledge.[127] Unlike subject-matter experts visiting an online finding aid, novice users seldom know exactly what they are looking for when initially approaching a collection.[128] Non-experts quickly discover that finding aids generally reflect the archivists' perspective on collections, which often differ substantially from their own.[129] By 2010, novice archives users were increasingly conversant with internet technologies, and expected the availability of typical web-usability features—including sidebar menus, descriptive hover text, and supplementary help guides—when visiting archives websites.[130] For collections that offered such web-usability features, not only did keyword searching with controlled vocabularies grow in popularity, item-level search interfaces proved significantly more popular than engaging with and traversing the collection hierarchy.[131] Today, for both expert and non-expert users, commercial search engines are the preferred tools for locating known items.[132] With the growth of unmediated digital access to archival repositories, information design has become an effective means for providing access and promoting the value of these collections.

Information Design and Finding Aids

In October 2005, William Paterson University of New Jersey (WPU) hosted the Nicholas Martini Conference on Local Government, a series of presentations and panels featuring historians and elected public officials discussing regional political issues. For the conference, the university's Cheng Library accessioned the personal papers and artifacts of Nicholas Martini, the former commissioner of Passaic County, and mayor of Passaic, New Jersey. Processing archivist Trudi Van Dyke organized, described, and compiled the guide, which provides a detailed representation of the collection. Because the collection lacked an original order, Van Dyke arranged the materials by subject into series and grouped chronologically, reflecting the practice of folder-level description. The result is a professional information product following best practices in archival description.[133] At WPU, 45 percent of enrolled students represent the first generation attending university.[134] Undergraduate students are often unfamiliar with primary source materials. Historians and political scientists experience little difficulty in interpreting the Martini Collection finding aid; however novice users, including many WPU freshmen, require guidance and direction. With the increasing availability of hybrid and distance education courses requiring self-directed access to online resources, such interventions are

---

FIGURE 2
Print Collection Summary Description Page

Guide to the Nicholas Martini Collection, 1931-1991

Archives & Special Collections, Cheng Library
William Paterson University

Descriptive Summary

Creator: Martini, Nicholas, 1904-1991

Title: Guide to the Nicholas Martini Collection

Dates: 1931-1991

Quantity:	Campaign Files:	5 Boxes
	Alberta Central:	1 Box
	Scrapbooks:	33 Volumes
	Microfilm:	3 Reels
	Photographs:	6 Boxes
	Personal:	5 Boxes

Abstract: Collection supports research on the life of Passaic, NJ attorney and politician Nicholas Martini, who served as Freeholder, Commissioner and Mayor of Passaic at various times in his career. Personal papers and extensive newspaper clippings document Martini's campaigns for office and present a political history of Passaic in the 1930s through the 1950s. Numerous photos and other personal papers provide information about the Martini family, his business ventures, and involvement in community activities.

FIGURE 3
Print Series Description Page

<u>**Series Descriptions**</u>

<u>**CAMPAIGN FILES**</u>

NICHOLAS MARTINI'S CAMPAIGNS:
1936 & 1937 CAMPAIGNS FOR PASSAIC COUNTY FREEHOLDER
1935 & 1939 CAMPAIGNS FOR PASSAIC COUNTY COMMISSIONER
MISCELLANEOUS CAMPAIGNS

Folders arranged topically and chronologically; documents arranged in chronological order (wherever possible) in folders as well.

This series mainly contains documentation pertaining to Nicholas Martini's 1936 and 1937 bids for Passaic County Freeholder and his 1935 & 1939 campaigns for Passaic County Commissioner. However, there are also some documents pertaining to other campaigns, including Republican campaigns of 1931 and 1938. These files contain correspondence pertaining to Martini's political affiliations and invitations to various functions, such as benefits and dedications. These files also contain correspondence related to Martini's duties as a City Commissioner of Passaic, as he was often acting in that capacity during his campaigns for Freeholder as well as when he was running for re-election for Commissioner. Among the documents are letters to/from the Passaic County Clerk's Office, the Central Italian-American Committee, the New American, Robert Wardle Associates, the Dante Political Club, as well as letters from citizens. These files also include letters from Martini asking for support in the elections and documents pertaining to the Martini League.

In addition to the correspondence, these files contain political paraphernalia, including campaign cards, brochures, posters and receipts pertaining to the campaigns. Election ballots and voting tallies of the elections can also be found in these files. Among the documents are offers of condolences to Martini on his 1936 loss and congratulations on his 1937 victory, and Martini's acknowledgement of these materials. These documents are in the form of cards, letters and telegrams.

---

not guaranteed. Information design offers a means to overcome these limitations. A sample illustration of information design principles and guidelines applied to the Martini Collection finding aid demonstrates their effectiveness.

Two essential components of a finding aid are the collection summary (Figure 2) and series description (Figure 3). Many details provided in a standard summary, such as the author's name and primary language, are administrative and not essential to novice users. Other elements can be contextually introduced. Displaying arrangement descriptions within an individual series and associating access terms with visitor information are methods for conditionally presenting these elements.

For non-experts, the goal is to efficiently determine a collection's subject areas and content. Figure 4 simplifies the presentation of the online summary. The collection creator, title, and repository name are integrated into the page template. The extent and abstract are reformulated using plain language, and the dates—a frequent source of confusion for inexperienced read-ers[135]—are expressed as a specific subset of coverage reflecting the collection's central topic.
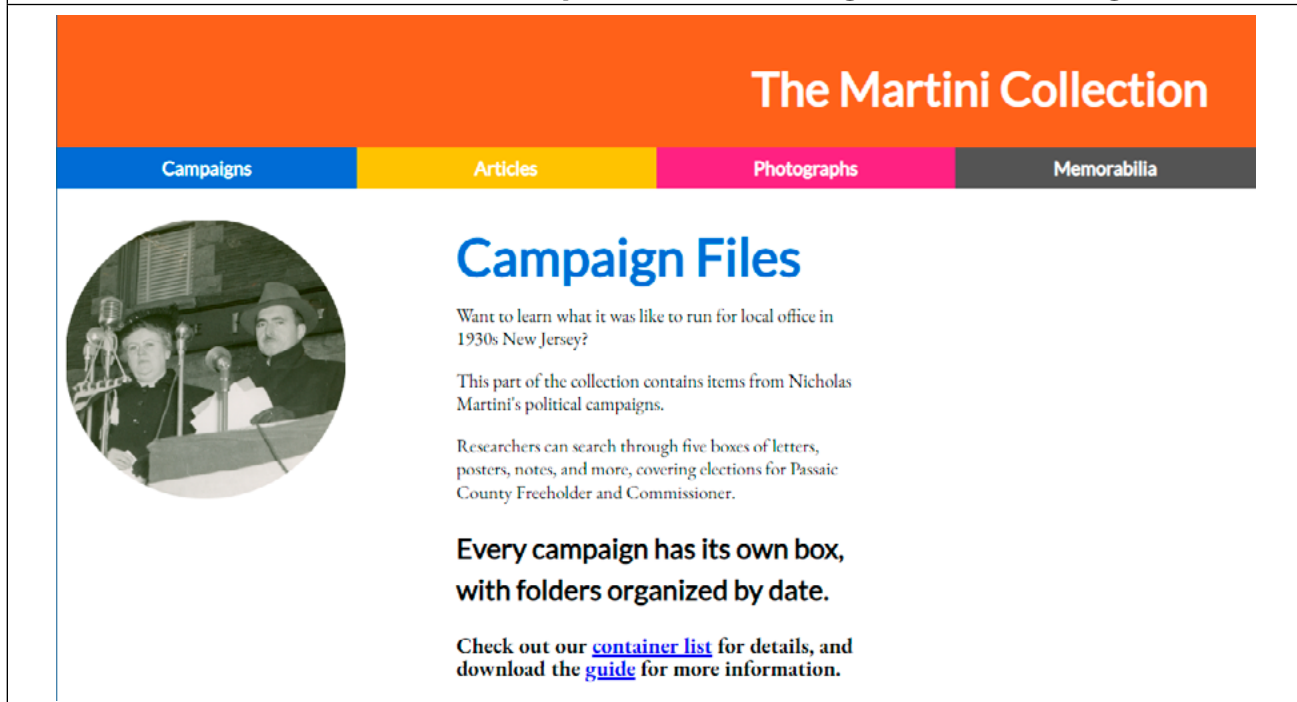
Figure 5 provides an alternative series description, eliminating long blocks of text in favor of brief messages. Plain language intended for specific audiences facilitates the quick scanning and evaluation of key details.

FIGURE 4
Custom Online Summary Description Demonstrating Information Design

FIGURE 5
Custom Online Series Description Demonstrating Information Design

These sample documents introduce four additional information design practices:
1. Consistent visual style, highlighting the collection title, repository name, search feature, print format finding aid, and other recurring page elements.
2. Application of color for both aesthetic and functional purposes, with a high contrast scheme optionally mirroring wayfinding practices.

3. Inclusion of visual elements to supplement and complement text elements, promoting effective engagement.
4. Implementation of useful typography, in the form of mixed case, varying font sizes and weights, and structured headings prioritizing content. Usability, readability, and comprehension improves significantly when distinct headings are applied.[136]

Conclusion

Digital archives and online archival resources, including electronic finding aids, are valuable contemporary developments that support information management and access. Developments in electronic standards and online finding aid dissemination have improved education. Data visualization offers further educational value to archives by increasing engagement and adding interactivity to primary source collections.[137] Correspondingly, standards-based markup languages and related technologies innovate workflows by electronically extracting and transforming item-level metadata. Reformatting this content into a variety of representations provides multiple customized access points, while also preserving traditional archival description.[138] Future enhancements to electronic standards in the form of integrated audience attributes can establish elements intended for alternative user communities, including surrogate images and plain-language messages clarifying the structure and components of a collection.

Where item-level description is limited or missing, collection search features will be correspondingly deficient.[139] Scanning and processing documents using optical character recognition technologies, although time-consuming and subject to preservation considerations, increases the volume of item-level content. The additional metadata produced by these activities greatly enhance collection discovery, and offset the negative effects of a limited, or absent, search text index.[140] Information design provides the final step of the process, ensuring that the data are tested and distributed in a usable, user-friendly manner. In the absence of comprehensive digitization initiatives, skillfully designed information products will increase entry-level researcher comfort with primary sources and improve educational outcomes.

Information design is an established and economical practice offering significant enhancements to the overall usability and effectiveness of both physical and online environments. Proficiency in information design is readily attainable with immediate, measurable benefits. Applying information design guidelines and best practices to complex and confusing information artifacts, in addition to positively impacting usability, has proven to be a relatively inexpensive investment that is easy to implement.[141] As demonstrated using finding aid content from the Martini collection, librarians, archivists, and library users benefit substantially when incorporating information design into their professional activities.

Bibliography

Beier, Sofie, Chiron A.T. Oderkerk, Birte Bay, and Michael Larsen. "Increased Letter Spacing and Greater Letter Width Improve Reading Acuity in Low Vision Readers." *Information Design Journal* 26, no. 1 (April 28, 2021): 73–88. https://doi.org/10.1075/idj.19033.bei.

Berg, Magnus. "A 'Major Technological Challenge': Multi-Level Description and Online Archival Databases." *Emerging Library & Information Perspectives* 4, no. 1 (July 2, 2021): 62–87. https://doi.org/10.5206/elip.v4i1.12529.

Chapman, Joyce Celeste. "Observing Users: An Empirical Analysis of User Interaction with Online Finding Aids." *Journal of Archival Organization* 8, no. 1 (June 10, 2010): 4–30. https://doi.org/10.1080/15332748.2010.484361.

Chen, Yu-Hui, Carol Anne Germain, and Abebe Rorissa. "Defining Usability: How Library Practice Differs from Published Research." *Portal: Libraries and the Academy* 11, no. 2 (2011): 599–628. https://doi.org/10.1353/pla.2011.0020.

Cole, Tiffany. "Characteristics of Successful Finding Aids." Mid-Atlantic Regional Archives Conference, October 31, 2011. https://www.marac.info/index.php?option=com_content&view=article&id=64.

Daines III, J. Gordon, and Cory L. Nimer. "Re-Imagining Archival Display: Creating User-Friendly Finding Aids." *Journal of Archival Organization* 9, no. 1 (May 20, 2011): 4–31. https://doi.org/10.1080/15332748.2011.574019.

DeRidder, Jody L., Amanda Axley Presnell, and Kevin W. Walker. "Leveraging Encoded Archival Description for Access to Digital Content: A Cost and Usability Analysis." *The American Archivist* 75, no. 1 (April 1, 2012): 143–70. https://doi.org/10.17723/aarc.75.1.5641v61p422u0u90.

Emerson, John. "Visualizing Information for Advocacy: An Introduction to Information Design." Open Society Institute Information Program, January 2008.

Ericson, Jonathan D., William S. Albert, Benjamin P. Bernard, and Elizabeth Brown. "End-User License Agreements (EULAs): Investigating the Impact of Human-Centered Design on Perceived Usability, Attitudes, and Anticipated Behavior." *Information Design Journal* 26, no. 3 (May 23, 2022): 190–208. https://doi.org/10.1075/idj.20018.eri.

Ferriero, David. "Finding Aid Type." Lifecycle Data Requirements Guide (LCDRG). Washington, DC: National Archives and Records Administration, August 15, 2016. https://www.archives.gov/research/catalog/lcdrg/elements/findingtype.html.

Freund, Luanne, and Elaine G. Toms. "Interacting With Archival Finding Aids." *Journal of the Association for Information Science and Technology* 67, no. 4 (April 27, 2015): 994–1008. https://doi.org/10.1002/asi.23436.

Gibson, David. *The Wayfinding Handbook: Information Design for Public Places*. 1st ed. New York, NY: Princeton Architectural Press, 2009.

Godfrey, Krista. "Creating a Culture of Usability." *Weave: Journal of Library User Experience* 1, no. 3 (2015): 1–10. https://doi.org/10.3998/weave.12535642.0001.301.

Hayhoe, George F. "Telling the Future of Information Design." *Communication Design Quarterly* 1, no. 1 (September 2012): 23–26.

Hazlett, Richard L., Kevin Larson, A. Dawn Shaikh, and Barbara S. Chaparo. "Two Studies on How a Typeface Congruent with Content Can Enhance Onscreen Communication." *Information Design Journal* 20, no. 3 (September 1, 2013): 207–19. https://doi.org/10.1075/idj.20.3.02haz.

Jansen, Frank. "How Bulleted Lists and Enumerations in Formatted Paragraphs Affect Recall and Evaluation of Functional Text." *Information Design Journal* 21, no. 2 (November 3, 2015): 146–62. https://doi.org/10.1075/idj.21.2.06jan.

Johnston, Rita D. "A Qualitative Study of the Experiences of Novice Undergraduate Students with Online Finding Aids." Master's thesis. University of North Carolina at Chapel Hill, 2008. https://cdr.lib.unc.edu/concern/masters_papers/12579x16p.

Krug, Steve. *Don't Make Me Think, Revisited: A Common Sense Approach to Web Usability*. 3rd ed. San Francisco, CA: New Riders, Peachpit Press, 2013.

Laugwitz, Bettina, Theo Held, and Martin Schrepp. "Construction and Evaluation of a User Experience Questionnaire," 63–76. Graz, Austria: Springer-Verlag, 2008. https://doi.org/10.1007/978-3-540-89350-9_6.

Lonsdale, Maria dos Santos, David Lonsdale, and Hye-Won Lim. "The Impact of Delivering Online Information Neglecting User-Centered Information Design Principles." *Information Design Journal* 24, no. 2 (April 18, 2019): 151–77. https://doi.org/10.1075/idj.00005.san.

Luca, Edward, and Bhuva Narayan. "Signage by Design: A Design-Thinking Approach to Library User Experience." *Weave: Journal of Library User Experience* 1, no. 5 (June 2016): 1–25. https://doi.org/10.3998/weave.12535642.0001.501.

Marchionini, Gary. "Information-seeking Strategies of Novices Using a Full-text Electronic Encyclopedia." *Journal of the American Society for Information Science* 40, no. 1 (January 1989): 54–66. https://dl.acm.org/

doi/10.5555/65193.65199.

Mayer, Richard E. "Instructional Design as a Form of Information Design." *Information Design Journal* 25, no. 3 (October 22, 2020): 258–63. https://doi.org/10.1075/idj.25.3.03may.

McGahee, Clayton. "Making Special Collections Accessible to Users: Finding Aids." Lecture presented at the International Association of Law Libraries 36th Annual Course on International Law and Legal Information, Civil Rights, Human Rights, and Other Critical Issues in U.S. Law, Atlanta, GA, October 26, 2017. https://doi.org/10.1017/jli.2018.2.

Meloncon, Lisa. "Embodied Personas for a Mobile World." *Technical Communication* 64, no. 1 (February 2017): 50–65.

Mollerup, Per. *Data Design: Visualising Quantities, Locations, Connections*. London, UK: Bloomsbury Academic Publishing, 2015.

Nielsen, Jakob, and Thomas K. Landauer. "A Mathematical Model of the Finding of Usability Problems." In *CHI '93: Proceedings of the INTERACT '93*, 206–13. Amsterdam, NL: Association for Computing Machinery, 1993. https://doi.org/10.1145/169059.169166.

Nielsen, Jakob, and Donald A. Norman. "User Experience," n.d. https://www.nngroup.com/articles/definition-user-experience/.

Norman, Donald A. *The Design of Everyday Things: Revised and Expanded Edition*. 2nd ed. New York: Basic Books, 2013.

Norman, Donald A., Jim Miller, and Austin Henderson. "What You See, Some of What's in the Future, And How We Go About Doing It: HI at Apple Computer." In *Conference Companion on Human Factors in Computing Systems*, 155. Denver, CO: ACM, 1995. https://doi.org/10.1145/223355.223477.

North, Alvin J., and L. B. Jenkins. "Reading Speed and Comprehension as a Function of Typography." *Journal of Applied Psychology* 35, no. 4 (August 1951): 225–28. https://doi.org/10.1037/h0063094.

Oberbichler, Sarah, Katharina Gallner-Holzmann, and Theo Hug. "Generous and Inviting Interfaces Revisited: Examples of Designing Visual Structures for Digital Archives." *Information Design Journal* 26, no. 2 (December 7, 2021): 157–74. https://doi.org/10.1075/idj.20028.obe.

Orna, Elizabeth. "Information Science and Information Design: Have They Anything to Communicate to One Another?" *Information Design Journal* 1, no. 4 (January 1, 1980): 271–80. https://doi.org/10.1075/idj.1.4.07orn.

Pearce-Moses, Richard. "Finding Aid." In *SAA Dictionary of Archives Terminology*. Chicago, IL: Society of American Archivists, April 29, 2020. https://dictionary.archivists.org/entry/finding-aid.html.

Pettersson, Rune. "Information Design–Principles and Guidelines." *Journal of Visual Literacy* 29, no. 2 (2010): 167–82. https://doi.org/10.1080/23796529.2010.11674679.

———. *It Depends*. 4th ed. Stockholm, SE: Institute for Infology, 2012. https://www.researchgate.net/profile/Rune-Pettersson/publication/281810734_11_It_Depends/links/6267908e1b747d19c2a89281/11-It-Depends.pdf.

———. "Seven Theories for ID." In *Proceedings of the 7th Information Design International Conference*, 2:819–30. São Paulo, Brazil: Blucher Design Proceedings, 2015. https://doi.org/10.5151/designpro-CIDI2015-cidi_ZZ.

Pirolli, Peter, and Daniel M. Russell. "Introduction to This Special Issue on Sensemaking." *Human-Computer Interaction* 26, no. 1–2 (March 16, 2011): 1–8. https://doi.org/10.1080/07370024.2011.556557.

Pontis, Sheila, and Michael Babwahsingh. "Improving Information Design Practice: A Closer Look at Conceptual Design Methods." *Information Design Journal* 22, no. 3 (January 19, 2017): 249–65. https://doi.org/10.1075/idj.22.3.06pon.

Prom, Christopher J. "The EAD Cookbook: A Survey and Usability Study." *The American Archivist* 65, no. 2 (September 1, 2002): 257–75. https://doi.org/10.17723/aarc.65.2.b3783jr052731588.

Redish, Janice C. *Letting Go of Words: Writing Web Content That Works*. 2nd ed. Waltham, MA: Morgan Kaufmann Publishers, 2014. https://www.sciencedirect.com/science/article/pii/B9780123859303000327.

———. "Readability Formulas Have Even More Limitations than Klare Discusses." *ACM Journal of Computer Documentation (JCD)* 24, no. 3 (August 1, 2000): 132–37. https://dl.acm.org/doi/pdf/10.1145/344599.344637.

———. "Technical Communication and Usability: Intertwined Strands and Mutual Influences." *IEEE Transactions on Professional Communication* 53, no. 3 (September 2010): 191–201. https://doi.org/0.1109/TPC.2010.2052861.

———. "What Is Information Design?" *Technical Communication: Journal of the Society for Technical Communication* 47, no. 2 (May 1, 2000): 163–66. https://www.researchgate.net/profile/Ginny-Redish/publication/233710886_What_Is_Information_Design/links/56e4494e08aedb4cc8ac232d/What-Is-Information-Design.pdf.

Roth, James M. "Serving Up EAD: An Exploratory Study on the Deployment and Utilization of Encoded Archival Description Finding Aids." Master's, University of North Carolina at Chapel Hill, 2001. https://doi.org/10.17723/aarc.64.2.e687471v304k0u66.

Scales, Alice Y. "Improving Instructional Materials by Improving Document Formatting," 1–12. American Society for Engineering Education, 2011.

Scheir, Wendy. "First Entry: Report on a Qualitative Exploratory Study of Novice User Experience with On-

line Finding Aids." *Journal of Archival Organization* 3, no. 4 (July 18, 2006): 49–85. https://doi.org/10.1300/J201v03n04_04.

Schmidt, Aaron, and Amanda Etches. *Useful, Usable, Desirable: Applying User Experience Design to Your Library.* Chicago, IL: American Library Association, 2014. https://www.alastore.ala.org/content/useful-usable-desirable-applying-user-experience-design-your-library.

Schriver, Karen A. *Dynamics in Document Design: Creating Texts for Readers.* New York: John Wiley & Sons, Inc., 1996.

Shedroff, Nathan. "Information Interaction Design: A Unified Field Theory of Design," 1994.

Stapleton, Katina Rae, and Katherine Spivey. "Federal Plain Language Guidelines." The Plain Language Action and Information Network (PLAIN), May 2011. https://www.plainlanguage.gov/guidelines/.

Strikwerda, Jelle, Bregje Holleman, and Hans Hoeken. "Designing Pension Communication: Lessons from the Medical Domain." *Information Design Journal* 26, no. 3 (August 4, 2022): 1–21. https://doi.org/doi.org/10.1075/idj.21011.str.

Tinker, Miles A. "The Relative Legibility of the Letters, the Digits, and of Certain Mathematical Signs." *The Journal of General Psychology* 1, no. 3–4 (1928): 472–96. https://doi.org/10.1080/00221309.1928.9918022.

Tufte, Edward R. *Envisioning Information.* 4th ed. Cheshire, CT: Graphics Press, 1990.

———. *The Visual Display of Quantitative Information.* 2nd ed. Cheshire, CT: Graphics Press, 2001.

U.S. Dept. of Health and Human Services. "Visual Design Basics." Usability.gov. Department of Health and Human Services, October 8, 2013. https://www.usability.gov/what-and-why/visual-design.html.

Van Dyke, Trudi. "The Nicholas Martini Collection 1931-1991." William Paterson University, October 14, 2005. https://www.wpunj.edu/library/pdf/MartiniFindingAidUpdated060407.pdf.

Wakimoto, Diana K. "Librarians and Graphic Design: Preparation, Roles, and Desired Support." *Public Service Quarterly* 11, no. 3 (July 3, 2015): 171–82. https://doi.org/10.1080/15228959.1054545.

Waller, Rob. "Functional Information Design: Research and Practice." *Information Design Journal* 1, no. 1 (January 1, 1979): 43–50. https://doi.org/10.1075/idj.1.1.06wal.

———. "The Origins of the Information Design Association." University of Reading Department of Typography & Graphic Communication, 2008.

Walton, Rachel. "Looking for Answers: A Usability Study of Online Finding Aid Navigation." *The American Archivist* 80, no. 1 (June 2017): 30–52. https://doi.org/10.17723/0360-9081.80.1.30.

William Paterson University Office of Institutional Effectiveness. "University Facts." William Paterson University, n.d. https://www.wpunj.edu/about-us/university-facts.html.

Yakel, Elizabeth, Seth Shaw, and Polly Reynolds. "Creating the Next Generation of Archival Finding Aids." *D-Lib Magazine* 13, no. 5/6 (May 13, 2007): 7. https://doi.org/10.1045/may2007-yakel.

York, Jeremy. "Legibility and Large-Scale Digitization." Hathi Trust Digital Library, November 2008.

Zeldman, Jeffrey. "Design Is Typography," December 23, 2015. https://twitter.com/zeldman/status/679727437198929921?s=20&t=RoHX_FVinW-yv3TODE8YYA.

Zhang, Jane. "Archival Representation in the Digital Age." *Journal of Archival Organization* 10, no. 1 (May 29, 2012): 45–68. https://doi.org/10.1080/15332748.2012.677671.

Notes

1. Diana K. Wakimoto, "Librarians and Graphic Design: Preparation, Roles, and Desired Support," *Public Service Quarterly* 11, no. 3 (July 3, 2015): 171, https://doi.org/10.1080/15228959.1054545.

2. Aaron Schmidt and Amanda Etches, *Useful, Usable, Desirable: Applying User Experience Design to Your Library* (Chicago, IL: American Library Association, 2014), 7, https://www.alastore.ala.org/content/useful-usable-desirable-applying-user-experience-design-your-library.

3. Krista Godfrey, "Creating a Culture of Usability," *Weave: Journal of Library User Experience* 1, no. 3 (2015): 1–10, https://doi.org/10.3998/weave.12535642.0001.301.

4. Donald A. Norman, Jim Miller, and Austin Henderson, "What You See, Some of What's in the Future, And How We Go About Doing It: HI at Apple Computer," in *Conference Companion on Human Factors in Computing Systems* (Human Factors in Computing Systems, Denver, CO: ACM, 1995), 155, https://doi.org/10.1145/223355.223477.

5. Donald A. Norman, *The Design of Everyday Things: Revised and Expanded Edition*, 2nd ed. (New York: Basic Books, 2013), 9.

6. Yu-Hui Chen, Carol Anne Germain, and Abebe Rorissa, "Defining Usability: How Library Practice Differs from Published Research," *Portal: Libraries and the Academy* 11, no. 2 (2011): 622, https://doi.org/10.1353/pla.2011.0020.

7. Jakob Nielsen and Donald A. Norman, "User Experience," n.d., https://www.nngroup.com/articles/

definition-user-experience/.

8. Steve Krug, *Don't Make Me Think, Revisited: A Common Sense Approach to Web Usability*, 3rd ed. (San Francisco, CA: New Riders, Peachpit Press, 2013), 152.

9. Janice C. Redish, "Technical Communication and Usability: Intertwined Strands and Mutual Influences," *IEEE Transactions on Professional Communication* 53, no. 3 (September 2010): 191, https://doi.org/0.1109/TPC.2010.2052861.

10. Janice C. Redish, *Letting Go of Words: Writing Web Content That Works*, 2nd ed. (Waltham, MA: Morgan Kaufmann Publishers, 2014), xxvi, https://www.sciencedirect.com/science/article/pii/B9780123859303000327.

11. Rob Waller, "The Origins of the Information Design Association" (University of Reading Department of Typography & Graphic Communication, 2008), 4.

12. Janice C. Redish, "What Is Information Design?," *Technical Communication: Journal of the Society for Technical Communication* 47, no. 2 (May 1, 2000): 163, https://www.researchgate.net/profile/Ginny-Redish/publication/233710886_What_Is_Information_Design/links/56e4494e08aedb4cc8ac232d/What-Is-Information-Design.pdf.

13. Redish, "What Is Information Design," 165.

14. Karen A. Schriver, Dynamics in Document Design: Creating Texts for Readers (New York: John Wiley & Sons, Inc., 1996), 6–7.

15. Rune Pettersson, *It Depends*, 4th ed. (Stockholm, SE: Institute for infology, 2012), 15, https://www.researchgate.net/profile/Rune-Pettersson/publication/281810734_11_It_Depends/links/6267908e1b747d19c2a89281/11-It-Depends.pdf.

16. Elizabeth Orna, "Information Science and Information Design: Have They Anything to Communicate to One Another?," *Information Design Journal* 1, no. 4 (January 1, 1980): 271, https://doi.org/10.1075/idj.1.4.07orn.

17. Nathan Shedroff, "Information Interaction Design: A Unified Field Theory of Design," 1994: 4.

18. Per Mollerup, *Data Design: Visualising Quantities, Locations, Connections* (London, UK: Bloomsbury Academic Publishing, 2015), 5.

19. Rune Pettersson, "Seven Theories for ID," in *Proceedings of the 7th Information Design International Conference*, vol. 2 (CIDI 2015: The 7th Information Design International Conference, São Paulo, Brazil: Blucher Design Proceedings, 2015), 1, https://doi.org/10.5151/designpro-CIDI2015-cidi_ZZ.

20. Waller, "Origins of the IDA," 4.

21. Pettersson, *It Depends*, 26.

22. Pettersson, "Seven Theories for ID," 821.

23. Sheila Pontis and Michael Babwahsingh, "Improving Information Design Practice: A Closer Look at Conceptual Design Methods," *Information Design Journal* 22, no. 3 (January 19, 2017): 250, https://doi.org/10.1075/idj.22.3.06pon.

24. Pettersson, "Seven Theories for ID," 822.

25. Redish, "What Is Information Design?," 164.

26. John Emerson, "Visualizing Information for Advocacy: An Introduction to Information Design" (Open Society Institute Information Program, January 2008), 3.

27. Pettersson, *It Depends*, 13.

28. George F. Hayhoe, "Telling the Future of Information Design," *Communication Design Quarterly* 1, no. 1 (September 2012): 23.

29. Pettersson, "Seven Theories for ID," 819.

30. Redish, "What Is Information Design?," 163.

31. U.S. Dept. of Health and Human Services, "Visual Design Basics," Usability.gov (Department of Health and Human Services, October 8, 2013), https://www.usability.gov/what-and-why/visual-design.html.

32. Emerson, "Visualizing Information for Advocacy," 3.

33. Pontis and Babwahsingh, "Improving Information Design Practice," 250.

34. Godfrey, "Creating a Culture of Usability."

35. Krug, *Don't Make Me Think, Revisited*, 135.

36. Jakob Nielsen and Thomas K. Landauer, "A Mathematical Model of the Finding of Usability Problems," in *CHI '93: Proceedings of the INTERACT '93* (CHI '93 Conference on Human Factors in Computing Systems, Amsterdam, NL: Association for Computing Machinery, 1993), 213, https://doi.org/10.1145/169059.169166.

37. Bettina Laugwitz, Theo Held, and Martin Schrepp, "Construction and Evaluation of a User Experience Questionnaire" (Symposium of the Austrian HCI and Usability Engineering Group, Graz, Austria: Springer-Verlag, 2008), 64, https://doi.org/10.1007/978-3-540-89350-9_6.

38. Rob Waller, "Functional Information Design: Research and Practice," *Information Design Journal* 1, no. 1 (January 1, 1979): 45, https://doi.org/10.1075/idj.1.1.06wal.

39. Redish, *Letting Go of Words*, xxvi.

40. Lisa Meloncon, "Embodied Personas for a Mobile World," *Technical Communication* 64, no. 1 (February 2017): 59.

41. Richard E. Mayer, "Instructional Design as a Form of Information Design," *Information Design Journal* 25, no. 3 (October 22, 2020): 258, https://doi.org/10.1075/idj.25.3.03may.

42. Pettersson, *It Depends*, 16.

43. Mayer, "Instructional Design as Information Design," 258.

44. Schmidt and Etches, *Useful, Usable, Desirable*, 2.

45. David Gibson, *The Wayfinding Handbook: Information Design for Public Places*, 1st ed. (New York, NY: Princeton Architectural Press, 2009), 46.

46. Wakimoto, "Librarians and Graphic Design," 173.

47. Gibson, *The Wayfinding Handbook*, 46.

48. Edward Luca and Bhuva Narayan, "Signage by Design: A Design-Thinking Approach to Library User Experience," *Weave: Journal of Library User Experience* 1, no. 5 (June 2016): 1–25, https://doi.org/10.3998/weave.12535642.0001.501.

49. Gibson, *The Wayfinding Handbook*, 79.

50. Pettersson, *It Depends*, 42.

51. Edward R. Tufte, *Envisioning Information*, 4th ed. (Cheshire, CT: Graphics Press, 1990), 10.

52. Pontis and Babwahsingh, "Improving Information Design Practice," 250.

53. Pettersson, *It Depends*, 17.

54. Maria dos Santos Lonsdale, David Lonsdale, and Hye-Won Lim, "The Impact of Delivering Online Information Neglecting User-Centered Information Design Principles," *Information Design Journal* 24, no. 2 (April 18, 2019): 29, https://doi.org/10.1075/idj.00005.san.

55. Pettersson, "Information Design Principles and Guidelines," 169.

56. Pettersson, "Information Design Principles and Guidelines," 177.

57. Pettersson, *It Depends*, 19.

58. Jelle Strikwerda, Bregje Holleman, and Hans Hoeken, "Designing Pension Communication: Lessons from the Medical Domain," *Information Design Journal* 26, no. 3 (August 4, 2022): 1, https://doi.org/doi/10.1075/idj.21011.str.

59. Rune Pettersson, "Information Design–Principles and Guidelines," *Journal of Visual Literacy* 29, no. 2 (2010): 168, https://doi.org/10.1080/23796529.2010.11674679.

60. Jeremy York, "Legibility and Large-Scale Digitization" (Hathi Trust Digital Library, November 2008), 14.

61. Janice C. Redish, "Readability Formulas Have Even More Limitations than Klare Discusses," *ACM Journal of Computer Documentation (JCD)* 24, no. 3 (August 1, 2000): 132, https://dl.acm.org/doi/pdf/10.1145/344599.344637.

62. Pettersson, "Information Design Principles and Guidelines," 173.

63. Katina Rae Stapleton and Katherine Spivey, "Federal Plain Language Guidelines" (The Plain Language Action and Information Network (PLAIN), May 2011), i, https://www.plainlanguage.gov/guidelines/.

64. Redish, "What Is Information Design?," 165.

65. Alvin J. North and L. B. Jenkins, "Reading Speed and Comprehension as a Function of Typography," *Journal of Applied Psychology* 35, no. 4 (August 1951): 228, https://doi.org/10.1037/h0063094.

66. Richard L. Hazlett et al., "Two Studies on How a Typeface Congruent with Content Can Enhance Onscreen Communication," *Information Design Journal* 20, no. 3 (September 1, 2013): 207, https://doi.org/10.1075/idj.20.3.02haz.

67. Sofie Beier et al., "Increased Letter Spacing and Greater Letter Width Improve Reading Acuity in Low Vision Readers," *Information Design Journal* 26, no. 1 (April 28, 2021): 85, https://doi.org/10.1075/idj.19033.bei.

68. Jeffrey Zeldman, "Design Is Typography," December 23, 2015, https://twitter.com/zeldman/status/679727437198929921?s=20&t=RoHX_FVinW-yv3TODE8YYA.

69. York, "Legibility and Digitization," 46.

70. Alice Y. Scales, "Improving Instructional Materials by Improving Document Formatting" (ASEE Southeast Section Conference, American Society for Engineering Education, 2011), 2.

71. Scales, 4.

72. Scales, 6.

73. Scales, 6.

74. Gary Marchionini, "Information-seeking Strategies of Novices Using a Full-text Electronic Encyclopedia," *Journal of the American Society for Information Science* 40, no. 1 (January 1989): 56, https://dl.acm.org/doi/10.5555/65193.65199.

75. Frank Jansen, "How Bulleted Lists and Enumerations in Formatted Paragraphs Affect Recall and Evaluation of Functional Text," *Information Design Journal* 21, no. 2 (November 3, 2015): 159, https://doi.org/10.1075/

idj.21.2.06jan.

76. Miles A. Tinker, "The Relative Legibility of the Letters, the Digits, and of Certain Mathematical Signs," *The Journal of General Psychology* 1, no. 3–4 (1928): 492, https://doi.org/10.1080/00221309.1928.9918022.

77. Scales, "Improving Instructional Materials," 7.

78. Redish, "What Is Information Design?," 166.

79. Tufte, *Visual Display of Quantitative Information*, 56.

80. Emerson, "Visualizing Information for Advocacy," 4.

81. Pettersson, *It Depends*, 30.

82. Redish, "What Is Information Design?," 166.

83. Edward R. Tufte, *The Visual Display of Quantitative Information*, 2nd ed. (Cheshire, CT: Graphics Press, 2001), 191.

84. Pettersson, "Information Design Principles and Guidelines," 176.

85. Shedroff, "Information Interaction Design," 2.

86. Shedroff, 14.

87. Pettersson, 825.

88. Pettersson, "Information Design Principles and Guidelines," 178.

89. Strikwerda, Holleman, and Hoeken, "Designing Pension Communication," 14.

90. Strikwerda, Holleman, and Hoeken, 16.

91. Pettersson, 180.

92. Pettersson, 178.

93. U.S. Dept. of Health and Human Services, "Visual Design Basics."

94. Pettersson, "Information Design Principles and Guidelines," 179.

95. Pettersson, "Seven Theories for ID," 827.

96. David Ferriero, "Finding Aid Type," Lifecycle Data Requirements Guide (LCDRG) (Washington, DC: National Archives and Records Administration, August 15, 2016), https://www.archives.gov/research/catalog/lcdrg/elements/findingtype.html.

97. Richard Pearce-Moses, "Finding Aid," in *SAA Dictionary of Archives Terminology* (Chicago, IL: Society of American Archivists, April 29, 2020), https://dictionary.archivists.org/entry/finding-aid.html.

98. Tiffany Cole, "Characteristics of Successful Finding Aids" (Mid-Atlantic Regional Archives Conference, October 31, 2011), https://www.marac.info/index.php?option=com_content&view=article&id=64.

99. James M. Roth, "Serving Up EAD: An Exploratory Study on the Deployment and Utilization of Encoded Archival Description Finding Aids" (Master's, Chapel Hill, NC, University of North Carolina at Chapel Hill, 2001), 228, https://doi.org/10.17723/aarc.64.2.e687471v304k0u66.

100. Luanne Freund and Elaine G. Toms, "Interacting With Archival Finding Aids," *Journal of the Association for Information Science and Technology* 67, no. 4 (April 27, 2015): 995, https://doi.org/10.1002/asi.23436.

101. Wendy Scheir, "First Entry: Report on a Qualitative Exploratory Study of Novice User Experience with Online Finding Aids," *Journal of Archival Organization* 3, no. 4 (July 18, 2006): 50, https://doi.org/10.1300/J201v03n04_04.

102. Freund and Toms, "Interacting With Archival Finding Aids," 995.

103. J. Gordon Daines III and Cory L. Nimer, "Re-Imagining Archival Display: Creating User-Friendly Finding Aids," *Journal of Archival Organization* 9, no. 1 (May 20, 2011): 6, https://doi.org/10.1080/15332748.2011.574019.

104. Magnus Berg, "A 'Major Technological Challenge': Multi-Level Description and Online Archival Databases," *Emerging Library & Information Perspectives* 4, no. 1 (July 2, 2021): 63, https://doi.org/10.5206/elip.v4i1.12529.

105. Christopher J. Prom, "The EAD Cookbook: A Survey and Usability Study," *The American Archivist* 65, no. 2 (September 1, 2002): 258, https://doi.org/10.17723/aarc.65.2.b3783jr052731588.

106. Prom, 274.

107. Prom, 258.

108. Elizabeth Yakel, Seth Shaw, and Polly Reynolds, "Creating the Next Generation of Archival Finding Aids," *D-Lib Magazine* 13, no. 5/6 (May 13, 2007): 7, https://doi.org/10.1045/may2007-yakel.

109. Clayton McGahee, "Making Special Collections Accessible to Users: Finding Aids" (Lecture, International Association of Law Libraries 36th Annual Course on International Law and Legal Information, Civil Rights, Human Rights, and Other Critical Issues in U.S. Law, Atlanta, GA, October 26, 2017), 32, https://doi.org/10.1017/jli.2018.2.

110. Jane Zhang, "Archival Representation in the Digital Age," *Journal of Archival Organization* 10, no. 1 (May 29, 2012): 45, https://doi.org/10.1080/15332748.2012.677671.

111. Zhang, 49.

112. McGahee, "Making Special Collections Accessible," 37.

113. Rachel Walton, "Looking for Answers: A Usability Study of Online Finding Aid Navigation," *The American Archivist* 80, no. 1 (June 2017): 31, https://doi.org/10.17723/0360-9081.80.1.30.

114. Jody L. DeRidder, Amanda Axley Presnell, and Kevin W. Walker, "Leveraging Encoded Archival Description for Access to Digital Content: A Cost and Usability Analysis," *The American Archivist* 75, no. 1 (April 1, 2012): 146, https://doi.org/10.17723/aarc.75.1.5641v61p422u0u90.

115. Roth, "Serving Up EAD," 216.

116. Prom, "EAD Cookbook Survey," 264.

117. Roth, "Serving Up EAD," 234.

118. Scheir, "Novice User Experience with Online Finding Aids," 60.

119. Scheir, 60.

120. Cole, "Successful Finding Aids."

121. Yakel, Shaw, and Reynolds, "Creating the Next Generation," 7.

122. Rita D. Johnston, "A Qualitative Study of the Experiences of Novice Undergraduate Students with Online Finding Aids" (Master's, Chapel Hill, NC, University of North Carolina at Chapel Hill, 2008), 11, https://cdr.lib.unc.edu/concern/masters_papers/12579x16p.

123. Walton, "Looking for Answers," 45.

124. Roth, "Serving Up EAD," 219.

125. Scheir, "Novice User Experience with Online Finding Aids," 52.

126. Johnston, "Experiences of Novice Undergraduate Students," 2.

127. Peter Pirolli and Daniel M. Russell, "Introduction to This Special Issue on Sensemaking," *Human-Computer Interaction* 26, no. 1–2 (March 16, 2011): 7, https://doi.org/10.1080/07370024.2011.556557.

128. Johnston, "Experiences of Novice Undergraduate Students," 45.

129. Freund and Toms, "Interacting With Archival Finding Aids," 1005.

130. Joyce Celeste Chapman, "Observing Users: An Empirical Analysis of User Interaction with Online Finding Aids," *Journal of Archival Organization* 8, no. 1 (June 10, 2010): 5, https://doi.org/10.1080/15332748.2010.484361.

131. DeRidder, Presnell, and Walker, "Leveraging Encoded Archival Description," 148.

132. Freund and Toms, "Interacting With Archival Finding Aids," 1003.

133. Trudi Van Dyke, "The Nicholas Martini Collection 1931-1991" (William Paterson University, October 14, 2005), https://www.wpunj.edu/library/pdf/MartiniFindingAidUpdated060407.pdf.

134. William Paterson University Office of Institutional Effectiveness, "University Facts" (William Paterson University, n.d.), https://www.wpunj.edu/about-us/university-facts.html.

135. Scheir, "Novice User Experience with Online Finding Aids," 58.

136. Jonathan D. Ericson et al., "End-User License Agreements (EULAs): Investigating the Impact of Human-Centered Design on Perceived Usability, Attitudes, and Anticipated Behavior," *Information Design Journal* 26, no. 3 (May 23, 2022): 200, https://doi.org/10.1075/idj.20018.eri.

137. Sarah Oberbichler, Katharina Gallner-Holzmann, and Theo Hug, "Generous and Inviting Interfaces Revisited: Examples of Designing Visual Structures for Digital Archives," *Information Design Journal* 26, no. 2 (December 7, 2021): 167, https://doi.org/10.1075/idj.20028.obe.

138. DeRidder, Presnell, and Walker, "Leveraging Encoded Archival Description," 146.

139. Freund and Toms, "Interacting With Archival Finding Aids," 996.

140. Freund and Toms, 1006.

141. Ericson et al., "End-User License Agreements," 203.