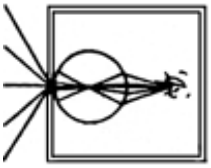

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Current Research Methodologies of Scholars in the Visual Arts: Toward an emerging model in image and text retrieval for the domain

Keywords: Visual arts, electronic resources, research practice, process, methodology, information-seeking behaviour

The lack of understanding the information-seeking behaviours and processes of scholars in the visual arts first came to light with the pivotal 1985 collaborative study conceived by the Art History Information Program of the J. Paul Getty Trust and the Institute for Research and Information Scholarship of Brown University (AHIP-IRIS). Results of the study published in 1988 by Elizabeth Bakewell and her colleagues revealed that although the quantity and variety of resources needed for art inquiry were especially suited to electronic aids to research, the application of technology seemed to intrude upon established research practices.[1]

If one attempted to characterise the idiosyncratic information-seeking behaviours of visual arts humanities scholars, it could be couched in their use of original works and documents and the key importance of images. Although the information-seeking behaviours and processes reported thus far among visual arts humanities scholars vary somewhat, most scholarship within the domain seems to be propelled by an image supported by related texts and secondary images, whether the final creation is an article in a scholarly journal, a thesis or dissertation, or a visual work.

In the world of visual scholars, interest in one compelling image can precipitate an exhaustive process that sometimes involves information-seeking within the domain as well as in related disciplines. Depending upon the complexity of the image, research may begin with a reproduction, although hands-on investigation is valued in the domain and is considered to be the most essential aspect of knowing an image. In fact, reproductions are considered notoriously responsible for distorting works of art.[2] Consequently, art inquiry remains reliant upon a tradition of primary images and documents in conjunction with scholarship that is often laden by secondary text and images. Despite the difficulties encountered in gaining access to an original work, an onsite investigation is usually necessary if a scholar wishes his or her work to be taken seriously. As the non-linear research process moves between original images and texts, and secondary images and texts, the burden of proving one's hypothesis rests ultimately in the power of the

evidence found in specific related images contained in the final document, or those visually evident in a newly created work of art.[3]

Related Literature

A substantial number of library studies have been devoted to identifying the various critical differences that exist in the research methodologies of the visual arts and especially in the field of art history while attempting to define the information needs of this user group. Yet, it is astonishing to see how little progress has been made in information-seeking and behavioural research in the domain, and how modest the changes have been in the last quarter century when compared to other disciplines. For example, many of the distinctive research traditions of art historians first observed by Deirdre Stam in 1984, such as, reliance on one's personal library, the need for original works and avoidance of technology are consistently reported in subsequent domain studies.[4]

Most scholars in the visual arts agree that there are misconceptions in the field of library science about the utility of secondary sources in images and texts available in libraries. For example, while many secondary sources are helpful in accessing relevant theoretical issues, biographical information, and interpreting the historical, cultural and visual content of works of art, reproductions of any kind are not necessarily neutral documents to the visual arts scholar, and do not replace original sources.[5] Routinely, many scholars in the domain who now understand the value of e-resources, still grapple with the idea of computer-generated imagery because digital images may be generations away from their original state.[6] While Suzanna Simor placed the responsibility of selecting and evaluating high-quality electronic materials on information professionals, librarians and art faculty, she posited that the discerning human judgment of visual art scholars would remain irreplaceable for a long time to come. Conversely, she pointed out that among those teaching art and involved in scholarship, resistance to new media (digital resources), reliance on old research methodologies and limited access to technology remained problematic.[7] Accordingly, in a more recent article, Barbara Elam expressed concerns about the limited awareness of electronic resources in the field and the challenge for librarians to respond to traditional and current needs of art professionals.[8]

Nevertheless, some former studies should be credited for their role in developing a research framework for portions of this study. Notably, Trish Rose and Sandra Cowan acknowledged the need for real user studies to bring visual arts information-seeking research forward.[9] Moreover, a number of queries derived from works by Deidre Stam, Marcia Bates and her colleagues, Susie Cobbledick, Trish Rose and Sandra Cowan were adapted to frame this study's the Phase I questionnaire (see Appendix A).[10]

Related Information-Seeking Models

Recognised information-seeking models are rarely considered applicable to typical research agendas in the visual arts. Yet, Joan Beaudoin recognised the potential application of established information-seeking models to research in the domain.[11] Before embarking on this novel course of research, one must consider that most information-seeking models generally fall within the paradigm of library science and were developed solely for text retrieval. Independently they may not address the current and specific requirements of the domain under examination, especially one which is so reliant on images. With numerous possibilities abound, a particular thread of information-seeking research emerged, that is, the concept of integrating or nesting existing models.

Nesting Models

In 1999, T. D. Wilson explored existing models of information-seeking already established in the literature and suggested that by nesting (combining) these models, alternative models could be created. Wilson explored a variety of models and proposed that new clarity could be accomplished by considering the complimentary aspects of existing systems toward a broader understanding of information behavioural research.[12] Wilson defined a model as a framework for thinking about a problem and further declared that most models were statements in the form of diagrams that attempted to describe an information-seeking activity or stages of information-seeking behaviour.[13] Wilson examined Brenda Dervin's Sense-Making information search processing model[14] and posited that its strength was contained partly in its methodological consequences because it led to questioning, genuine insight, and information delivery.[15] He also investigated Carol Kuhlthau's Uncertainty Principle for information-seeking[16], noting that it was well accepted because her empirical research findings could be generalised to other populations.[17] Finally, Wilson, anticipating a broader perspective on information-seeking behaviour research, posed the following questions: 'To what extent are different models complete; in what ways are existing models complimentary; and how do modes of information-seeking behaviours aid our understanding of the search process?"[18]

The works of Nicholas Belkin[19], Dervin, and Kuhlthau played a foundational role in Kristy Williamson's Ecological Theory of Human Information Behaviour.[20] Williamson was motivated by Bates' article on integrating models of information-seeking and searching, and like Wilson, conceptualised combining existing models.[21] Although the works of Wilson and Williamson appear to be closely associated, they are not linked in the literature. Nevertheless, they emerge in agreement and as Wilson suggested, combining pertinent aspects of existing complimentary information retrieval models may be key to understanding the ever-evolving field of information research. For that reason, combining or nesting

models may be especially relevant to the unique and complicated research agendas of scholars in the visual arts.

Williamson's ecological approach toward understanding the complexities of information-seeking behaviours and processes in image and text across the domain of the visual arts may prove more satisfactory in the current dynamic information milieu. Here ecology does not necessarily mean harmony or an ideal balance, rather, 'Ecology is a term that suggests the many interrelationships that people develop between each other to engage with the community of which they are a part.'[22] The term ecology has not been specifically attached to this type of research in the past, because it has always been assumed that scholars in the visual arts are isolated creatures. Yet, it is probable that in today's shifting information environment, an ecological approach may be appropriate since it addresses human behaviours in both solitary information gathering and in those actions that depend on social contact.

Methodology

The techniques used to gather data from visual arts scholars at three American Universities, namely Long Island University, the City University of New York, and Princeton University, included a Phase I self-administered questionnaire (Appendix A) to query participants on demographic information, their use of information resources and their approaches to locating information. In Phase II, an interactive survey instrument (Appendix B) was employed to examine users' satisfaction and frustration with both web-based and academic image and text retrieval systems. This process was audio-recorded to gather experiential data and was followed by the completion of an information horizon graphical representation technique (Sonnenwald, 2005). The latter enabled participants to report on their individual information sources, thus capturing data that could be lost by conventional methods such as a questionnaire or survey.

Research Goals and Questions

The goals of this research were, first, to achieve a broader understanding of the current information-seeking behaviours and processes of scholars in the visual arts and second, to move toward an information-seeking model in image and text retrieval for the domain.

Research Questions

- Have digital technologies profoundly altered traditional information-seeking in the visual arts?
- Is there a new domain-specific information-seeking behaviour and processing model emerging for visual arts humanities scholars?

Operational Definitions

Domain: refers to members of the visual arts community who are believed to have a common understanding of the conceptual issues shared and addressed in this research. Full-time visual arts professors with diverse academic concentrations across the domain from three Universities were queried during this study.

Information-seeking behaviour: refers to the way in which members of the visual arts community seek information as a consequence of a need to satisfy a research goal. In the context of this study, individuals utilised a self-administered questionnaire, documented their information-seeking behaviour by ranking their use of information resources and made personal observations about their research methods. Employing a task-driven interactive survey with think-aloud (audio recorded) protocol, participants interacted with and evaluated computer based information systems, then produced a graphical representation of other information sources.

Information horizon: refers to a graphical depiction of all information resources (including people) that one typically accesses when seeking information in the context of a personal research agenda. Sources are then ranked according to their usefulness. This process was designed to help users focus and verbalise their thoughts regarding their information resources and their information-seeking behaviours and processes.[23]

Information-seeking process: For the purposes of this study, information-seeking process can be defined as an active process whereby participants are closely observed and monitored in order to understand exactly what visual arts scholars do during the course of their research agendas. Observations took place in natural settings during a convenient timeframe predetermined by the researcher and each participant. Sessions were mediated and audio recorded by the author.

Model: Although generally used to describe information-seeking activities or the relationship among stages in information-seeking behaviour, the current study also explored the prospect of an emerging information retrieval model for the domain of the visual arts.

Data Collection and Analysis Techniques

Overview
Data collection and subsequent analysis consisted of an 18-month process, which was completed in April 2010. The methodology was designed to address the research questions from the users' perspective. Overall, in a two-phase process, the user evaluated an array of information sources including electronic resources, while their domain-specific requirements, attitudes, behaviours and

processes were self-documented during Phase I. During Phase II, data collection via an interactive survey instrument was enhanced by mediation and recorded think-aloud protocol. Participants also crafted a graphical description of their information sources. The combined data collection techniques were essential because as the information environment continues to progress rapidly, especially now with the flood of electronic images and texts available, a current understanding of the information-seeking behaviours and processes of the domain must be studied anew. The data collection process was aimed at documenting persistent and distinctive information requirements within the population, noting changes in information-seeking behaviours over time, and determining the extent to which technology and demographics may have affected the information-seeking experience within the domain.

Selection of Participants
Sixty-five participants were solicited via US Post for the study; 18 from Long Island University; 22 from the City University of New York (CUNY); 26 from Princeton University. Their solicitation was based on the following criteria: (1) participants were full-time faculty members in the department of the visual arts at one of the three Universities mentioned, and (2) during data collection, participants were involved in teaching or research in their field of expertise. Thirty-two subjects completed the Phase I questionnaire of which 30 volunteered for the Phase II process. Ultimately, 19 of the 32 volunteers took part in Phase II. While expert samples such as this are typically small, based on the theory of user modelling with personas, user demographics and behavioural data obtained from a limited number of real users, can serve as effective tools in defining users' needs and behaviours.[24] Because a non-random sample population was utilised in this investigation, its results cannot be generalised.

Phase I Questionnaire (See Appendix A)
The questionnaire was divided by a number of themes such as the use of information sources including queries on traditional text and image formats, and electronic text and image formats, as well as other modes of acquiring information such as attending conferences and art exhibitions. Data were collected utilising a five-point Likert scale. The Likert scale is designed to measure the strength of attitudes at either ordinal or interval levels. In this study, intervals on the Likert scale were regarded as having equal distance as noted on each questionnaire. Thus data collection was at the interval level and was analysed using Statistical Package for the Social Sciences (SPSS 17.0) for Windows.

Based on the data collected from the questionnaires, subjects apparently followed a precise method of information-seeking based on their personal experience and expertise. This confirmed that overall traditional methodological tools and idiosyncratic practices have remained persistent over time; among them, dependence on ones' home art library, adding materials to a home art

library collection, owning an art slide collection, dependence on print media for image and text materials, concerns with the quality of art reproductions and reliance on original works of art. The data supported the overall homogeneous nature of this study group.[25] However when further statistical analysis (e.g. Pearson's r), was conducted to determine if there were significant correlations between user traits and participants' responses, apparently in many instances, dynamic changes in the domain and in technology had impacted participants' information-seeking behaviours, professional attitudes, values, and beliefs.

Phase II Interactive Survey (See Appendix B)

In Phase II, the interactive survey and criteria formerly used by the author to indicate domain specificity in users' information-seeking behaviours and processes using Web based image retrieval systems, was adapted to the present study.[26] Here, the refashioned data collection instrument used both web-based (Google Image and Google Scholar) and academic (ARTstor and JSTOR) retrieval systems and repositories to examine image and text retrievals among members of the domain. Two search techniques were employed, basic and advanced. Search terms were selected by participants to assure that retrievals would be relevant to their research agendas (Table 1).

Table 1. Phase II Participants' Demographics and Search Terms

Subject Code	Academic Department	Years in the profession	Age Range	Gender	Basic Search Term	Advanced Search Term
1048	Digital Arts and Design	29-29	50-59	Male	John Maeda	John Maeda + New York Times Magazine Cover
1049	Art History	1-9	30-39	Female	Vito Acconci	Vito Acconci + Performance + Body
1050	Digital Arts and Design	10-19	40-49	Male	Warhol	Warhol + Portraits
1052	Art History	30 or more	60 and above	Female	Native American	Native American + Ceramics
1053	Digital Arts and Design	30 or more	50-59	Female	Andy Goldsworthy	Andy Goldsworthy + Environment
1057	Printmaking	20-29	60 and above	Male	Andy Goldsworthy	Andy Goldsworthy + Eco Art + Environment
1060	Photography	30 or more	60 and above	Female	Lois Greenfield	Lois Greenfield + Dance Photography
1061	Printmaking	10-19	40-49	Female	Andy Goldsworthy	Andy Goldsworthy + Environment + Art

Subject Code	Academic Department	Years in the profession	Age Range	Gender	Basic Search Term	Advanced Search Term
1062	Painting	30 or more	50-59	Male	John Singer Sargent	John Singer Sargent + Watercolor
1063	Ceramics	20-29	50-59	Female	Native American	Native American + Pottery + Mimbres
1065	Photography	30 or more	60 and above	Female	John Pfahl	John Pfahl + Books
1003	Art History	20-29	60 and above	Female	Castello Udine	Castello Udine + Domenici Bollani + Matteo Bembo + Crete + Cyprus + anthropoid + sarcophagus Salamis + Famagusta
1004	Art History	30 or more	60 and above	Male	Phrasikleia	Phrasikleia + Merenda + Peplos Kore
1013	Art History	20-29	50-59	Female	Baldus	Baldus + Edouard + Photographer
1025	Art History	30 or more	60 and above	Male	Master of the Boston City of God	Boston City of God + Boston Public Library
1040	Painting	20-29	50-59	Male	Corot	Corot + Portraits
1039	Photography	10-19	40-49	Male	Robert Frank	Robert Frank + The Americans
1042	Ceramics	1-9	40-49	Female	Contemporary Ceramics	Contemporary Ceramics + 2000-2009
1036	Art History	1-9	40-49	Male	Marcel Duchamp	Marcel Duchamp + New York Dada + Readymade + Assemblage

After viewing the first page of documents retrieved during each search episode, participants ranked their retrieved results on a scale of 1 (negative) to 5 (positive) in relation to user frustration (low) and user satisfaction (high), based on the following criteria:

- Precision: The number of retrieved documents that the searcher considers to be in context.
- Utility: The number of retrieved documents with aspects interesting to the user beyond topic relatedness.
- Novelty: The number of retrieved documents previously unknown to the user.[27]

Descriptive analysis was performed to obtain demographic summary measures (e.g., frequencies) for the 19 respondents who participated in Phase II. Inferential statistical analysis was conducted using Spearman's rho formula to determine if significant correlations existed between demographics and ranked responses. Comparisons were made across different retrieval systems as well as between basic and advanced search queries. A further analysis of participants' ranked responses was conducted and compared to affective responses and think-aloud recordings. When relevant, Phase I responses were compared to Phase II data to see if there were discrepancies in participants' self-reporting and active searching activities.

Phase II participants were also asked to select from words, phrases and sentences extracted from the related information search processing models discussed in this paper and to choose those that best described their present information-seeking experience. For example, participants were asked to indicate whether or not they experienced feelings of frustration, confusion, optimism, etc. during the process; did they encounter new information or patterns of information, and was the experience optimised by physical surroundings and social interaction (mediation). These aspects of information-seeking could be directed toward understanding whether or not established information-seeking models were applicable in this investigation.

Finally, utilising Sonnenwald's information horizons theoretical framework[28], participants were asked to create a graphical representation of information resources including people and social networks accessed in the context of a personal research agenda and to rank their selected resources in terms of their usefulness. The information horizon theoretical framework was effective in learning more regarding the role of social networking in the information behaviours and processes of visual arts scholars. This is noteworthy because although in the past it was often perceived that research in the visual arts takes place in isolation, it was possible that this attitude could have shifted due to today's dynamic environment.

Phase I and Phase II data collection instruments described here were designed to gather information, both quantitatively and qualitatively, utilising a variety of approaches. The combination provided increased reliability and validity to the findings even though a small non-random population was employed. Thus by using this new unified and ecological approach to data collection designed to enrich insight into the information-seeking behaviours and processes of visual arts humanities scholars, progress toward an information-seeking model in image and text retrieval for the domain could be realised.

Examining Information-Seeking Behaviours Using Information Horizon Graphics
Information horizon graphical representations allowed participants to document 'this is what I do' and verified a range of findings reported via the Phase I

questionnaire. In addition to gaining a more comprehensive understanding of information-seeking in this user group, improved validity was substantiated by the high degree of overlap with information resources preferred earlier by participants. This was especially accurate in regards to personal libraries, museums and galleries, and Internet resources. Conversely, other choices were unanticipated and reflected a higher degree of social interaction than previously reported on the self-administered questionnaire.

Further examinations of the information horizon graphics are shown in a full view on the Excel radar chart (Fig. 1) designed to aid in visualising patterns and clusters in information-seeking behaviours and processes, detecting new trends among information resource preferences, and observing relationships among information resources. The symbols and numbers to the right of the diagram in Fig. 1 represent the 19 participants who took part in this exercise.

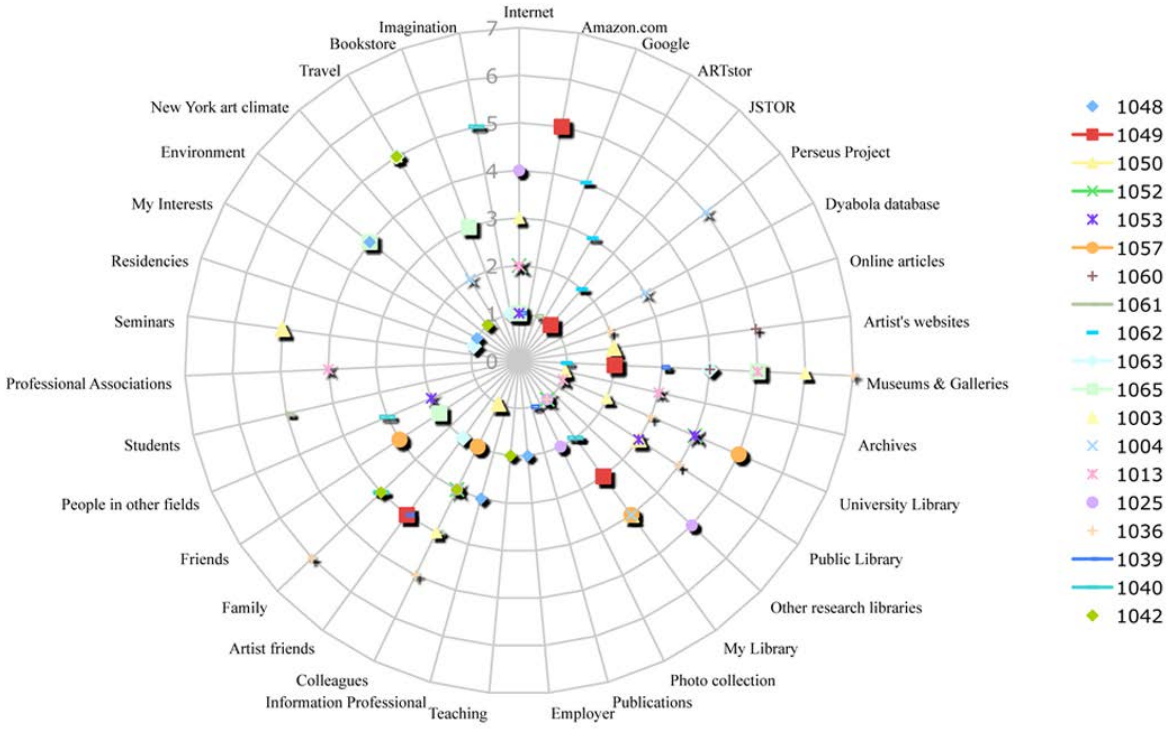

Fig.1. Information horizon radar chart. A full view.

As illustrated in Fig. 1, the perimeter of the diagram represents the 35 information sources reported by participants. Following in Fig. 2, all singular references to an information source were eliminated, leaving 17 information sources and a selected view of participants' preferences as a whole.

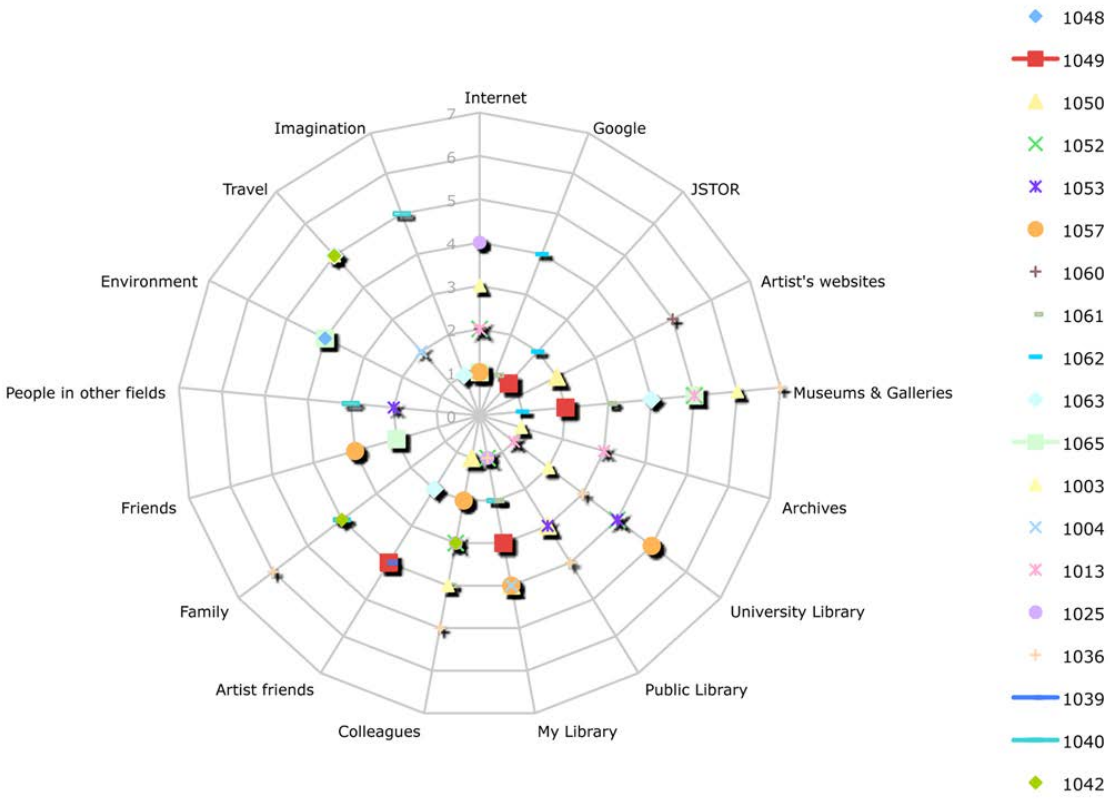

Fig.2. Information horizon radar chart. A selected view.

In this concise analysis of the resources mentioned most often, nine chose the Internet and another four chose related resources such as Google and artists' websites. Of this group of 13, nine chose an Internet source as either a primary or secondary resource in their information-seeking. The number of selected Internet resources correlated to Phase I data where the majority of participants used the computer for research at least once a week, almost all frequently used Google or Yahoo!, and at least 75 per cent downloaded images from the Internet.[29]

Eleven of 19 subjects chose their home library as an important information resource and nine selected it as a primary or secondary resource. This was in agreement with the 75 percent who reported dependence on their personal collections on the Phase I questionnaire.[30] Eleven participants chose museums and galleries, a number well in line with the over 80 percent who previously reported attending art exhibitions.[31] Five categories fell under the umbrella of social interaction. Contrary to Phase I data, where only 25 percent collaborated with colleagues and over 50 percent preferred an isolated work environment, all 19 participants selected at least one of these categories with nine relying to some extent on colleagues for information. Two clear clusters of information resources

are shown in Fig. 2, first, traditional resources such as museums, galleries and various types of libraries, and second, social interactions including colleagues, artist friends, family, friends, and people in other fields. Participants also named a sizeable number of distinct electronic resources in addition to the commonly identified Internet, Google, and artist websites. They include Amazon.com 'for new books' and numerous domain-specific databases and digital resources such as ARTstor, JSTOR, Perseus, Dyabola, and a general reference to 'online articles'. All of these signalled an interest in technology characterised by a cluster that marked a shift toward a balance of traditional and electronic information sources.

Toward a Model in Image and Text Retrieval for the Visual Arts

While a number of existing information-seeking models have been investigated during the course of this research, Wilson's concept of nesting models and Williamson's ecological model of information-seeking and use, gave the author the flexibility needed toward developing her model. Though both provided a framework, no existing model included the distinctive combination of elements essential for information-seeking in the visual arts.

Based on past scholarship and the data collected here, the visual arts community, because of its unique, domain specific requirements for image and text materials, had developed idiosyncratic research traditions over time. Now, a number of those practices are in transition due to technological advances. This has given scholars an extraordinary opportunity to re-evaluate aspects of their methodologies both traditional and contemporary and consider those that will support the practicality of research in the domain for the future.

Participants in the current study spanned a number of decades in professional experience and age range, worked on a variety of artistic endeavours and came from diverse institutional environments. Thus, a number of interesting findings have emerged during the course of this project. For instance, library use among art historians was substantial; yet owning a personal art library collection and frequently adding material to it were important practices across the domain regardless of demographics. Owning a slide collection, as expected, was commonplace among senior participants. However, studio artists have always used the medium to document their work and still rely on slides to some extent. Younger participants commonly owned digital collections although not exclusively. All participants recognised the value of traditional media for archival and digitalisation purposes.

Those with years of experience travelled most often to see original works of art and were likely to recall a time when institutional support for hands-on investigation was routine. Although senior professors used print text formats regularly, printed image formats were essential regardless of participants'

demographics. Despite the fact that senior professors in Phase I self-reported confusion and frustration most often when using new technologies, Phase II participants, when interacting with electronic resources, experienced confusion and frustration regardless of age or other characteristics.

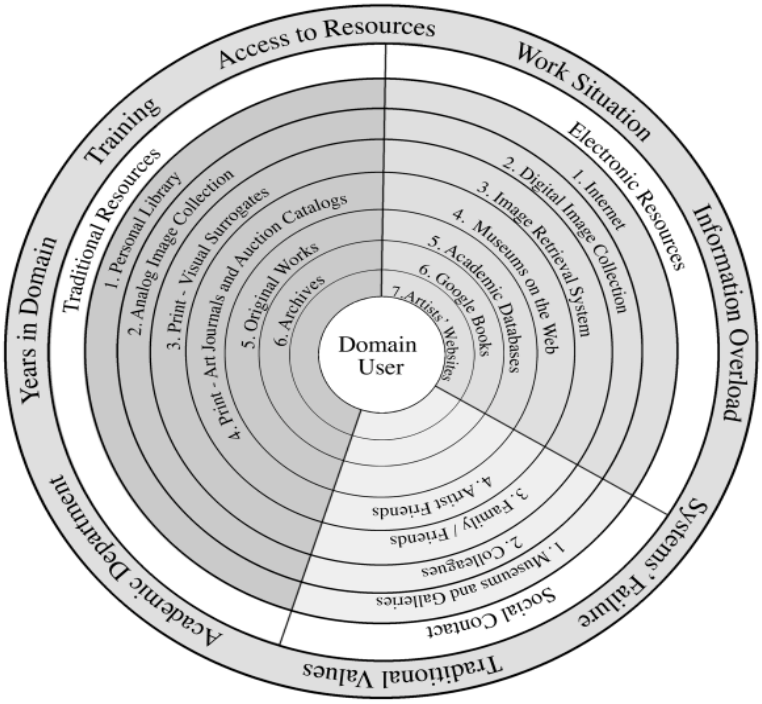

Fig. 3. An ecological model of information-seeking in the visual arts.

This emerging model represents dynamic changes in information resources due to technology and how that couples with the idiosyncratic research methods of visual arts professionals (Fig. 3). Traditional resources for the most part have not been abandoned and except for a noticeable shift to digital images, they are still essential tools relied upon in the domain. Three categories of information sources surfaced during this course of research and are applicable to a preliminary model: 1) traditional resources in images and texts made up of print materials, original works, and analogue image media; 2) electronic resources in images and texts, available on the Internet in image retrieval systems, at museum sites, artists' websites, in electronic books and in academic databases; and 3) social contacts such as colleagues, family and friends, and social interactions at museums, galleries and local artists' exhibitions. The three categories are not exclusive and interact vigorously.

During this investigation it was also discovered that several elements played a part in impeding or enhancing information-seeking. They are shown surrounding the perimeter of the model and incorporate traditional values, years in the domain, access to resources, academic department, work situation or

environment, lack of training with new electronic resources, systems' failure and information overload. A major strength of this model is its plasticity since it can be fine-tuned to accommodate shifts in information-seeking behaviours and processes as new technologies impact this dynamic domain. The sizes of the fields designated on the graphic are only estimates reliant on the author's overall analysis during this investigation.

Summary of the Research Findings

Although it would be unfeasible to report all the findings of this study in a brief paper, the author sought to present a comprehensive evaluation of the information-seeking behaviours and processes of visual arts scholars in the current timeframe. The entire report is most likely the first wide-ranging examination of the use of both traditional and electronic resources, and first to offer an emerging model in image and text retrieval for the domain.

In an analysis of the data collected during this research, it could be said with conviction that the overriding domain-specific requirement responsible for the differences in information-seeking and thus the overall characterisation of the domain is the collective necessity for image and text materials, with the pursuit of images emerging as paramount. In regard to the use of traditional image resources, participants commonly relied on their personal collections instead of academic collections, images in other printed materials (such as auction catalogues and journals), and their personal image collections made up of a combination of media. Overall, the majority of participants, regardless of demographics, were concerned with the quality of image reproductions and frequently added materials to their personal collections of images and texts resources. Generally, traditional values (such as an author's reputation) remained persistent, as did the arduous process of conducting an exhaustive literature search before embarking on a creative agenda.

When questioning the impact of technology on the information-seeking practices, attitudes, values and beliefs of members of the domain, a number of significant findings surfaced, most often in terms of age and length of one's career. Although all participants utilised information and image retrieval systems on the Internet, junior participants were most likely to own a digital image collection and utilise other electronic formats. While many of those over 50 years of age had discovered and utilised Google Books, all participants were disillusioned with Google Scholar because of its strong concentration in the sciences. An overwhelming majority of participants frequented museums on the web, though most avoided participating in web-based art exhibitions.

As indicated by the data collected via the Phase I self-administered questionnaire (Appendix A), a divide emerged regarding art historians and studio artists although these data could have been skewed by the fact that most art historians

were senior participants. Nevertheless, art historians most often owned slide collections, used university libraries, and were most competent with using electronic academic databases.

The complexities of interactive searching resulting in Phase II were unanticipated by the author and it would be impractical to report them in depth here. Generally, participants reflected the observations of Wendy Lucas and Heikki Topi who proposed that searchers often do not realise that their search skills are weak, have little patience with learning new skills, rely on web search engines that promise the best possible retrievals and tend to avoid searches that go beyond a simple search.[32] Clearly, personal biases along with the lack of experience and training with ARTstor and JSTOR were exposed during the study. Environmental factors resulting in systems' failures occurred frequently in remote locations such as art studios causing frustration among participants. However, participants persevered and contributed to the significant findings of this study and an understanding of its limitations.

The author was able to present a conceptual model based on the design of Williamson's ecological model of information-seeking and use. Williamson's design was chosen mainly because it is user-centric, flexible and adaptable. It offered an alternative to earlier linear text models which could not compensate for the idiosyncratic processes, and the dynamic activities and shifts in information-seeking occurring presently in the domain of the visual arts.

The new model offers an alternative descriptive framework for information-seeking behaviours and processes in the field. It serves as a visual aid for understanding the complex and unique information environment of the domain. The model is suggested as a possible foundation for further investigations toward a productive understanding of the vigorous process of information-seeking in the visual arts. The three broad categories will modify over time with the advent of new technologies and other external influences.

Discussion and Suggestions for Further Research

Foremost, the selection of participants was non-random and purposeful thus the findings of this study cannot be generalised to a larger population. The purposeful sampling was deemed necessary since domain knowledge would be essential for subjects to carry out the study's protocol. A number of participants were from the researcher's home institution, and therefore the sample must be further categorised as a convenient sample. In the future, a randomised study population of visual arts humanities scholars could be selected to take part in comparable research.

Some perceptions such as participants' lack of computer use may be responsible for a smaller number of subjects than expected. It is possible that an email

questionnaire would have been more effective in increasing the size of the study population. An email questionnaire could be implemented in further research.

Various local environments such as open studios, where much of the Phase II data collection took place, were adverse to the use of technology. In the future, a controlled environment such as a usability laboratory should be considered for this type of data collection. Although, one must consider that in a controlled environment, the rich experiential data — documented using think-aloud protocol and information horizon graphics — in the current research design may be restricted by the lack of social interaction.

The three evaluation criteria, namely precision, utility and novelty used in this study were based on the author's previous examination of web-based image retrieval systems. The criterion of utility proved to be the most frustrating and the least effective in terms of data collection. Regarding retrievals, participants were clearly interested in precision and somewhat interested in the concept of novelty. The criterion of utility, misunderstood by most, could be discarded in a follow-up study thus decreasing users' frustration, which may have hindered data collection during interactive searching.

Several participants had access to a variety of home-grown institutional resources and specialised databases not available to others. These subjects had formed biases against electronic resources such as ARTstor and JSTOR. In addition, although ARTstor and JSTOR were available at all three institutions, various participants were unaware of their functionality. This impacted the present study, and also reflected a lack of library instruction and technological training. For future studies, the factor of training in the use of electronic resources should be investigated. If necessary, instruction should be implemented in preparation for a similar procedure. Furthermore, as new technologies emerge, visual arts scholars as domain specialists should be collaborators in their development. There were significant relationships found between user characteristics such as the length of one's professional career and age range having an effect on users' information-seeking behaviours. Thus, it may be beneficial to investigate generational information-seeking in the domain.

CHArt editorial note

This paper has been reviewed by David Prytherch in March 2011 and Yolanda Spínola in July 2011, and was subsequently revised by the Author. CHArt wishes to thank both reviewers for their insightful comments.

Notes

1. Bakewell, E., Beeman, W. O. and McMichael Reese, C. (1988), *Object, Image, Inquiry: The Art Historian at Work*. Report on a collaborative study by the Getty Art History Information Program (AHIP) and Brown University, Schmitt, M. (ed), Santa Monica, California: AHIP.
2. Bakewell, E., Beeman, W. O. and McMichael Reese, C. (1988), *Object, Image, Inquiry: The Art Historian at Work*. Report on a collaborative study by the Getty Art History Information Program (AHIP) and Brown University, Schmitt, M. (ed), Santa Monica, California: AHIP, especially 7–11 under *Original Works of Art and Reproductions*.
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Appendix A: Phase I Questionnaire

Part 1: Basic Information

A. Academic Department (Please check one)

☐Art History
☐Ceramics
☐Digital Arts and Design
☐Multimedia
☐Painting
☐Printmaking
☐Sculpture
Other (please specify) _____

B. Number of years in the profession (Please check one)
☐1-9 ☐10-19 ☐20-29 ☐30 or more

C. Age (Please check one)
☐20-29 ☐30-39 ☐40-49 ☐50-59 ☐ 60 & above

D. Gender (Please check one)
☐Male ☐Female

E. How often do you use a computer for research purposes? (Please check one)
☐At least once a week ☐At least once a month ☐Every three months

Other (please specify)_____

F. How often do you visit the library for research purposes? (Please check one)
☐At least once a week ☐At least once a month ☐Every three months

Other (please specify) _____

Part 2: Your Use of Information Resources

Please check the box that best describes your opinion of each statement. NOTE: The distance between every two adjacent points on the scale is equal.		Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
		1	2	3	4	5
1	I depend heavily on my home art library.					
2	I frequently add materials to my home art library collection.					
3	I own an art slide collection for teaching and research purposes.					
4	I own a digital art image collection.					
5	I often utilise other image formats such as reproductions in the literature, photos and photocopies.					
6	My main sources of information are images and text materials.					
7	I am concerned with the quality of art reproductions.					
8	I often travel to see original works of art and to acquire research materials.					
9	I often use computerised databases.					
10	I often use a library online catalog.					
11	I often use Web-based information retrieval systems (e.g. Google, Yahoo!).					
12	I often utilise images downloaded from the Internet or other electronic sources.					
13	I often find electronic searching confusing or frustrating.					
14	I often request help or training from information professionals.					

Part 3: Approaches to Locating Information Resources

Please check the box that best describes your opinion of each statement. NOTE: The distance between every two adjacent points on the scale is equal.		Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
		1	2	3	4	5
1	I often consider the authors' reputation in the field when I make authority judgments.					
2	I often conduct an exhaustive search of the literature when beginning a research agenda.					
3	I consider my research process to be collaborative.					
4	I consider my research process to be isolated.					
5	I consider my research methodology intuitive.					
6	I consider my research methodology systematic.					
7	I consider my research methodology serendipitous.					
8	A particular art medium inspires or facilitates my work.					
9	Forms occurring in nature inspire or facilitate my work.					
10	Original works of art inspire or facilitate my work.					
11	Printed texts in books on art inspire or facilitate my work.					
12	Images in books on art inspire or facilitate my work.					
13	Printed text in other materials such as art journals, periodicals and auction catalogs inspire or facilitate my work.					
14	Images in other printed materials such as art journals, periodicals, and auction catalogs inspire or facilitate my work.					
15	Electronic text materials on art subjects inspire or facilitate my work.					
16	Electronic art images inspire or facilitate my work.					

Part 4: Other Sources for Acquiring Information

Please check the box that best describes your opinion of each statement. NOTE: The distance between every two adjacent points on the scale is equal.		Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
		1	2	3	4	5
1	I often attend conferences.					
2	I often participate in conferences.					
3	I often attend art exhibitions.					
4	I often participate in art exhibitions.					
5	I often visit art exhibits and/or museum sites on the Internet.					
6	I often participate in art exhibits and/or museums sites on the Internet					

Appendix B: Phase II Interactive Survey

Instructions

An information professional will mediate this part of the study and guide you throughout the process. After each retrieval system chosen for this study on your computer screen, you can enter your basic search term into the system, and record it in the space provided below on this survey form. After viewing the first page of retrieved items only, you can rank them according to the criteria below. Please follow the same procedure when doing the advanced search.

Sample Search Terms:
Basic Search: Caravaggio, or Michelangelo Merisi da Caravaggio
Advanced Search: Caravaggio and Painting and Baroque

Please consider the following criteria after viewing the first page of retrieved items only.
Precision: The number of retrieved documents that you consider to be relevant
Utility: The number of retrieved documents that appear interesting to you beyond topic relatedness
Novelty: The number of retrieved relevant documents previously unknown to you

A1. Google Image - Basic Search

Your Search Term: _____
Artist's name

Please consider the following criteria using the first page of retrieved items only.		Negative ---------- Positive				
		1	2	3	4	5
Precision	The number of retrieved documents that you consider to be relevant					
Utility	The number of retrieved documents that appear interesting to you beyond topic relatedness					
Novelty	The number of retrieved relevant documents previously unknown to you					

A2. Google Image - Advanced Search

Your Search Terms: _____ _____ _____
Artist's name medium art period

Please consider the following criteria using the first page of retrieved items only.		Negative ---------- Positive				
		1	2	3	4	5
Precision	The number of retrieved documents that you consider to be relevant					
Utility	The number of retrieved documents that appear interesting to you beyond topic relatedness					
Novelty	The number of retrieved relevant documents previously unknown to you					

B1. Google Scholar - Basic Search

Your Search Term: _____
Artist's name

Please consider the following criteria using the first page of retrieved items only.		Negative ---------- Positive				
		1	2	3	4	5
Precision	The number of retrieved documents that you consider to be relevant					
Utility	The number of retrieved documents that appear interesting to you beyond topic relatedness					
Novelty	The number of retrieved relevant documents previously unknown to you					

B2. Google Scholar - Advanced Search

Your Search Terms: _____ _____ _____
Artist's name medium art period

Please consider the following criteria using the first page of retrieved items only.		Negative ---------- Positive				
		1	2	3	4	5
Precision	The number of retrieved documents that you consider to be relevant					
Utility	The number of retrieved documents that appear interesting to you beyond topic relatedness					
Novelty	The number of retrieved relevant documents previously unknown to you					

C1. ARTstor - Basic Image Search

Your Search Term: _____
Artist's name

Please consider the following criteria using the first page of retrieved items only.		Negative ---------- Positive				
		1	2	3	4	5
Precision	The number of retrieved documents that you consider to be relevant					
Utility	The number of retrieved documents that appear interesting to you beyond topic relatedness					
Novelty	The number of retrieved relevant documents previously unknown to you					

C2. ARTstor - Advanced Image Search

Your Search Terms: _____ _____ _____
Artist's name medium art period

Please consider the following criteria using the first page of retrieved items only.		Negative ---------- Positive				
		1	2	3	4	5
Precision	The number of retrieved documents that you consider to be relevant					
Utility	The number of retrieved documents that appear interesting to you beyond topic relatedness					
Novelty	The number of retrieved relevant documents previously unknown to you					

D1. JSTOR - Basic Search

Your Search Term: _____
Artist's name

Please consider the following criteria using the first page of retrieved items only.		Negative ---------- Positive				
		1	2	3	4	5
Precision	The number of retrieved documents that you consider to be relevant					
Utility	The number of retrieved documents that appear interesting to you beyond topic relatedness					
Novelty	The number of retrieved relevant documents previously unknown to you					

D2. JSTOR - Advanced Search

Your Search Terms: _____ _____ _____
Artist's name medium art period

Please consider the following criteria using the first page of retrieved items only.		Negative ---------- Positive				
		1	2	3	4	5
Precision	The number of retrieved documents that you consider to be relevant					
Utility	The number of retrieved documents that appear interesting to you beyond topic relatedness					
Novelty	The number of retrieved relevant documents previously unknown to you					

Part 2: Information-Seeking Experience

Please check all the boxes that apply with regard your information-seeking experience today.

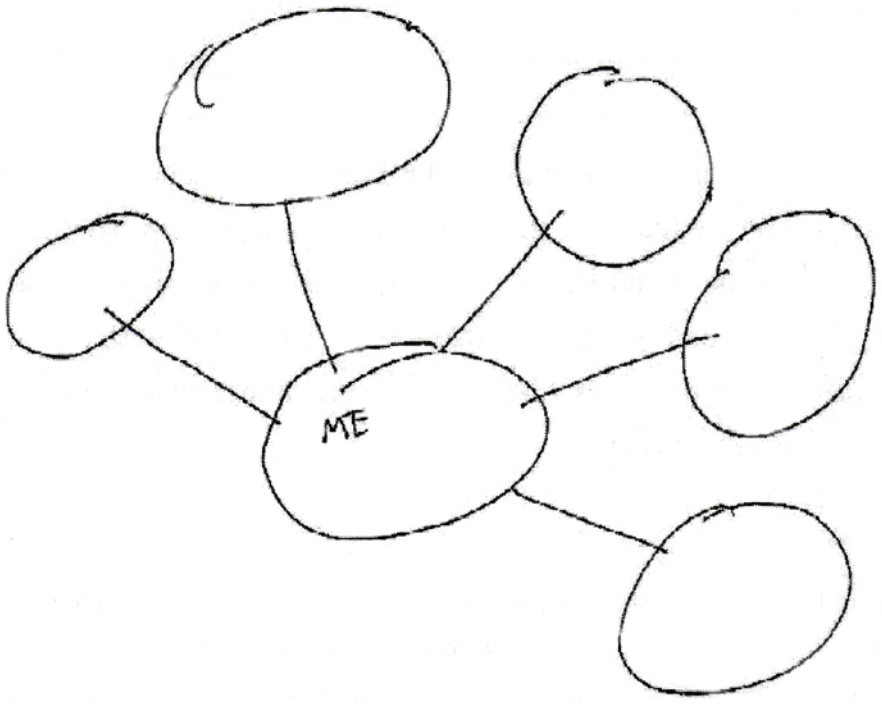
	1. At times I was frustrated.
	2. At times I was confused.
	3. At times I was confident.
	4. At times I was optimistic.
	5. I encountered new information.
	6. I recognised patterns, clusters and/or categories of useful information in today's search results.
	7. Familiar physical surroundings enhanced my information-seeking experience.
	8. Personal and professional values influence my information-seeking choices.
	9. My information-seeking experience improved with mediation and/or social interaction.

Part 3: Graphical Representation of Your Information Horizon

Instructions: Please create a graphical representation of your Information Horizon using the definition and sample graphical representation below as your guide. Add as many circles as needed. After you have completed your Information Horizon graphic, rank your resources in terms of their usefulness with one (1) being the most important.

Definition: A graphical representation of an Information Horizon is all information resources including people or social networks that you typically access when seeking information in the context of a personal research agenda. This process is designed to help you focus and verbalise your thoughts regarding your information resources and your information-seeking processes.

Your graphical representation of your Information Horizon



Thank you very much for your help and participation!

