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Keywords

cataloging, design, research questions, taxonomy

Disciplines

Library and Information Science

Additional Information

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Introduction

Recent years have seen an increased need for cataloging-related research. In 2008, the Library of Congress recommended increased research efforts in the realm of bibliographic control as a means of strengthening the LIS profession,¹ inspiring a resolution from the American Library Association's Association for Library Collections and Technical Services proclaiming 2010 as "The Year of Cataloging Research."² Allyson Carlyle responded by identifying the need for research in many aspects of cataloging, such as cost and cost-effectiveness of cataloging processes; quality of bibliographic data; changing resource formats and metadata standards; and user interface design, just to name a few.³ But with the need for research in so many varied areas, beginning a research project in this space seemed a daunting task. What should researchers prioritize? Where should research efforts be focused?

To determine a practical research agenda, Carlyle began the Everyday Cataloger Concerns (ECC) project, which aimed to identify important areas of research from the perspective of practicing catalogers.⁴ The project team (on which the author participated) invited catalogers

¹ Library of Congress Working Group on the Future of Bibliographic Control. *On the Record: Report of the Library of Congress Working Group on the Future of Bibliographic Control* (Washington, D.C.: Library of Congress, 2008), <http://www.loc.gov/bibliographic-future/news/lcwg-ontherecord-jan08-final.pdf> (accessed April 10, 2017). See section 5.1.2 for specific recommendations regarding research.

² "2010 Designated as the Year of Cataloging Research." ALCTS Newsletter Online, vol. 20, no. 4 (December 2009), <http://www.ala.org/alcts/ano/v20/n4/nws/alcts> (accessed April 10, 2017).

³ Allyson Carlyle, "Invited Editorial: Announcing 2010, Year of Cataloging Research," *Cataloging & Classification Quarterly*, vol. 47, no. 8 (2009): 687-690; Allyson Carlyle, "Cataloging Research Guided by Values," *Library Resources and Technical Services*, vol. 54, no. 3 (July 2010): 126-128.

⁴ Allyson Carlyle, "Research." <http://faculty.washington.edu/acarlyle/publications.html> (accessed April 10, 2017). See the section on ongoing research projects.

working in public, academic, and school libraries to share their opinions in focus groups on the most pressing concerns about their cataloging work.⁵ The team then combed through the transcripts, deriving research questions (RQs). To assist in making these RQs actionable, especially for practitioners, they were sorted into broad topics (e.g., advocacy, quality, cooperation) and reframed so as to be practicable. We developed a group process of compiling related topics, synthesizing similar questions, and refining questions to RQs that would be answerable by scientific research methods.

Through this refinement process, we noticed that many of the original RQs needed significant work to become answerable with scientific methods. However, in this paper I argue that many of these RQs could be answerable as originally identified through a different approach—design. The major epistemological division between traditional science and design stems from the idea that science concerns itself with observing and describing the existing natural world with the goal of replicability and prediction. Design, on the other hand, centers on the artificial world: objects created by humans to institute change and solve problems. Science is about *what is*, while design is about *what could be* (or arguably *what should be*).⁶

In this paper, I assert that many of the emergent research questions identified in the ECC project reflect design-based RQs. To support this idea, I review existing discussions in research literature to identify prominent types of RQs, highlighting the characteristics of design-based RQs. After classifying these various types into a taxonomic framework, I compare the original derived questions from the ECC project against it. This comparative method demonstrates the ways in which the research areas identified by cataloging practitioners reflect design questions, and thus require design approaches and methods to answer them.

Literature Review

What is a Research Question?

While much has been written about research methods, surprisingly little has focused specifically on research questions (RQs). Although posing a question is called out as a specific, independent phase in some delineations of the traditional scientific method process, many social science research methods textbooks quickly gloss over RQs, folding them in with discussions of motivation or identification of research problems, while others do not include a discussion of them at all.⁷ According to Hernon and Metoyer-Duran, a research question is not the same as a

⁵ Allyson Carlyle, Rachel Ivy Clarke, Paul J. Weiss, and Violet Fox, “Everyday Cataloger Concerns: A Research-Based Agenda for Library Cataloging.” Presentation given at the Cataloging and Metadata Management Section of the Cataloging and Classification Research Interest Group, ALA Annual Conference, Anaheim, California (June 21-26, 2012). Presentation slides available at <http://connect.ala.org/node/183589> (accessed April 10, 2017).

⁶ Jeanne Liedka, “Design Thinking: The Role of Hypothesis Generation and Testing,” in *Managing as Designing*, ed. R. J. Boland and F. Collopy (Stanford, CA: Stanford University Press, 2004).

⁷ See for example Lynn Silipigni Connaway and Marie L. radford’s *Research methods In Library and Information Science* (6th ed), which refers sporadically to research questions throughout the text but never offers a concrete

research problem statement, despite some methods textbooks indicating that they are interchangeable. The research question is typically more precise and specific than a problem statement.⁸ In their research methods textbook for library and information science, Wallace and Van Fleet define a RQ as “a general query that guides research but does not necessarily establish a formal structure for an anticipated outcome. A research question is normally stated explicitly as a question.”⁹ Andrews delineates RQs from “ordinary” questions by indicating that research questions must be answerable.¹⁰ Robson and McCartan elaborate on this characteristic and add the following additional factors of good RQs:

- They help to define a project, set boundaries, give direction and define success
- They are linked to the purpose of the research
- They are clear, unambiguous, answerable and non-trivial
- In the case of multiple RQs, they form a coherent set.¹¹

They note that these characteristics may not always be present at the start of a study, especially in qualitative social research. Maxwell notes that in social qualitative research, RQs may only emerge after significant data collection and analysis; however, researchers do start with provisional questions that frame inquiry and guide decisions.¹² RQs play a vital role in dictating the type of research design or method used, population and sampling decisions, types of research instruments and data analysis techniques.¹³ The entire success or failure of any given research project hinges on its RQs, as a research study is only successful to the extent that it answers the RQ it proposed.¹⁴

Types of Research Questions

Beyond the aforementioned characteristics, concrete discussions of RQs identify various types of questions according to different characteristics. In an early attempt to understand types of RQs, Dillon asks *what are the kinds of questions that may be posed for research?*¹⁵ He identifies at least 17 different types and sub-types of questions related to inquiry, concluding that to better

definition, or Alison Jane Pickard’s *Research methods in Information*, which only discusses research questions in relation to specific research methods.

⁸ Peter Hemon and Cheryl Metoyer-Duran. “Problem Statements: An Exploratory Study of Their Function, Significance, and Form.” *Library & Information Science Research* 15, no. 1 (Winter 1993), 71-92.

⁹ Danny P. Wallace and Connie Van Fleet. *Knowledge Into Action: Research and Evaluation in Library and Information Science* (Santa Barbara: Libraries Unlimited, 2012), 48.

¹⁰ Richard Andrews. (2003). *Research questions* (New York: Continuum, 2003), 2.

¹¹ Colin Robson and Kieran McCartan. *Real World Research: A Resource for Users of Social Research Methods in Applied Settings*, 4th ed. (Chichester, UK: John Wiley & Sons, 2016), 59-62.

¹² Joseph Alex Maxwell. *Qualitative Research Design: An Interactive Approach*, 3rd ed. (Thousand Oaks, CA: Sage, 2013), 73-75.

¹³ Anthony J. Onwuegbuzie and Nancy L. Leech. “Linking research questions to mixed methods data analysis procedures.” *The Qualitative Report* 11 vol. 3 (2006), 474–498: <http://nsuworks.nova.edu/tqr/vol11/iss3/3/>

¹⁴ Andrew H. Van de Ven. *Engaged Scholarship: A Guide for Organizational and Social Research* (Oxford: Oxford University Press, 2007).

¹⁵ J.T. Dillon. “The Classification of Research Questions.” *Review of Educational Research* 54, no. 3 (1984), 327-361: <http://journals.sagepub.com/doi/pdf/10.3102/00346543054003327>

understand inquiry, more and better classifications are necessary. Numerous others have since followed suit, proposing various characteristics intended to delineate types of RQs.

Blaikie, Garcia-Murillo, and Byrne all organize RQs according to their interrogative openings: who, what, why, how, where.¹⁶ Garcia-Murillo also introduces what she calls ‘verb-induced questions’: those beginning with has, did, does, or will. She describes these as theory-testing questions that aim to determine the impact that a factor has had on an event of interest.¹⁷ However, these terms alone do not seem sufficient to delineate categories or concretely distinguish types of RQs. While they may offer introductory cues as to what type of inquiry may be under proposal, many of these interrogative terms preface multiple types of questions. For instance, the interrogative word “what” may be used to begin descriptive RQs (“what is X?”);¹⁸ relational RQs (“What is the relationship between X and Y?”);¹⁹ contingent RQs (“What correlates with X?”);²⁰ or causal RQs (“What causes X?”).²¹ Depending on the classifier, the word “how” may be used to lead off descriptive RQs (“How does X act?”);²² relational RQs (“How do X and Y differ?”);²³ and/or normative RQs (“How can we do X?”)²⁴ Thus, introductory phrasing alone is not a strong enough factor to identify types of research questions.

Instead, other factors must be used to classify types of RQs. While Andrews references questions that begin with “what,” “how,” “can,” and “why,” he does not use them in his categorization. Instead, he divides RQs into classes of main, subsidiary and contributory questions.²⁵ This organization of RQs is based more on the role the question is playing in supporting a main research focus, rather than an inherent quality of the question itself. Similarly, Maxwell delineates between general and particular questions: the former being those that are broadly applicable while the latter are set in a specific context or setting.²⁶ He also discusses instrumentalist questions (questions formed in terms of observable or reportable data) vs. realist questions (questions formed based on data as unquestioningly representing real phenomena).

¹⁶ Norman Blaikie. *Approaches to Social Enquiry*, 2nd ed.. (Cambridge, UK: Polity Press, 2007); Martha Garcia-Murillo. *Research questions* (United States: Martha A. Garcia-Murillo, 2012).; D. Byrne. “Types of research questions: why? when? who? how? where?” *Project Planner* [SAGE Research Methods] (2016): <http://methods.sagepub.com/project-planner/developing-a-researchable-question>

¹⁷ Garcia-Murillo 2012.

¹⁸ Dillon 1984; Mats Alvesson and Jörgen Sandberg. “The Context of Constructing and Formulating Research Questions.” In *Constructing Research Questions: Doing Interesting Research* (London: SAGE, 2013): <http://dx.doi.org/10.4135/9781446270035.n2>; Julian Meltzoff. *Critical Thinking about Research: Psychology and Related Fields* (Washington, DC: American Psychological Association, 1998); Robert Feldt. “Guide to Research Questions” (2010): <http://www.robertfeldt.net/advice/guide-to-creating-research-questions.pdf>

¹⁹ William M. K. Trochim. “Types of Questions.” In *The Research Methods Knowledge Base*, 2nd ed. (Cincinnati, OH: Atomic Dog Publishing, 2006): <https://www.socialresearchmethods.net/kb/resques.php>

²⁰ Feldt 2010.

²¹ Feldt 2010; Garcia-Murillo 2012.

²² Dillon 1984; Feldt 2010; Garcia-Murillo 2012; Byrne 2016.

²³ Feldt 2010; Alvesson & Sandberg 2013.

²⁴ Ibid.

²⁵ Andrews 2003.

²⁶ Maxwell 2013.

Maxwell clearly acknowledges the influence of the positivist traditions of generalizability and objective reality in these divisions.

Onwuegbuzie and Leech categorize their RQs methodologically, describing quantitative, qualitative, and mixed methods RQs.²⁷ Quantitative RQs may be descriptive (usually evidenced by the interrogative phrases “what is...” and “what are...”); comparative (“what is the difference between...”; “what is the effect of...”); or relationship questions (comparative questions with two or more variables). Quantitative RQs are developed a priori, while qualitative RQs are developed a posteriori or iteratively. Mixed methods RQs are used for research designs investigating quantitative and qualitative questions concurrently or sequentially. Given that Onwuegbuzie and Leech also emphasize the role of the RQ in selecting the type of research design or method, their typology almost seems tautological.

Although Onwuegbuzie and Leech do correlate functional factors with methodological categories, Knight uses the functions themselves to derive RQ types: descriptive, evaluative, narrative, causal, and effects.²⁸ Each of his categories includes example “keywords” that reflect the interrogative terminology above; for instance, the keywords *what*, *who*, *where*, and *when* are used in defining the descriptive category; *how good* for the evaluative category; and *why* for causal RQs. Similarly, White categorizes RQs based on purpose, such as descriptive, explanatory, and comparative questions, and he aligns the keywords *what*, *who*, *when* and *where* with descriptive questions and *how* and *why* with explanatory questions.²⁹ Trochem also bases his three categories on functions: descriptive, relational, and causal.³⁰ He notes that these question types are often cumulative: to understand relationships between two variables, those variables must first be described, and to understand cause and effect between two variables, it must first be shown that the variables have a relationship. Metzloff also uses function as a basis for his categories: existence, description and classification, composition, relationship, descriptive-comparative, causality, causality-comparative, and causality-comparative interaction.³¹

Building on Metzloff, Feldt also offers a function-based approach to categorizing RQs.³² However, Feldt’s taxonomy proposes a superclass of functions: knowledge-focused RQs and solution-focused RQs. Hierarchically nested under knowledge-focused are many of the same RQ

²⁷ Onwuegbuzie & Leech 2006.

²⁸ Peter T. Knight. “Starting with Writing: Creating Research Questions.” In *Small-Scale Research: Pragmatic Inquiry in Social Science and the Caring Professions* (London: SAGE Publications, 2002), <http://dx.doi.org/10.4135/9781849209908>

²⁹ Patrick White. *Developing Research Questions: A Guide for Social Scientists* (New York, NY: Palgrave Macmillan, 2009), 47-52.

³⁰ Trochem 2006.

³¹ Metzloff 1998.

³² Feldt 2010.

types elucidated by others, such as descriptive, comparative, relationship, and causality. These reflect almost all of the previous RQ categories identified in the context of social science and likely influenced by Metzloff's work in the discipline of psychology. However, Feldt also draws on Easterbrook et al., whose work comes from software engineering research. In addition to "knowledge questions" comparable to those articulated above, Easterbrook et al. explicitly call out design questions as a type of research question, one concerned with creating better procedures, tools, and/or regulatory policies.³³ Examples of these types of RQs include questions like "What is an effective way to achieve X?" or "How can we create X?" Feldt's category of "solution-focused" RQs was clearly inspired by these design questions. Feldt offers sub-types of each question type except for the solution-focused RQs, and neither Easterbrook et al. nor Feldt elaborate much on this category, relegating design questions as "non-empirical" RQs. Andrews goes so far as to say that such questions can only be hypothetical: no research is required to answer such a question and that "can" RQs should be avoided entirely.³⁴

However, separating solution-focused questions from the knowledge-focused questions and labeling them as "non-empirical" implies that solutions do not generate knowledge. Yet the generation of problem solutions is the foundational form of knowledge generation in design, making these types of RQs just as valid and legitimate as those in traditional science. Indeed, a growing body of research through design—a research approach that employs methods and processes from design practice—demonstrates that design research is a valid form of inquiry.³⁵

Design research in librarianship has traditionally been defined in a very narrow way, in line with the paradigms of science, understood and evaluated via traditional scientific norms. Often "design research" is characterized as a type of action research method, by designing, implementing, and evaluating artifacts intended to solve problems through intervention.³⁶ For example, Bowler and Large suggest what they call "design-based research" as a useful methodology for LIS research.³⁷ Their suggestion draws on design methodologies as understood in the field of education, which frames design as a form of scientific experiment,³⁸ and thus still reflects a scientific paradigm. However, design offers a different epistemological perspective than science. The recent articulation of *research through design* reflects this idea, in that research—the discovery and formulation of new knowledge—occurs through the creation of new

³³ Steve Easterbrook, Janice Singer, Margaret-Anne Storey, and Daniela Damian. "Selecting Empirical Methods for Software Engineering Research." In F. Shull et. al. (eds.) *Guide to Advanced Empirical Software Engineering* (Germany: Springer, 2008), 287-290.

³⁴ Andrews 2003, 34.

³⁵ John Zimmerman and Jodi Forlizzi. "The Role of Design Artifacts in Design Theory Construction." *Artifact 2*, no. 1 (2008): 41-45.

³⁶ Susan E. Beck and Kate Manuel. *Practical research methods for librarians and information professionals* (New York: Neal-Schuman, 2008).

³⁷ Leanne Bowler and Andrew Large. "Design-based research for LIS." *Library and Information Science Research* 30, no. 1 (2008), 39-46.

³⁸ Ann L. Brown. "Design experiments: Theoretical and methodological challenges in creating complex interventions in classroom settings." *The Journal of the Learning Sciences* 2, no. 2 (1992), 141-178.

materials and products.³⁹ Since research through design is an activity where design researchers focus not just on making, but on making the *right* thing, it is a methodology that endorses the making of an artifact itself as a form of inquiry.⁴⁰ Research through design is separated from everyday design practices through its intention to function as inquiry. To qualify as research through design, Zimmerman et al. argue that the motivation for making an artifact must be to produce knowledge, rather than the typical design goal of producing a commercially viable product. This research approach is intrinsic to traditional design fields, such as product design, graphic design, and architecture, but it is also used in fields like engineering, information systems, and human-computer interaction—all fields which are relevant and often considered to be a part of library and information science at large. Indeed, research through design has even seen recent use in some aspects of librarianship, such as the work of Subramaniam et al. which draws on co-design with youth to gain knowledge about their information behaviors.⁴¹ Given that design is an established legitimate approach to research, we must then conclude that design questions are, indeed, legitimate research questions, and should not be relegated to a subordinate status. A good example of this is Alvesson & Sandberg’s typology of RQs, in which they do not distinguish between knowledge-based and solution-based RQs, but rather integrate solution-focused RQs into the same classificatory level as other functional categories.⁴² Their typology includes the traditional social science types of RQs (descriptive, comparative, explanatory) but also includes what they call normative questions—questions that aim to produce knowledge about how something should be done. This RQ type is the epitome of design research since science is about *what is*, while design is about *how something could be* (or arguably how it *should be*).⁴³

Few have as of yet developed subcategories of design RQs. In a guide to help graduate students, Bakker delineates two major types of design RQs: *characteristics* questions and *how* questions.⁴⁴ The former asks about characteristics of an intervention, such as his example “What are the characteristics of valid and effective teaching and learning strategy to teach students about correlation and regression in such a way that they experience coherence between mathematics

³⁹ Christopher Frayling. “Research in Art and Design.” *Royal College of Art Research Papers* 1, no. 1 (1993), 1-5.

⁴⁰ John Zimmerman, Jodi Forlizzi, and Shelley Evenson. “Research through design as a method for interaction design research in HCI.” *Proceedings of the ACM SIGCHI Conference on Human Factors in Computing Systems (CHI 2007)*: 493-502.

⁴¹ Mega Subramaniam, June Ahn, Amanda Waugh, Natalie Greene Taylor, Allison Druin, Kenneth R. Fleischmann, and Greg Walsh. “Crosswalk between the *Framework for K-12 Science Education and Standards for the 21st Century Learner*: School Librarians as the Crucial Link. *School Library Research*, 16 (2013): 1-28; Mega Subramaniam, June Ahn, Amanda Waugh, Natalie Greene Taylor, Allison Druin, Kenneth R. Fleischmann, and Greg Walsh. “The Role of School Librarians in Enhancing Science Learning.” *Journal of Librarianship and Information Science* 47, no. 1 (2013): 3-16.

⁴² Alvesson & Sandberg 2013.

⁴³ Liedka 2004.

⁴⁴ Arthur Bakker. “Research Questions in Design-Based Research” (Utrecht: Freudenthal Institute, 2014): http://www.fi.uu.nl/en/summerschool/docs2014/design_research_michiel/Research%20Questions%20in%20DesignBasedResearch2014-08-26.pdf

and the natural sciences?” This form of question aligns closely with some of the descriptive question categories described in the social sciences, and Bakker even notes that these types of questions require descriptive answers, rather than design answers. He is much more interested in the *how* questions: questions that aim to achieve goals. While he notes some critiques of these types of questions similar to those posited by social scientists, he also argues that *how* questions are valid not because they necessarily demonstrate effectiveness, but because they provide proof of principle or existence. Eris describes these types of questions as generative questions, a class he proposes to add to existing question taxonomies.⁴⁵ He proposes five subclasses of generative design questions: proposal/negotiation, in which the questioner suggests a concept or negotiates an existing concept; scenario creation, in which the questioner creates a scenario to investigate possible outcomes; ideation, in which the questioner wants to generate as many concepts as possible without aiming to achieve a specific goal; method generation, in which the questioner wants to generate as many possible means to achieve a goal; and enablement, in which the questioner wants to construct acts, states, or resources that can enable the question concept. Unlike in the sciences, which aim to prove or disprove hypotheses resulting in single, concrete answers, a multiplicity of answers is a valid result in design research. Recent studies even show that generating multiple design ideas and outcomes, especially concurrently and parallel to one another, can spur more divergent ideas and thus better design solutions.⁴⁶

Based on the various categories proposed by the authors above, a function-based taxonomy of RQ types was synthesized to represent a fuller landscape of RQs (Table 1). Building on Dillon’s foundation, this taxonomic framework incorporates subsequent discussions to update and reflect multiple disciplines and additional research perspectives relevant to librarianship beyond traditional social science.

[insert table 1 here. Caption: A function-based taxonomy of research question types.]

Although verbiage varies, a taxonomic approach to these various typographies and categorizations shows a number of generally overarching similarities. While used as taxonomic characteristics of division by some of the above authors, factors such as time, methodological approach, and relationship among RQs may be considered orthogonal to this hierarchy, as each of those factors can be applied to the types of RQs identified in Table 1.

⁴⁵ Özgür Eris. “Asking Generative Design Questions: A Fundamental Cognitive Mechanism in Design Thinking,” *International Conference on Engineering Design, ICED 03* (Stockholm, Sweden, August 19-21, 2003).

⁴⁶ Steven P. Dow, Alana Glassco, Jonathan Kass, Melissa Schwarz, Daniel L. Schwartz, and Scott R. Klemmer. “Parallel prototyping leads to better design results, more divergence, and increased self-efficacy,” *ACM Transactions on Human-Computer Interaction* 17, no. 4 (2010), Article 18.

Methods

As part of the Everyday Cataloger Concerns project, a project intended to determine a practical research agenda for library cataloging, catalogers were invited to share their opinions on the most pressing concerns about their cataloging work and their thoughts about what kinds of research was needed to assist them in their practice.⁴⁷ In 2011, the research team conducted two focus groups: one group comprised of five public library catalogers and one group of eight academic library catalogers. Recruitment notices were posted to the AUTOCAT listserv, a professional list focused on discussion related to library cataloging, and respondents who worked half- to full-time in an American library where 50% or more of their job involved cataloging of library materials were encouraged to participate. The focus group sessions were completed via conference call to enable nationwide participation.

Recordings of each focus group were transcribed and analyzed by members of the project team (of which the author was a part). Thematic analysis only revealed topics of concern to catalogers (e.g., advocacy, quality, cooperation), which did not assist the team in uncovering what research was of interest to or needed by practicing catalogers. Therefore, the transcripts were re-analyzed, this time using a new process: derivation of RQs that reflected participants' concerns, with the ultimate aim of presenting actionable RQs to the cataloging community.

Each project team member re-coded the transcripts, this time articulating RQs instead of thematic codes. Given the original aim of the project—to create an actionable research agenda relevant to cataloging practitioners—the team then developed a collaborative process of grouping related RQs from the list, synthesizing similar RQs into a single RQ, and refining RQs into a form that would be answerable by scientific research methods. More details about the process and its results from this process will be detailed in a future paper.

After a preliminary round of derivation, we ended up with 610 RQs (315 from the public librarian focus group, and 295 from the academic librarian focus group). The high number of RQs is due to the coding of each focus group independently by each team member, which were then combined into one large list of RQs. Although many of these RQs covered the same issues from the focus group transcripts, each ECC team member offered slightly different ways of framing and wording the suggested RQs. For the purposes of this paper, all of the preliminary RQs from the original ECC coding were compared to the above taxonomic framework (Table 1). As part of a collaborative process, two people (the author plus a research assistant not associated with the ECC project) independently compared every ECC question against the framework, selecting the type of RQ that they thought best represented it.

⁴⁷ Carlyle, "Research"; Carlyle et. al. 2012.

Occasional difficulty emerged due to the preliminary nature of the RQs and their lack of precise language. For example, many RQs referred to concepts like “quality,” “cataloging effectiveness” or “success” without concretely articulating what was meant by those terms. Certainly, such concepts would need to be defined and operationalized for actionable research purposes. However, much of the time the type of question could be determined even without operationalizing such variables. For instance, the preliminary RQ “What is the impact of duplicate/near-equivalent records on catalog effectiveness?” does not need to have “duplicate/near-equivalent records” or “catalog effectiveness” defined to determine that this is a question asking about a potential relationship between the former and the latter.

Some preliminary RQs had multiple questions embedded in them, such as “What are the burdens catalogers must keep track of when working and are there ways that systems or interfaces might take over or alleviate some of that cognitive load?” When these questions were encountered, they were split, and each question was addressed separately. This increased the total count of RQs to 654 (an increase from 315 to 327 in the public library focus group set and an increase from 295 to 327 in the academic library focus group set). The two lists were then compared, and any divergences reconciled.

Findings

Of the 654 RQs compared against the framework, 156 (24%) were identified as normative, with 124 RQs identified as normative: existence questions and 32 identified as normative judgement questions. The only question type identified more frequently than normative was descriptive questions, of which 188 (29%) were identified. See Figure 1 for a breakdown of question types.

[insert Figure 1 approximately here. Caption: Types of RQs identified in the ECC RQs (n=654)]

Table 2 offers examples of RQs from the ECC dataset representing each of the RQ types from the taxonomy.

[insert table 2 approximately here. Caption: Examples of RQs from the ECC dataset classified according to the RQ taxonomy]

Chi-square goodness of fit tests were performed to determine if the differences between RQ proportions from the academic library focus groups and RQ proportions from the public library focus groups were significant. RQs from academic and public library catalogers significant differed in the following three question types: comparative, evaluative, and normative (see Table 2). Interestingly, there were significantly more normative RQs identified in those derived from the academic library RQs than from the public library RQs.

[insert Table 3 approximately here. Caption: Differences in the breakdown of question types between academic library RQs and public library RQs]

Of the normative academic library RQs (n=109), 87 (80%) were identified as normative: existence and 22 (20%) as normative judgment, while the public library RQs (n=47) reflected counts of 37 (79%) and 10 (21%) respectively. A chi-square goodness of fit test was performed and found the differences between types of normative RQs to not be statistically significant ($\chi^2(1)=0.060$, $p=0.8061$). So although the amount of normative RQs varied between academic and public library catalogers, the sub-types of normative RQs in both groups were consistent.

Discussion

During the question refinement process, the team struggled with a number of seemingly unanswerable questions—or at least, unanswerable according to traditional social science. For instance, the RQ

How do we bridge the financial gaps to help libraries move forward with RDA and other upcoming cataloging initiatives?

was one the team wrestled with. We could certainly reformulate this RQ as a descriptive RQ, perhaps something along the lines of *What financial gaps currently exist among libraries?* It could be a comparative question, such as *In what way, if any, do the financial situations of RDA-adopting libraries and non-RDA adopting libraries differ?* Or perhaps a relationship question: *What, if anything, is the relationship between a library's financial standing and their decision whether or not to adopt RDA?* But something is missing from all of these questions. The answer to each of these social science formulated RQs is information, whereas the answer to the RQ as originally presented would be in the form of a solution to a problem. This question appears to be a normative RQ, and thus a design question. The answer to this RQ requires the creation of some kind of proposal, system, or tool that offers a bridge to address financial gaps. From a scientific perspective, this question appears unanswerable. But these types of questions are answerable—they just rely on a different model of reliability and validity than science. The answer does not have to offer the creation of all possible tools. It does not have to demonstrate whether the created tool is effective. To answer the question, some *thing* just needs to be created. This is the epitome of a design RQ: a question for which the answer is the creation of a solution to a problem. This difference in research viewpoint can be seen in the wording of the above question, which does not ask how we are currently bridging gaps, but how they might be bridged to accomplish a particular goal (in this case, moving forward with RDA and other upcoming initiatives). Other normative questions identified in the dataset, such as “How can ILS system design make up for staffing cuts?”; “What can be done to mitigate problems caused by lack of

funding in cataloging/technical services and by decreased cataloging staffing?"; and "How can we automate cataloging punctuation?" reflect this goal-focused viewpoint. The answer to each of these questions is a process or product that offers one (of potentially many) ways of achieving a goal. Other normative questions in the dataset, such as "How should catalogers work with products like discovery services to enhance use of cataloging records?" and "How should libraries make decisions regarding use of controlled vocabularies and expenditures on metadata?" reflect aspects of judgement, asking not just how a goal could possibly be achieved, but how it perhaps should be achieved.

Upon reflection and subsequent development of the broader taxonomy of RQs presented in this paper, it seems that some of the team's struggle may have been due to our attempts to shoehorn these normative RQs into other, social science-based RQ types. However, by imposing such a change, we as a research team also imposed a specific perspective and worldview—one not necessarily held by the practicing catalogers we aimed to serve. The formulation and wording of any given RQ hinges on the type of information sought, and in turn, influences which methods are used to gather and understand that information. It is clear from the taxonomy of RQs presented in this paper that formulation and wording of RQs also hinges on ontological and epistemological perspectives and worldviews. The ECC team's original goal to refine all cataloging RQs in the form of descriptive, comparative, and conditional RQs reflects the traditional framing of library and information science as a social science, leaving no room for design.

However, according to the ECC data from practicing library catalogers, it seems that many of the research lines of inquiry perceived as valuable are indeed normative and rooted in problem solving. This seems especially true for academic libraries, where normative RQs comprised the highest percentage of RQ type. The public library RQs, on the other hand, were more commonly classed as descriptive RQs, with contingent RQs the second most common, and normative RQs only appearing as the third most frequently classified type, tied with comparative RQs.

Why are there so many normative RQs of interest and relevance to practicing library catalogers, especially in academic libraries? A variety of factors may have contributed to this outcome. Some of it may stem from the original framing of the focus group questions: since participants were asked to discuss problems they faced in cataloging, it makes sense that RQs derived from such a discussion would reflect the problem-solving focus embodied in normative RQs and their accordant design-based methods. However, since both focus groups were asked the same problem-based questions, this would not explain the significant difference between the normative RQs from the academic and public library groups. Another influence may possibly have been variations in individual ECC team members' approaches to deriving RQs. Perhaps certain team members were more inclined to conceptualize and/or phrase their derived RQs in a normative fashion. Although attempts were made to investigate whether or not RQ types were correlated to

the ECC team member that derived them, complete information connecting individual team members and RQs was unavailable.

Regardless of these possible influences, this exploration shows that some proportion of RQs of interest and value to practicing catalogers are normative, requiring RQs and accordant methods to address that need. Since answers to normative questions come from the creation of a product or process, they therefore require research approaches that derive new knowledge from creation. Such an inherently different purpose calls for different methodologies and techniques of practice, and therefore requires a fundamentally different way of viewing and evaluating research. As design research approaches are rooted in creation, it stands to reason that a number of important cataloging RQs could benefit from design research approaches. Therefore, normative RQs derived from the ECC study should not all be subsumed into social science questions, but, where appropriate, refined into actionable design RQs.

This is not to say that social science RQs have no relevance to cataloging. Many are informative and useful, providing insightful knowledge about the cataloging landscape. In addition to this knowledge for its own sake, such knowledge is also relevant to design approaches. Often when broaching normative design RQs, we first need to ask scaffolding questions, such as descriptive RQs, to understand the design space and context.⁴⁸ A good example of this is the “inspiration” phase in the recently popular “design thinking” model used in libraries.⁴⁹ During this phase, which occurs prior to any making or creation, designers investigate a specific situation or context, often using social science research methods such as observations, surveys, and interviews, to better understand and empathize with potential users. Much of design could not happen without the type of knowledge supplied by social science RQs. However, entertaining the possibility of an additional worldview—design—affords the possibility of gathering and understanding additional forms of information—information that has been identified by practitioners as important to their work.

Conclusion

Allyson Carlyle is well known for her advocacy for and support of increased research in library cataloging. However, even she acknowledges the large and broad space that constitutes cataloging research and a variety of competing needs in that space. Her recent work focuses on what researchers should prioritize and where research efforts should be concentrated. While there are many ways to determine such decisions, a classification of RQs is one approach that helps us understand the space of inquiry and provides a useful device for organizing and reviewing research. Using a synthesized taxonomy of RQs from social sciences as well as design

⁴⁸ Alvesson and Sandberg 2013.

⁴⁹ IDEO. *Design Thinking for Libraries: A Toolkit for Patron-Centered Design*, 1st ed. (2015), 10: <http://designthinkingforlibraries.com>

fields, I have shown that many of the emergent research questions identified in Carlyle's ECC project reflect normative RQs that require design approaches and methods to answer them. Classification of questions can also propose a new public conception of a given field.⁵⁰ The taxonomy outlined here offers the potential to shift perceptions about cataloging, emphasizing the recently proposed view of catalogers as designers.⁵¹ Such a shift could arguably assist in communications about the value of cataloging and the need for experienced cataloging professionals to undertake this design work.

It is time to expand our notions of what it means to do research in cataloging, and explicitly include, welcome, and support design research. This taxonomic approach has helped further our understanding of cataloging practitioners' research needs. In addition to demonstrating that any research agenda intended to be relevant to practitioners needs to consider design RQs, this new taxonomy of RQs also offers useful framing and language for reshaping other types of RQs in more actionable terms, thus helping us move forward in our quest to develop a future research agenda for cataloging that is useful to all.

⁵⁰ Dillon 1984, 355.

⁵¹ Patrick Lambe. "From Cataloguers to Designers: Paul Otlet, Social Impact and a More Proactive Role for Knowledge Organization Professionals." *Knowledge Organization* 42, no. 6 (2015), 445-455.