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Understanding Ultimate Use Data and its Implication for Digital Library Management: A Case Study

Michele Reilly
reillym@cwu.edu, reillym@cwu.edu

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ARTICLE

Understanding Ultimate Use Data and its Implication for Digital Library Management: A Case Study

MICHELE REILLY

Central Washington University Libraries, Ellensburg, Washington, USA

SANTI THOMPSON

University of Houston Libraries, Houston, Texas, USA

Information professionals and librarians have been studying, discussing, and developing digital libraries for over two decades, but understanding ultimate use of images from digital libraries remains a mystery for many of them. Most articles written on digital library use focus on users' search retrieval needs and behavior. Few mention how digital library patrons use the images they request. Like many digital libraries, archives, and special collections, the University of Houston Digital Library makes high resolution images available to their patrons. Image delivery is achieved by an automated system, titled the Digital Cart Service. An unexpected benefit of the Digital Cart Service is the reporting mechanism that produces data that includes intended use information. This article discusses the analysis of this data to determine why images were used, what products were created from the images, and what implications this has on digital library management. The authors believe that answering these questions creates an environment in which digital library innovators can better promote and design digital libraries, and describe and select the content in them.

KEYWORDS   digital libraries, digital library users, digital images, user requests, user study, outreach, data collection, selection for

30 *digitization, ultimate use, metadata, digital asset management*
31 *systems*

INTRODUCTION

33 With the click of a mouse, today's users have more images at their disposal
34 than ever before. According to researchers Lori McCay-Peet and Elaine Toms,
35 "The plethora of readily available images led Jorgensen (2003) to suggest that
36 we have returned to an era when images dominated human communication
37 that formerly was grounded in visual representations rather than text" (2009,
38 2416). However, understanding how these images are ultimately used re-
39 mains largely unexplored in the professional literature.

40   The University of Houston Digital Library (UHDL) is a freely accessible,
41 online repository containing objects from the University of Houston Libraries
42 and other university departments. Established in September 2009 and built
43 on the CONTENTdm platform, the UHDL is a Web-based library of ap-
44 proximately 50 collections holding almost 50,000 images, documents, sound
45 recordings, and moving images of cultural, historical, and research signifi-
46 cance. The UHDL was created to be used by academics and researchers at
47 UH and around the world. The mission statement asserts, "The University of
48 Houston Digital Library is a comprehensive digital library, which provides
49 for our students, faculty, and the greater community a rich and exciting en-
50 vironment for the discovery of digital resources and knowledge" (University
51 of Houston Libraries 2013).

52   For the context of this article, the authors define a digital library in
53 general terms as any digital repository that includes multiple formats, pro-
54 vides associated metadata and other descriptive information, and is open
55 and accessible to the public.[1] In recent literature, these repositories have
56 been defined as "general" and/or "web image collections" (Chung and Yoon
57 2011, 163). Most of these materials will be in the form of images, PDF
58 documents, maps, and audio/video files. They often contain digital surro-
59 gates of rare or unique special collection materials. The authors believe that
60 these image repositories are not primarily considered institutional reposito-
61 ries, which typically make accessible the scholarly pursuits of a university's
62 faculty and students (e.g., scholarly articles, electronic theses and disser-
63 tations, and data sets). Some examples of popular digital libraries include
64 the Library of Congress's American Memory, the New York Public Digital
65 Gallery, and the Smithsonian's Digital Library.

66   Many digital libraries, archives, and special collections make high resolu-
67 tion images available to their patrons. Although some services are fee-based,
68 UHDL delivers high resolution images for free upon request. To facilitate
69 this service, the UH library's Digital Services department worked with the
70 library's Web Services department to create an innovative digital request

71   system. Known as the Digital Cart Service (DCS), this automated system al-
72   lows users to request 600 dots per inch (dpi) jpeg images to be delivered via
73   e-mail. The patrons have 90 days to retrieve their requests and can download
74   the images as often as they want within that 90-day period. Providing high
75   resolution images for free in an automated system was intended to increase
76   use by patrons and reduce the overall work for UHDL staff.

77   The DCS is designed to record patron-provided data, including name,
78   date, image file name, affiliation, and the description of use. An unanticipated
79   benefit of the DCS was the accumulation of "ultimate use" data. For the
80   context of this article, the authors define "ultimate use" as the purpose for
81   which users are requesting high resolution images. Since the system was
82   developed in 2011, approximately 917 high resolution images have been
83   requested and delivered to patrons. Relying on the responses from users
84   of the DCS from 2011–13, this article will analyze the ultimate use of items
85   requested from DCS. To do this, the authors asked the following questions:

86   ● How are UHDL images ultimately used?
87   ● What products are being produced using these images?
88   ● What implications do these ultimate uses have on other facets of digital
89   library management?

90   Investigating the above questions yielded insight into other important facets
91   of administering a digital library, such as metadata creation, system design,
92   marketing and promotion, and content selection.

93   The authors' analysis focuses on why users downloaded the objects
94   they did. Image seeking behavior, search retrieval, and other aspects of user
95   behavior are not discussed except to make comparisons to other research
96   or to discuss how the user behavior directly affects ultimate use results. As
97   McCay-Peet and Toms stated, "Because the focus of image retrieval research
98   has been on how people search for and describe images and the creation
99   of tools for the retrieval of images, we know little about what people use
100   images for" (2009, 2417).

LITERATURE REVIEW

102   Information professionals and librarians have been studying, discussing, and
103   developing digital libraries for over two decades. Despite these conver-
104   sations, the topic of understanding digital library ultimate use has rarely
105   been addressed, especially in the professional literature. Most articles writ-
106   ten on digital library use focus on users' search retrieval needs and behavior.
107   Few mention how digital library patrons are using the images they request.

108   Regarding the lack of research and literature on the uses of digital images,
109   the authors of this article agree with Dr. Joan E. Beaudoin:

110   The ultimate use of images once they have been retrieved is another
111   research area that is nearly without mention in the literature. While there
112   have been many successful forays into discerning the phenomena sur-
113   rounding image retrieval, the discipline has failed to address image users'
114   needs and how images are being used. This lack of understanding sur-
115   rounding images has continued to make finding and using images some
116   of the most challenging information experiences for users. (2009, 68–9)

117   Gradually, this gap in research is being addressed. Some of the earliest men-
118   tions of digital library use originated with studies focused on the behaviors of
119   users, how they interacted with user interfaces, and their satisfaction levels.
120   In a 2002 study, Joan Cherry and Wendy Duff observed the following:

121   The comments from the survey also revealed some unanticipated uses
122   of the ECO collection, e.g., a toponymist uses ECO to pinpoint the date
123   and origin of place names; one person uses ECO to help learn his native
124   language; and another uses ECO as a source of knitting and crochet-
125   ing patterns. These users may be some of the people who have been
126   introduced to Early Canadiana through the WWW. (para. 40)

127   While Cherry and Duff were able to identify some uses of digital library
128   content, more in-depth investigations were needed.
129   McCay-Peet and Toms (2009) addressed the role of ultimate use in
130   digital library management. Recognizing that ultimate use is "inadequately
131   researched in information science," the authors administered a survey to his-
132   torians and journalists addressing this research gap (2009, 2427). Their study
133   asked how their key audience used two-dimensional images "as objects to il-
134   lustrate a written work or as data to inform the writing process" (2009, 2416).
135   To formulate answers to this question, McCay-Peet and Toms interviewed
136   30 historians and journalists to understand how they were using images (for
137   information or for illustration) and how they determined what images were
138   appropriate for their work (2009). The authors discovered that both in gen-
139   eral practice and in specific use, historians and journalists ultimately used
140   images for illustrations rather than for information (2009). To benefit future
141   ultimate uses, the authors suggested that information professionals develop
142   more categories of access points to aid in image retrieval (2009). Specifically,
143   McCay-Peet and Toms noted that "conceptual" attributes were often queried
144   by users (2009, 2427). Often, these conceptual terms were not available in
145   the metadata; however, users were able to adapt descriptive attributes such
146   as "visual quality" to fit their needs (2009, 2427). They encouraged librarians
147   to describe objects using both the conceptual and non-conceptual attributes

148 to aid the user (2009, 2427). Their work yielded important insights into how
149 historians and journalists ultimately used images in their work.

150 Other investigations have also focused on use among specific academic
151 disciplines. Valerie Harris and Peter Hepburn (2013) analyzed the use of
152 images by academic historians. They aimed to identify images derived from
153 a digital library and used within scholarly historical articles. They hypoth-
154 esized that more recently published history journal articles would include
155 images because the availability of images has increased with the rise of dig-
156 ital libraries. After reviewing journal articles from the last decade, Harris and
157 Hepburn speculated that "historians are not finding images suitable to their
158 research" (278). While the work of McCay-Peet and Toms and Hepburn and
159 Harris show the needs of specific users (historians and journalists), future
160 research could broaden this study by investigating ultimate image use in a
161 more general audience domain.

162 In their 2011 article, EunKyung Chung and JungWon Yoon grappled
163 with the topic of ultimate use among a larger pool of users. Using patron
164 search requests from the Yahoo! Answers.com portal as a case study, Chung
165 and Yoon created a mechanism to investigate ultimate uses of images. They
166 focused their analysis on data that asked 464 "image-seeking questions." Us-
167 ing this data, Chung and Yoon developed a coding scheme for image use
168 (based on seven discernible classes of images created by Conniss, Ashford,
169 and Graham) and a coding scheme for image attributes (2011, 167–8). They
170 found that a majority of image uses fell into two categories: illustrative uses
171 and generation of idea uses. This discovery indicated that "users primarily
172 seek images that will be used for illustrating particular ideas with appropriate
173 images and for provoking thought patterns or inspirational ideas" (2011, 169).
174 Chung and Yoon concluded that information professionals should relate uses
175 to image indexing and build better interfaces informed by the ultimate use of
176 images (2011). While Chung and Yoon addressed the complexities of under-
177 standing ultimate use, practical examples of how this project relates to other
178 cultural heritage institutions is sparse. The present investigation will begin
179 to address some of these issues with more detail and make comparisons to
180 their work.

181 Perhaps the most in-depth investigation of digital library ultimate uses
182 to date is Beaudoin's 2014 article on establishing a framework for under-
183 standing image use among archaeologists, architects, art historians, and
184 artists. She cited how difficult it is to account for ultimate use when man-
185 aging digital libraries because very few studies have documented "how and
186 why visual information is used" (Beaudoin 2014, 119). To overcome this
187 challenge, Beaudoin interviewed 20 professionals from the previously men-
188 tioned occupations to understand the "behaviors of individuals whose work
189 depends on images" (2014, 126). Specifically, Beaudoin asked three key
190 questions:

191   • How are images used to support users' work tasks?
192   • How are images incorporated into their work?
193   • What functional roles do images fulfill for users? (2014, 120)

194   Her findings showed that a majority of uses pertained to the "development
195   of knowledge" (2014, 131). Some other important uses included "developing
196   creative works," "critical thinking development," "translating verbal informa-
197   tion," "engaging students," "creating emotion," and "marketing" (2014, 131).
198   Many of the respondents used images in their work, particularly in lecture
199   presentations, scholarly publications, architectural renderings, and marketing
200   materials (2014). Beaudoin's framework proved to be highly adaptable for
201   the present research study. Specifically, her central questions closely mir-
202   rored the questions and hypotheses the authors were formulating. Drawing
203   on data from the UHDL DCS, this study builds upon Beaudoin's work by
204   expanding the user base to include general visitors, scholars, researchers,
205   students, and university staff. It also compares the ultimate use categories
206   with those suggested by Chung and Yoon.

207   METHODS

208   The data in this study were obtained through the DCS "download statistics"
209   feature. When a patron requests an image, the system logs their responses
210   into an easily readable spreadsheet. Information collected includes name,
211   e-mail address, affiliation, intended use, description of project, date, time
212   stamp, the name of digital library collection accessed, and the digital image
213   title downloaded by the patron. However, name, e-mail, date, and time stamp
214   were deleted to protect the individuals' identity. Thus, three fields for analysis
215   remained: affiliation, intended use, and description. If personal information
216   was left within the description field, that information was removed as part
217   of the coding process. This spreadsheet was imported to an Access database
218   for final analysis, which included analyzing the text of the description field,
219   running queries to discover duplicates, determining the exact number of
220   users and intended uses, and sorting the data. Tests performed by UHDL
221   staff members for internal purposes were also removed.
222   From the descriptions given by patrons, a series of terms or codes were
223   developed (Table 1). These codes were then normalized by the researchers
224   to ensure accuracy and a shared understanding of the code terms. Any
225   responses that did not meet the existing criteria were placed in the category
226   "other."
227   After compiling and analyzing all data, the authors recognized several
228   limitations to this study. First, the study sample may not be representative
229   of UH's user population. For example, the authors do not know the users'
230   levels of education, their interest in cultural materials, or their visual literacy.

TABLE 1 Initial Codes and Definitions

Code	Purpose indicated by the user's response
Artwork	Decorative purposes
Publication	Print material (e.g., journal article, monograph, magazine article, thesis, or dissertation)
Genealogy	Genealogical or family history purposes
Video	Video creation purposes
Promotional	Promotional, marketing, or display materials in any format (e.g., Web site, poster)
Presentation	Presentation to a professional or general audience
Exhibit	Exhibiting materials or expanding the understanding of other materials within an exhibit
Gift	A personal reward or present
Industry	Internal archives or use by a corporate entity
Instruction	Instructional purposes within a classroom or educational setting
Research	Any academic or personal research purposes
Other	Any responses that did not fit in any of the above categories or use was not immediately apparent, including blank responses

231 Also, the ultimate use of UHDL images by users may not be the same at other
232 cultural heritage institutions with digital libraries. Furthermore, the data from
233 this case study were qualitative in nature, and the authors relied on the
234 users' descriptions of their projects to determine ultimate use. UHDL users
235 have multiple ways to acquire images for ultimate use; therefore, data from
236 the DCS may not be representative of all ultimate uses. Finally, as the DCS
237 went through multiple upgrades, the options within the drop-down menu
238 were added, changed, or deleted, thereby making some of the earlier data
239 not as refined as later data.

240   RESULTS

241 In the "Affiliation" field, the user has the choice of selecting one of five
242 options presented in a drop-down menu: Visitor, Staff, Student, Alumni, or
243 Faculty. Results are shown in Table 2. Visitors were the largest group of users
244 requesting images, at approximately 62 percent. The second largest group

TABLE 2 Type of User

Type of user	n	%
Visitor	594	64.8%
Staff	130	14.2%
Alumni	71	7.7%
Student	83	9.1%
Faculty	39	4.3%
Total	917	100%

TABLE 3 Intended Uses

Intended uses	n	%
Personal	326	35.6%
Other	315	34.4%
Scholarly article	59	6.4%
Class project	58	6.3%
Book	52	5.7%
Magazine	48	5.2%
Scholarly book	45	4.9%
Thesis	14	1.5%
Total	917	100.0%

245 was UH staff (inside and outside out of the library), followed by UH alumni,
246 students, and faculty.

247 The Intended Uses

248 To indicate the intended use, the user has the choice of several options in a
249 drop-down menu. The choices available were book, class project, magazine,
250 personal, scholarly article, scholarly book, thesis, and other (see Table 3).
251 The two largest categories of intended use were "personal" and "other."
252 These categories provided little insight into the ways that patrons were ulti-
253 mately using digital library content. Because these categories are vague, the
254 authors employed the existing intended use categories as additional context
255 for coding the "Description" field. In order to answer the research questions,
256 the authors determined specific ultimate uses and final products from the
257 comments left by users in the "Description" field.

TABLE 4 Codes from the Free-Text "Descriptions" Field

Description	n	%
Publication	215	23.4%
Research	197	21.5%
Artwork	140	15.3%
Promotional	97	10.6%
Personal	83	9.1%
Video	51	5.6%
Exhibit	42	4.6%
Genealogy	39	4.3%
Presentation	28	3.1%
Instruction	17	1.9%
Gift	5	0.5%
Industry	3	0.3%
Total	917	100%

TABLE 5 Research Subcategory

Subcategory	n	%
Personal	132	67.0%
Academic	63	32.0%
Industry	2	1.0%
Total	197	100%

258   The "Description" field was a free-text field providing users the oppor-
259 tunity to describe their project. Sometimes users explained why they were
260 requesting images. The authors used this field to generate a coding system
261 to quantify the data (see Table 4).

262   The results of the coding of the descriptions are shown in Table 4. Once
263 the coding was completed, the two largest categories were publication and
264 research. It was determined that more refined coding of these categories must
265 be done. This process will be discussed later in this section. Artwork was
266 the third largest category after coding the "Description" field. Promotional
267 and personal make up the fourth and fifth largest categories. The remaining
268 description codes make up a small percentage of the total user requests.

269   After the results of the initial coding, the authors thought that the pub-
270 lication and research codes did not allow for detailed analysis, and more
271 specific subcategories were developed (See Tables 5 and 6).

272 Publication and Research Subcategories

273 Refining the "publication" code showed that a majority of the descriptions
274 were focused on popular culture books and articles. The next most frequent
275 subcategories were for scholarly articles and scholarly books. The last sub-
276 categories of the publication code were industry books and industry articles.
277 Refining the "research" code into subcategories also demonstrated that a
278 majority of the ultimate uses of images from the digital library fell into the
279 personal subcategory, followed by academic research and "industry."

TABLE 6 Publication Subcategory

Subcategory	n	%
Popular culture book	66	30.3%
Scholarly article	59	27.1%
Popular culture article	46	21.1%
Scholarly book	36	16.5%
Industry book	6	2.8%
Industry article	5	2.3%
Total	218	100%

280   DISCUSSION

281 In answer to the question "How are UHDL images ultimately used?," the
282 researchers found that specific user groups used images for different pur-
283 poses depending on their work, need, and research areas. This conclusion
284 reinforces the findings by numerous researchers, including Beaudoin (2014),
285 Chung and Yoon (2011), and Harris and Hepburn (2013).
286   Visitors, the largest user group, were downloading images (particularly
287 maps and photographs) for their own personal collections. Images were
288 downloaded to decorate home and office spaces, to enrich genealogical
289 research and family history, and to celebrate important life moments. Fre-
290 quent uses also included researching local neighborhoods and houses and
291 conducting "amateur" research. Additionally, individuals mentioned gaining
292 "inspiration" from an object or objects in the UHDL. These people were
293 downloading images as part of their creative process and using the content
294 for various reasons, possibly to inform the artistic direction of their work.
295   These findings coincide with several of Chung and Yoon's categories,
296 including aesthetic value, emotive/persuasive purposes, and the generation
297 of ideas.

298   A generation of idea use is involved in providing inspiration or provoking
299   thought patterns; one example is looking for images to provide an artist
300   with creative ideas ... an aesthetic value use deals with using an image
301   because it is aesthetically pleasing ... an emotive and persuasive use is
302   involved in stimulating emotions or conveying a message, as images are
303   frequently used in the advertising and media fields. (2011, 165)

304 Examples from DCS users' comments illustrate these inspirational and artistic
305 uses of images:

306 • *I am using vintage photos of [H]ouston as table names for my wedding.*
307   *There will only be one copy printed for the table.*
308 • *I'm an artist and would love to have high res digital files for the entire*
309   *Narrenschiff ... for future reference. These prints have influenced a lot of*
310   *my work and I would love to have them locally.*
311 • *I intend to use this letter from my great-great-great-great-great-great grand-*
312   *father for personal genealogical purposes. Thanks.*

313 Staff are using images as tools to promote the university, share institutional
314 memory, commemorate important dates in the university's history, and mar-
315 ket campus events and departments. These findings align with Chung and
316 Yoon's information dissemination, learning, and emotive/persuasive pur-
317 poses coding schema.

318   An information dissemination use, the image itself is primary; this can be
319   exemplified by a dissemination of a suspect's photo by police officers . . .
320   learning use includes gaining knowledge from the image. (2011, 165)

321   Examples of users' comments from the DCS illustrate these images uses:

322   • *To be used on a historical informational sign at the Houston Zoo in*
323   *conjunction with the newest cougar at the zoo exhibit being named as*
324   *Shasta VI.*
325   • *I'm working on an informational video about the services offered at the*
326   *AD Bruce Religion Center and wanted to add some historical photos while*
327   *discussing the history of the space.*

328   Alumni are using images to reconnect with the university, to reminisce
329 about their time at UH, and to celebrate important moments they experi-
330 enced while on campus. Most alumni uses fall under a single Chung and
331 Yoon image use category, emotive/persuasive purposes. Examples of users'
332 comments from the DCS illustrate these images uses:

333   • *Sharing with my old college friends;*
334   • *My wife and I were recently married at the A. D. Bruce religion center. The*
335   *photos will be used to commemorate the occasion.*

336   Students were frequently using the DCS to download images for group
337 projects, course papers, class presentations, theses, and dissertations. Faculty
338 members said they used images in scholarly publications, primarily mono-
339 graph books or journal articles. They also used digital objects as supplemen-
340 tary instruction material.
341   The ultimate uses of students and faculty coincided with nearly every
342 category of Chung and Yoon's image use coding schema: emotive/persuasive
343 purposes, illustration, generation of ideas, information dissemination, infor-
344 mation processing, and learning. Chung and Yoon defined illustration use
345 as "images are used as a means of representing and encapsulating the object
346 that is being described. For instance, teachers use images to illustrate what
347 they are describing or explaining during class." They further define informa-
348 tion processing as "in a diagnosis by medical doctors. The data contained
349 within the image is of primary importance" (2011, 165).
350   The first user comment below illustrates the authors' contention that
351 students and faculty use of images parallels all of Chung and Yoon's cate-
352 gories. The second user comment mirrors Chung and Yoon's definition of
353 illustration use.

354 • *Under the supervision of [my professor], we are making a 20-second video*
355   *for KPRC Local 2 [a television station in Houston] in honor of Black History*
356   *Month.*
357 • *For part of my dissertation I am reviewing records of the Sullivan Campaign*
358   *to see how the soldiers perceived and experienced the natural environment.*
359   *This hand drawn map by Shreve will help to provide a frame of reference*
360   *for my committee and readers.*

361   To answer the second question, "What products are being produced
362 using these images?," the researchers discovered a wide range of products
363 derived from the ultimate uses. The most frequently created products from
364 UHDL content were publication-related materials in the form of popular cul-
365 ture products, such as information for articles and images in *Houston History*
366 magazine, a commemorative anniversary book, and for multiple personal
367 blogs and Web sites. Scholarly articles and books were also popular pub-
368 lication products. Some of the specific descriptions include information for
369 scholarly articles in the fields of cultural studies, history, and psychology, as
370 well as information and images for inclusion in college textbooks, encyclo-
371 pedia entries, and scholarly biographies. Private and public industry created
372 health and financial reports.
373   Examples of users' comments from the DCS illustrate these specific
374 products:

375 • *The [organization] submits a monthly Houston History article to Absolutely*
376   *Memorial. This month's article is on Houston at the Turn of the Century.*
377 • *Essay on Foucault's Madness and Civilization*
378 • *I am preparing a report for . . . a nonprofit group . . . that is assessing the way*
379   *the built environment (e.g., streets, sidewalks, parks) can impact childhood*
380   *activity and obesity levels.*

381 The second most popular product created from UHDL images was research,
382 which was shared with a variety of different audiences. Many of the ultimate
383 uses pertained to personal research, including the discovery and dissemina-
384 tion of important family history and the acquisition of content for personal
385 image albums and libraries. Other research products were either scholarly or
386 industrial in nature, such as content for theses and dissertations and outreach
387 material for private and public industry. Examples of users' comments from
388 the DCS illustrate these specific products:

389 • *I am [a] Spanish ophthalmologist doing my doctoral thesis about glasses.*
390   *The image is for illustrat[ing] my thesis.*
391 • *Scrap book on[R]ice [H]otel.*
392 • *I am performing work as a contractor for the U.S. Army Corps of Engineers*
393   *on an outreach project that is located in Harrison County, Texas. Part of the*

394 *project requires that we obtain historical information (such as newspaper*
395 *clippings, pictures, magazines, etc.) that are associated with World War II*
396 *activities—in this case San Jacinto Ordnance Depot.*

397 The next most popular product derived from UHDL content was artwork.
398 Users signified that they were accessing content in the digital library both
399 to create art as well as to download images to act as decorative objects in
400 their home and working spaces. Examples of users' comments from the DCS
401 illustrate these specific products:

402 • *We would like to display these pictures for personal use in our home study.*
403 *My husband and I both were raised in Houston, work in downtown, and I*
404 *attended Rice University, and we find these pictures fascinating!*
405 • *I am a Houston firefighter that works at the station in the photo. We are*
406 *having a reopening of our station on February 28th after a remodel and*
407 *would like to showcase this photo.*
408 • *Background decoration for local theatre production in Cape Town, South*
409 *Africa.*

410 UHDL objects were also used to create a variety of other products, although
411 there were only a few products in each category. Easy categorization of
412 these particular uses has eluded the authors due to the diversity within the
413 remaining categories and the small number of uses for each. Further studies
414 and possibly focus groups may be needed to fully understand why so few
415 users are using these images to create these products. Some of the questions
416 that could be asked are

417 • Why aren't filmmakers using digital images in their productions?
418 • Why aren't public speakers using digital images in their presentations?
419 • Why aren't K–12 instructors using digital images in their classrooms and
420 lesson plans, or encouraging their student to use them?

421 Videos included using content for documentary video productions. Ex-
422 hibits included incorporating images and content into display panels and
423 installations. Presentations included integrating images and content into pub-
424 lic speaking engagements and professional presentations. Instructional re-
425 sources included adapting content for educational and training materials
426 and aligning digital objects with the K–12 lesson plans. Gifts included using
427 digital objects to create "thank you gifts." Example of users' comments from
428 the DCS illustrate specific products:

429 • *Photos will be used in a video discussing the importance of bayous to the*
430 *Houston ecosystem. The video is being created for educational purposes as*

431 *part of an outreach program by a non-profit dedicated to creating park*
432 *space in Houston.*
433 • *I'm teaching a class next semester . . . and I'd love to be able to have my*
434 *students look through this text and illustrations when we discuss Chanel.*

435 To answer the study's third question, "What implications do these ultimate
436 uses have on other facets of digital library management?," the authors identi-
437 fied four library functions that can be directly influenced by the ultimate use
438 of digital library materials: metadata creation, system design, marketing and
439 promotion, and content selection. These four areas are important priorities
440 in nearly every library.

441 The ability to find desired images relies heavily on the quality and rele-
442 vance of the metadata describing that image. The authors of this article agree
Q1 443 with Raya Fidel (1997, 182), who noted that popular descriptive metadata
444 schema and standards, such as Dublin Core and AACR2, are sometimes too
445 broad and universal in nature. This presents a challenge for consistent and
446 accurate retrieval. To confront this limitation, the authors of this article are
447 continuing to investigate how understanding ultimate uses of images can
448 improve the metadata for those objects, thus their retrievability.

449 According to McCay-Peet and Toms, "descriptive and conceptual at-
450 tributes are almost equally important to image users" (2009, 2425). Creat-
451 ing rich conceptual metadata that takes into account the user's own search
452 queries encourages ultimate use by connecting images with users. It is not
453 surprising, then, that understanding and applying user's taxonomies is crit-
454 ical in determining what will be used and for what purpose. Researchers
455 have found that using concepts to describe images often generates more
456 helpful metadata categories than fields that document image attributes (e.g.,
457 black and white, color, size; McCay-Peet and Toms 2009). Knowing how
458 important conceptual subjects are to the retrieval and ultimate use of im-
459 ages, information professionals would better serve their users by identifying
460 user-generated concepts in the form of comments, image requests (paper or
461 digital), and other mechanisms, and implementing them into the metadata
462 they produce.

463 User-created metadata gives information professionals insight into users
464 and their ultimate use. Additionally, it opens the door for users to collab-
465 orate in the metadata creation process. Other researchers, such as McCay-
466 Peet and Toms, have suggested that "social tagging complements profes-
467 sional indexing" (2009, 2417). If user-generated metadata in the form of
468 social tagging, commenting, or image request (paper or digital) is to be so-
469 licited, system designers must create a mechanism that collects this metadata
470 and disseminates it to decision makers. This can be as simple as allowing
471 comments to be stored in a database that can later be queried by digital
472 repository managers or leveraging existing software to collect usage infor-
473 mation in meaningful ways. Some homegrown applications, like the DCS,

474 unintentionally collect ultimate use data. Other platforms, such as CON-
475 TENTdm, allow administrators to generate reports from user comments, mak-
476 ing the analysis of data more feasible and showing the diverse types of user
477 feedback.

478   Not all libraries will have the resources to use these platforms. In such
479 cases, others may have the opportunity to investigate ultimate use through
480 user commenting features found in tools such as Facebook, Flickr, blogs,
481 and patron request forms (paper or otherwise). While this "hands-on" ap-
482 proach to collecting ultimate use data can be laborious, the information
483 yielded from the activity is fruitful in many ways, including but not lim-
484 ited to enhanced metadata generation and the marketing and promotion of
485 collections.

486   Increasingly, libraries are turning to marketing and promotion to make
487 users aware of their services and collections. As with any marketing and
488 promotion campaign, knowing key audiences and their needs are important
489 first steps to any outreach effort (Cole, Graves, and Cipkowski 2010). This
490 is especially true of digital libraries, because few tools provide granular data
491 about users and their specific needs. Over time, librarians have developed
492 several methods to gather as much user information as possible, including
493 user surveys and Web site metrics like Google Analytics. However, ultimate
494 use has not traditionally been gathered. Data from any ultimate use analysis
495 can provide an expanded view of digital library users and their ultimate uses,
496 making marketing efforts easier.

497   Data from the DCS can illustrate how ultimate use can drive a marketing
498 and promotion campaign. One infrequent user group in this study was UH
499 History Faculty. They may be unaware of the primary sources available
500 in the digital library and how these materials can enhance their research
501 and scholarly output. UHDL staff could target this audience by developing
502 marketing materials that communicate both the accessibility and possible
503 uses of digital library content. Harris and Hepburn emphasized this idea,
504 stating that "if libraries and archives can better promote available resources,
505 obstacles to access may be mitigated" (2013, 278).

506   Another implication of ultimate use data for digital libraries is future con-
507 tent selection. Harris and Hepburn suggested that to generate meaningful and
508 relevant content, librarians must understand who uses digital libraries and
509 why (2013). Digital library best practices often state that selection decisions
510 are based on a host of criteria, including uniqueness, intellectual value, phys-
511 ical condition, copyright status, and institutional priorities. While the authors
512 believe that ultimate use should be another criterion when making content
513 selections, this approach is often underutilized by selectors, perhaps in part
514 because the mechanisms and the data needed to determine ultimate use are
515 difficult to implement and laborious to collect.

516   An example from the DCS demonstrates how effective ultimate use data
517 could be to support selection decisions. Data revealed that users created

518 art or artistic products and also gained inspiration by using UHDL con-
519 tent. Knowing this information, curators could consider choosing a more
520 graphically or visually appealing collection over a text-based collection in
521 putting together their digitization priorities.

522   As suggested in the UHDL example, ultimate use data can give artists or
523 other users a "virtual" voice in collection decisions. In this vein, Harris and
524 Hepburn also talked about giving historians a physical voice in digitization
525 efforts:

526   Collaboration among librarians, archivists, and historians should shape
527   digitization efforts. This goes beyond promotion of the materials. It means
528   engaging scholars in developing online collections. Collections enhanced
529   by scholarly input should find greater use by the scholarly community
530   since digital collections would reflect the needs and expertise of the
531   users. (2013, 283)

532   CONCLUSION

533 With academic institutions, cultural and historical centers, and government
534 agencies adding millions of images to digital libraries each year, the collection
535 of ultimate use data will be an important factor in their growth and use. The
536 inclusion of ultimate use data allows for alignment of interests to specific
537 users and uses. For example, including historians in the selection process
538 will increase the likelihood of them using digital library images in their
539 scholarly articles because they will be aware that those images exist. An
540 alternative example from the selectors' side is the recognition of a digital
541 library manager that their collections are being used for artist inspiration.
542 As a result, providing more visually interesting collections may be a way to
543 offer artists more inspirational digital materials.

544   Adding ultimate use data to the digital library toolkit may mitigate barri-
545 ers to use, especially in underserved communities such as faculty, students,
546 and historians. With better promotion, user enhanced metadata, subject spe-
547 cialists' collaboration in the collection/image selection process, and systems
548 designed with collecting and analyzing ultimate use in mind, digital library
549 innovators can bring to light exciting primary resources, offering research
550 and personal enjoyment materials to those who may not be aware that these
551 resources exist or that images are available for use.

552   This article is only a small subset of the research that could be conducted
553 on ultimate use. The authors have identified other research topics to be ex-
554 plored in the future, including highlighting additional implications for digital
555 library management, examining mechanisms to more easily capture ultimate
556 use data, and exploring the expansion of the types of data sets needed to

557 determine ultimate use. Hopefully, future studies will seek to align ultimate
558 use with digital library management.

559 ABOUT THE AUTHOR   **Q2**

560 NOTE

561   1. The definition of a digital library has been debated among the profession for decades. For other
562 examples, see Christin Borgman 1999; G. G. Chowdhury and Sudatta Chowdhury 2003; Daniel Greenstein
563 and Suzeanne Thorin 2002.

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