Making Job Postings More Equitable: Evidence Based Recommendations from an Analysis of Data Professionals Job Postings Between 2013-2018

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Abstract

Objective - Over the last decade, many academic libraries have hired data professionals to offer research data services. As these positions often require different types of experience than traditional librarian positions, there is an increased interest in hiring professionals from outside the typical library and information science (LIS) pipeline. More broadly, there has also been an increased interest in academic libraries and higher education to incorporate the principles and practices of diversity,
equity, inclusion, and accessibility (DEI&A) into their work. These phenomena allow an opportunity to examine the growing area of data professionals and library hiring practices through the lens of DEI&A. Data was collected from 180 data professional job positions, including education, experiences, and skills, to better understand the evolving and complex landscape of data professionals and to provide evidence based recommendations regarding how the profession can enact meaningful and lasting change in the areas of DEI&A.

Methods - The qualifications and responsibilities listed in data professional job postings from 2013 to 2018 were examined. Prior to analyzing the job postings, a codebook of 43 variables was developed. The 177 data professional job postings (corresponding to 180 positions) were independently analyzed, noting the presence of each variable, including the locations and the degrees of complexity sought. After coding, discrepancies were mutually resolved. Overall, the coding process had 94% intercoder agreement, which indicates a high level of agreement.

Results - Over one-third of postings (n = 63, 35%) did not use the word “librarian” in the job title. Eighty-eight percent (n = 159) required a Master’s in LIS degree, but 67% (n = 119) also accepted an equivalent degree. Over half of the positions (n = 108, 60%) were also looking for an additional degree, most frequently a graduate degree. The median salary of the positions listing a quantitative value was $57,000; however, this value may not be accurate because only 26% of job positions (n = 47) gave a quantitative salary. From the research data management skills mentioned, general data management (n = 155, 86%), data repositories (n = 122, 68%), and data curation (n = 101, 56%) appeared most frequently. Libraries were also looking for traditional LIS skills and experiences, including instruction (n = 138, 77%), consultation (n = 121, 67%), and a public services perspective (n = 69, 38%).

Conclusion - The results show that academic libraries are trying to recruit candidates from outside the traditional academic library pipeline. Research data activities (a non-traditional area for LIS) and traditional LIS areas were both frequently mentioned. Overall, these job positions should be written through a more intentional lens of DEI&A. This would help to make data professional positions more diverse and inclusive, while also helping academic libraries to reach their goal of recruiting outside of LIS. A set of concrete DEI&A recommendations are provided that are applicable for writing all library positions, so that readers can put these results into action and enact meaningful change within the profession.

Introduction

Over the last decade, an increasing number of academic libraries have hired data professionals to offer research data services (RDS) to facilitate the advancement of research. Data professionals help researchers to “address the full data lifecycle, including the data management plan, digital curation (selection, preservation, maintenance, and archiving), and metadata creation and conversion” (Tenopir, Sandusky, Allard, & Birch, 2013, p. 70). These positions often require different types of experience than traditional librarian positions, which can create an interest in hiring professionals from outside of the typical library and information science (LIS) pipeline. Accepting a variety of academic backgrounds and professional experiences naturally increases other forms of diversity because more types of people will apply. Furthermore, there is an increased interest in academic libraries and higher education more broadly to incorporate principles and practices of diversity, equity, inclusion, and accessibility.
(DEI&A) into their work. Examining the landscape of data professionals working in academic libraries and formulating recommendations for action can help increase diversity in these positions, reducing disparities within the profession and its institutions. The consequence of perpetuating the status quo is to worsen the disparities amongst underprivileged and underrepresented groups. As hiring managers, search committee members, tenure review committee members, advocates, and conversation starters, everyone has a role to play in making our profession more equitable and inclusive for a more diverse groups of professionals. DEI&A is much more than simply having a library or institutional statement at the bottom of a job posting. DEI&A principles and practices should inform every aspect of a job posting. This evidence based research study presents the data collected from a deductive thematic analysis of 177 data professional job postings, including education, experiences, and skills, to better understand the complex landscape of data professionals. The findings are used to create a set of recommendations for how DEI&A principles can be incorporated into any academic library job posting so that the profession can enact meaningful and lasting change.

**Literature Review**

**Research Data Services in Academic Libraries**

The need for academic libraries to provide RDS due to the emergence of more data intensive research, data management mandates from funding agencies, and other factors, has been well-established in the literature (Tenopir et al., 2013). Further, RDS is listed as a top trend in academic libraries in both 2016 and 2018 by the Association of College and Research Libraries (ACRL) (ACRL Research Planning and Review Committee, 2016; ACRL Research Planning and Review Committee, 2018). As RDS is an emerging area within academic librarianship, the literature consists mostly of case studies, focused primarily on assessing the needs of campus researchers and implementing these services, as summarized by Tenopir, Kaufman, Sandusky, and Pollock (2019). While this literature provides valuable information about researcher needs and the implementation of RDS services, it provides little information on the emerging sub-discipline of data professionals. There is a need to capture data about the responsibilities, qualifications, and other information about data professional positions, such as education, experiences, and skills.

**DEI&A in Academic Libraries and Higher Education**

Academic libraries have a long history of valuing DEI&A. Examples include research on accessibility and diversity of library websites (Yoon, Hulischer, & Dols, 2016) and LIS student groups advocating for DEI&A inclusion in LIS curriculum (Jardine & Zerhusen, 2015). There are several examples of conferences and events on this topic, such as the Conference on Inclusion and Diversity in Library & Information Science (https://cidlis.umd.edu/). Other national LIS conferences, such as the Digital Library Federation and Research Data Access and Preservation Association, have tracks or specific foci on these topics. Further, national groups such as the American Library Association and ACRL have offices and committees to ensure the prioritization of DEI&A.

Similarly, higher education institutions have also been incorporating DEI&A into their values and work, as seen throughout professional publications such as Inside Higher Ed (Willis, 2017) and the Chronicle of Higher Education (Brown, 2019). Professional associations such as Educause (n.d.) have identified DEI&A as a critical priority and higher education conferences such as the Leadership in Higher Education (https://www.magnapubs.com/leadership-in-higher-education-conference/) are likewise focusing on these themes. Additionally,
individual universities have incorporated these principles into many facets of the institution, such as the University of Michigan’s Diversity, Equity, and Inclusion Certificate (n.d.) for graduate students and the University of California Berkeley’s (2018) strategic plan. However, one area that has received less attention from the DEI&A perspective is the job search process in academia, which is opaque and favors those on the inside (Fernandes et al., 2020).

**Job Posting Analyses to Create a Landscape of Data Professionals**

Job postings describe “the duties and responsibilities ... experience, education, skills, knowledge, or other attributes required for the job; and the hiring organization, salary range, and other benefits” (Kim & Angnakoon, 2016, p. 327). Academic libraries can also use job postings to articulate their needs and priorities, especially for areas of expansion such as RDS.

Subsets of RDS job postings have been examined via content analysis. Si, Zhuang, Xing, and Guo (2013) compared the core competencies and duties of scientific data specialists in 46 job postings to the current curricula in 38 LIS programs. They found that most LIS curricula train students in the basics of data curation, but more specialized areas were limited. Kim, Warga, and Moen (2013) studied job postings for digital curation positions and developed a set of competencies for digital curation responsibilities, which were used to create curricula in digital curation and data management. Xia and Wang (2014) visualized keyword and phrase occurrences of 167 job postings for social science data librarians from 2005-2012. Chen and Zhang (2017) analyzed 70 data management professionals’ positions, from January to April 2015 using word frequency analysis, finding that 27% of postings mentioned a Master’s degree in Library and Information Science (MLIS).

**Thematic Analysis as a Research Method**

Thematic analyses “move beyond counting explicit words or phrases and focus on identifying and describing both implicit and explicit ideas within the data” (Guest, MacQueen, & Namey, 2012, p. 10). This method yields richer results than word frequency analysis because it can “captur[e] the complexities of meaning within a textual data set” (Guest et al., 2012, p. 11). This methodology has been previously applied to the analysis of job postings within academic libraries. Hall-Ellis (2005; 2006) used this confirmatory method to track changing expectations and requirements for entry-level cataloguer positions and managerial cataloguer positions. In addition to coding the appearance of predetermined variables in the job postings, Hall-Ellis (2005; 2006) also coded for the complexity of each variable, which cannot be done with word frequency analysis. A more rigorous analysis of job postings within RDS using thematic analysis is lacking from the literature, with Chen and Zhang (2017, p. 22) noting that the results of their study shows “a need for a follow-up study to monitor the development of th[is] emerging job area.”

**Aims**

This research project aims to answer the following research questions:

1. What are the most frequently occurring qualifications (required and preferred) and responsibilities for data professional positions?
   a. Specifically, what education and experiences occur most frequently?
   b. What research data activities occur most frequently?
   c. What other responsibilities and skills occur most frequently?
2. What is the median salary and salary range of data professional positions?
Methods

This research study uses deductive thematic analysis to examine data professional job postings that were posted from January 1, 2013 to June 30, 2018. These job postings were gathered from the following electronic mailing lists: 1) ACRL Science & Technology Section (n.d), 2) Code4Lib jobs list (n.d.), 3) Digital Library Federation Job Board (n.d.), 4) International Association of Social Science Information Services & Technology jobs portal (n.d.) and 5) Research Data Access and Preservation Association (n.d.). In addition, DataCure (an electronic mailing list on Google Groups) was analyzed for job postings; note that the viewer must be a member before accessing the list but anyone is allowed to join. These data sources were chosen because they are known nationally, attract job postings from a diverse pool of academic libraries, and provide access to job postings during the chosen time frame.

In some cases, the job announcement did not contain the complete job posting. In these cases, links to external websites (usually the university jobs portal), the Internet Archive WayBack Machine (n.d.), Google searches, and personal communications were used to locate the complete job posting. Seven job postings were excluded from this study because the full posting could not be located.

Job postings were first evaluated based on the job title. If a job title referenced data or RDS, the job posting was downloaded for further analysis. Postings were then reviewed to determine if they met the following four inclusion criteria:

1. Full-time, permanent positions
2. Located in an academic library
3. Located within the US
4. Primarily focused on providing RDS, which was defined as 50% or more of job responsibilities devoted to these services. The following description of RDS from Cox and Pinfield (2014) was used to determine if the job position fulfilled this criterion and positions that focused on library or administrative data were excluded:

[RDS] consists of a number of different activities and processes associated with the data lifecycle, involving the design and creation of data, storage, security, preservation, retrieval, sharing, and reuse, all taking into account technical capabilities, ethical considerations, legal issues and governance frameworks. (Cox & Pinfield, 2014, p. 300)

Once it was concluded that a job met the four inclusion criteria, metadata about the job posting was recorded, including the university name, job title, and posting date (see Appendix A for metadata on the job postings). In total, 236 full data professional job postings were gathered. However, this corpus contained duplicates. Job postings from the same university posted within 12 months of each other were targeted as possible duplicates. Several factors were scrutinized to determine if the postings were duplicates of the same position, including posting date, job title, responsibilities, and qualifications. If the postings had 25% or more difference in their responsibilities or qualifications, they were not considered duplicates and each posting was kept in the corpus. Potential duplicate postings were reviewed individually to determine if the posting should be included or excluded. Determinations were then discussed and agreement was reached on the inclusion or exclusion for each posting. If postings were duplicated, the posting with the most recent posting date was kept. In total, 59 postings were removed as duplicates, leaving 177 job postings corresponding to 180 job positions (3 job postings were for 2 positions).

To determine patterns in the qualifications and responsibilities for data professionals, a confirmatory approach was taken using a deductive thematic analysis methodology. A
A codebook of variables and attributes for each variable was determined prior to analyzing the job positions. The codebook was based on Hall-Ellis’ (2005; 2006) thematic analyses of cataloguing librarian job postings. Appendix B shows the complete codebook of 43 variables and corresponding attributes. Each variable in the codebook was operationally defined in order to avoid ambiguity. Descriptions of when each variable should be used and should not be used were included. Variables were grouped into three categories: 1) education, experience, and salary; 2) research data activities; and 3) other responsibilities and skills. For each of the 43 variables, the attribute of location in the job posting was coded (see Table 1 for list of attributes). If the variable was mentioned in multiple locations in the job positions, only one location was recorded, based on the following hierarchy: required qualifications > preferred qualifications > responsibilities > description. For example, if the variable “data management plan” appeared in the responsibilities and preferred qualifications sections, it was coded as preferred qualifications. For the variables in the research data activities category and most variables in the other responsibilities or skills category, an interval scale correlating to the stated degree of complexity sought was also coded (Table 1). The codebook was reviewed by two academic data professionals (who were not affiliated with the project) and their feedback was incorporated to ensure that the variables were an accurate and thorough representation of the responsibilities and qualifications sought for data professionals.

All job postings were coded independently to ensure consistency and reliability. Initially, a small corpus of 15 job postings was coded and the codebook was refined to define variables more clearly, add additional variables, eliminate unneeded variables, and revise attributes. After these revisions, the entire corpus of 177 job postings was coded. Coding discrepancies were resolved through discussion. Coding reflected a high level of intercoder agreement; percent agreement was 94%, which is higher than the threshold of 80% for good agreement (Guest et al., 2012).

| Variable = | Data Storage |
|---|---|
| **Attributes** | |
| Location in the job posting | Required qualifications (minimum requirements; basic requirements) | Preferred qualifications (Desired qualifications) | Responsibilities (Duties) | Description | Not applicable |
| Degree of complexity sought | Experience (ability; demonstrated ability; aptitude) | Knowledge (understanding; competent; competence) | Familiarity | Implied | Not applicable |

*Synonyms for each attribute are shown in parenthesis. The full codebook is in Appendix B.*
Table 2
The Carnegie Classification of Institutions of Higher Education for the Job Positions \( (n = 180) \) (Shown in Descending Order of Institutional Size)

| Carnegie Classification | \( n \) |
|-------------------------|--------|
| Doctoral Universities: Very High Research Activity | 146 |
| Doctoral Universities: High Research Activity | 19 |
| Doctoral/Professional Schools | 1 |
| Master’s Colleges & Universities: Larger Programs | 2 |
| Baccalaureate Colleges: Arts & Sciences Focus | 8 |
| Special Focus Four-Year: Medical Schools & Centers | 3 |
| Special Focus Four-Year: Other Health Professions Schools | 1 |

**Results**

**Metadata about the Job Positions**

The entire corpus contained 177 job postings, corresponding to 180 job positions. All of the following analyses were based on the number of job positions. The number of job positions posted each year over the 2013-2017 time frame remained relatively consistent, ranging from 25 to 38 positions. The positions were geographically dispersed across the US, spread out across 37 states and Washington D.C.

Most positions were located at doctoral-granting universities with very high research activity \( (n = 146, 81\%) \), based on The Carnegie Classification of Institutions of Higher Education (Indiana University, 2017). The breakdown of job positions by the Carnegie Classification of the institutions is shown in Table 2.

From the 180 positions, there were 119 unique job titles (job titles were analyzed based on exactly how they appeared in the job posting). The four job titles occurring most frequently were:

- Data Services Librarian \( (n = 23, 13\%) \)
- Data Curation Librarian \( (n = 7, 4\%) \)
- Research Data Management Librarian \( (n = 6, 3\%) \)
- Data Librarian \( (n = 6, 3\%) \)

Further, over one-third \( (n = 63, 35\%) \) of the job titles did not include the word “librarian”, instead using terms such as specialist, consultant, informationist, curator, coordinator, and analyst.

**Education and Experience**

Of the 180 positions, almost 90% \( (n = 159) \) listed an MLIS degree as a qualification (Figure 1).

However, over 70% of positions \( (n = 132, 73\%) \) accepted an equivalent degree in lieu of an MLIS degree and all mentions of an equivalent degree were located in the required qualifications. One position listed this qualification as “MLIS degree or equivalent advanced degree in the social sciences.” Figures 2 and 3 show the level and disciplines mentioned for these equivalent degrees (note that a position could list multiple levels or disciplines). The most frequent equivalent degree level sought was an advanced
Figure 1
The location of an MLIS as a qualification for the job position ($n = 180$).

Figure 2
The levels of equivalent degrees mentioned. Synonyms for advanced were graduate and professional; a synonym for doctorate was terminal. Note that a position could list multiple degree levels.
Figure 3
The disciplines of equivalent degrees mentioned. Synonyms for relevant were related, appropriate, and comparable. Note that a position could list multiple degree disciplines.

degree \((n = 73)\) and the most frequent discipline of the equivalent degree was relevant \((n = 47)\). While the term “relevant” is ambiguous, it does reflect the terms used in the job postings.

In addition to an MLIS or equivalent degree, 60\% of job positions \((n = 108)\) wanted the candidate to have an additional degree (either undergraduate or graduate). For example, a preferred qualification for one job position was an “additional relevant graduate degree.” The majority \((78\%, n = 84)\) of these additional degrees were listed as a preferred qualification. As for the level of the degree, the majority wanted an advanced degree \((n = 65; \text{Figure 4})\).

When an additional degree was mentioned, discipline(s) of that degree were sometimes also mentioned. Of the 108 positions that listed an additional degree as a qualification, the science, technology, engineering and math (STEM; \(n = 59\)) and social sciences \((n = 47)\) disciplines were mentioned most frequently (a position could list multiple disciplines and the complete disciplinary list is shown in Table 3).

| Discipline | \(n\) |
|------------|------|
| STEM       | 59   |
| Social Sciences | 47 |
| Data Science, Data Intensive Field, and others. | 27 |
| Business   | 7    |
| Relevant   | 7    |
| Health Sciences | 5  |
| Arts & Humanities | 4  |

\(^b\) Note that a position could list multiple disciplines. Synonyms for relevant were related, appropriate, and comparable.
Of the 117 positions with the word “librarian” in the title, 62% \((n = 73)\) accepted an MLIS degree or equivalent degree, while 36% \((n = 42)\) only accepted an MLIS degree (Figure 5). Conversely, of the 63 postings that did not use the word “librarian” in the job title, 65% \((n = 41)\) accepted an MLIS or equivalent degree and 2% \((n = 1)\) only accepted an MLIS degree.

In addition to educational qualifications, many positions were seeking professional experience. Almost half \((n = 87, 48\%)\) wanted a candidate who had previous academic library experience, with those mentions split between required \((n = 39)\) and preferred qualifications \((n = 48)\). Figure 6 shows the length of academic library experience listed in the job positions, with almost half \((n = 43)\) not specifying a length of time. In terms of previous experience with research data, 60% \((n = 108)\) of positions wanted a candidate with this type of experience, most frequently naming it a required qualification \((n = 85)\). Only a few positions \((n = 21)\) listed a length of time for this experience, with 3 to 5 years \((n = 11)\) being the most frequent length of time. For example, one position listed a required qualification as “minimum of three years professional experience working with large research datasets and/or familiarity with major data resources.”

In addition to professional experience, about one-fifth of the job positions \((n = 35, 19\%)\) were looking for additional academic experience. Almost two-thirds of mentions were for lab or research experience \((n = 23)\), while the remaining one-third of the mentions were for significant coursework or academic background in a discipline \((n = 12)\; \text{note that a position could list multiple types of academic experiences). All mentions of additional academic experience were in the required or preferred qualifications. While these terms for academic experiences are nebulous, they mirror the terms used in job postings. Examples of these qualifications are
Figure 5
Degree requirements for positions with the word “librarian” in the job title \((n = 117)\) and without the word “librarian” in the job title \((n = 63)\).

Figure 6
The length of experience in an academic library listed as a qualification \((n = 180)\).
“research laboratory experience” as a preferred qualification and “coursework or experience leading to knowledge of the principles and practices of data curation and long-term digital preservation” as a required qualification.

**Salary**

Almost half \( (n = 77, 43\%) \) of the positions did not mention salary. When salary was mentioned, about a third \( (n = 57, 32\%) \) only used descriptive words such as commensurate or competitive (Figure 7). A quarter \( (n = 47, 25\%) \) gave a quantitative salary value, with or without descriptive words. The range of salaries listed was from $40,000 to $157,000, with a median salary of $57,000, and over half \( (n = 25) \) clustered between $54,000 - 68,000 (Figure 8).

**Research Data Activities**

Of the 180 job positions, the most common research data activities mentioned were general data management \( (n = 154, 86\%) \), data repository \( (n = 122, 68\%) \), data curation \( (n = 101, 56\%) \), data discovery \( (n = 97, 54\%) \) and data documentation \( (n = 96, 53\%) \); Figures 9 and 10 and Appendix C). General data management was most commonly mentioned in the preferred qualifications \( (n = 73) \) and the degree of complexity sought most frequently was “experience” \( (n = 58, 37\%) \). The variable “general data management” is vague, but it reflects the actual terminology used in job postings. For example, one job position listed “assists faculty and graduate students with data management” as a responsibility; this is also an example of “implied” as the degree of complexity for this variable. In contrast, the more specific variable “data management plans” was mentioned in over 40% of positions \( (n = 76, 42\%) \), most commonly mentioned in the required qualifications section \( (n = 24) \).

“Data repository” was mentioned in more than two-thirds of positions \( (n = 122, 67\%) \). This was the variable with the highest number of occurrences in the required qualifications \( (n = 52) \); but it was also mentioned frequently in the responsibilities \( (n = 33) \) and preferred qualifications \( (n = 31) \). As for the degree of complexity sought, “experience” \( (n = 34) \) and “knowledge” \( (n = 32) \) were most common.

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![Figure 7](image_url)

How salary was described in the job positions \( (n = 180) \).
Different types of data analysis (general, statistical, spatial, or qualitative) were often mentioned in the job positions. In total, at least 1 type of data analysis was listed in over 60% of positions \((n = 111)\; \text{note that multiple types of data analysis could be listed in a position).}

“General data analysis”, the variable used when a specific type of data analysis was not mentioned, was mentioned in over 40% of the positions \((n = 78, 43\%)\). Over half of these mentions occurred in the required qualifications section \((n = 42, 53\%)\). Additionally, half of these mentions were seeking “experience” for the degree of complexity \((n = 39)\). For example, one job position stated, as a required qualification, “knowledge of quantitative data analysis applications.” Statistical \((n = 76, 42\%)\), spatial \((n = 46, 26\%)\), and qualitative \((n = 36, 20\%)\) data analysis were also mentioned in the job positions. Statistical analysis \((n = 45, 59\%)\) was most frequently listed as a required qualification, while spatial \((n = 24, 52\%)\) and qualitative data analysis \((n = 18, 50\%)\) were most frequently listed as preferred qualifications. As for the degree of complexity sought, all 3 types of analysis were most frequently seeking “experience” (statistical analysis: \(n = 45\); spatial analysis: \(n = 24\); qualitative analysis: \(n = 21\)).

**Other Responsibilities and Skills**

About one-third \((n = 60\) of the job positions had faculty status; two-thirds of those with faculty status \((n = 40\) were also tenure-track. The requirement to research and publish was mentioned in about one-third of the positions \((n = 55, 31\%)\), most commonly listed in the responsibilities section \((n = 28)\). Having a public or customer service perspective was mentioned in 38% of the postings \((n = 69\), most frequently mentioned as a required qualification \((n = 46, 67\%)\).

Instruction was mentioned in over three-fourths of positions \((n = 138, 76\%)\). Although mentioned in all 4 main locations within a job posting, mentions of instruction were most frequently mentioned in the required qualifications \((n = 49\) and responsibilities \((n = 46)\). This variable listed “experience” as the most common degree of complexity sought \((n = 81, 59\%)\).
Figure 9
Summary of the degree of complexity sought. Raw values are shown in Appendix C.

Figure 10
Summary of B) location in the job posting for 17 research data activities ($n = 180$).
Raw values are shown in Appendix C.
Consultation was mentioned in over two-thirds of the positions ($n = 121, 67\%$), most frequently in the responsibilities section ($n = 93$). Additionally, 85% of these mentions listed “implied” as the degree of complexity sought ($n = 103$), meaning that a specific degree of complexity was not mentioned. For example, one job position stated in the description that the incumbent will “provide training and consulting services.”

More than 40% of the positions were focused on meeting research data needs within specific disciplines ($n = 75, 42\%$). This variable was most commonly listed in the responsibilities section ($n = 42, 23\%$). Of those focused on specific disciplines, the most common discipline was the social sciences ($n = 32$; Table 4 shows the complete disciplinary breakdown).

Table 4
Disciplines of Job Positions that focused on the Research Data Needs of Specific Disciplines
d

| Discipline            | $n$ |
|----------------------|-----|
| Social Sciences      | 32  |
| STEM                 | 22  |
| Health Sciences      | 20  |
| Business             | 7   |
| Arts & Humanities    | 4   |

d If specific departments were listed, they were grouped into their broader discipline (multiple disciplines could be listed for a position).

Additionally, 28% ($n = 51$) of the job positions were the liaison to 1 or more departments or units on campus; this variable was most commonly listed in the responsibilities section ($n = 40, 22\%$). Of those with liaison responsibilities, three-fourths ($n = 37, 73\%$) listed specific departments or disciplines (Table 5) and the remaining positions had a department(s) assigned upon hiring. Of the 51 positions listing liaison responsibilities, over 85% ($n = 44$) also had instruction duties, as opposed to 72% of positions ($n = 93$) without liaison duties.

Table 5
Disciplines for Job Positions that included Liaison Responsibilities to One or More Department or Unit
d

| Discipline            | $n$ |
|----------------------|-----|
| STEM                 | 14  |
| Social Sciences      | 13  |
| Business             | 8   |
| Health Sciences      | 4   |
| Administrative Units | 3   |
| Data Science         | 2   |
| Arts & Humanities    | 1   |

d If specific departments were listed, they were grouped into their broader discipline (multiple disciplines could be listed for a position).

The variable of DEI&A related to the position, not the university or library, was mentioned in less than half of the positions ($n = 75, 42\%$). These statements were most often included in the required qualifications section ($n = 51$), followed by the preferred qualifications section ($n = 15$). As these statements most often referred to a candidate’s commitment to or understanding of the importance of DEI&A, the degree of complexity was not coded. For example, one required qualification was a “commitment to supporting and working in a multicultural and diverse environment.” Figure 11 shows that this variable was included in more job positions over time.
Figure 11
Number of occurrences of DEI&A statements relating to the position over time. Positions from 2018 were not included because they were only gathered for half of that year.

Discussion

What are the Required and Preferred Qualifications and Responsibilities for Data Professional Positions?

Overall, the education, experiences, and skills mentioned throughout these data professional job positions show that this sub-discipline of academic librarianship is looking for a mixture of traditional (instruction, consultation, and others) and non-traditional areas (general data management, data repositories, and others) for LIS. While the skills and experiences of those within the academic library pipeline are still sought, this mixture indicates an eagerness to recruit candidates from outside of the traditional LIS pipeline; this is a positive sign towards diversifying academic librarianship. Therefore, data professional positions are ripe to accept a variety of academic backgrounds and professional experiences, which naturally attract diverse candidates and thereby increase other forms of diversity.

Education and Experience

In the degree qualifications, over 70% \((n = 132, 67\%)\) accepted an equivalent degree in lieu of the MLIS degree. However, most positions were still seeking candidates with a degree beyond a Bachelor’s \((n = 104)\). Interestingly, for these equivalent degrees, most commonly the term “relevant” \((n = 47)\) was used to describe the discipline or the discipline was not specified \((n = 41)\). If a specific discipline was mentioned, STEM was the most common \((n = 35)\). This indicates that libraries are seeking candidates with graduate degrees from all disciplines for their data professional positions, allowing for a diverse set of backgrounds and thus more diverse candidates. Many libraries were seeking candidates possessing an additional degree \((n = 108, 60\%)\), most frequently mentioned as a preferred qualification \((n = 84)\). Again, if a specific discipline was mentioned, STEM was most common \((n = 59)\). These degree qualifications are troubling from a DEI&A lens because many inequities in our society prevent
individuals from obtaining a graduate degree much less multiple graduate degrees (Soto & Yao, 2010). In 2018, only 10.2% of the US adult population had a Master’s degree and only 2.1% had a doctoral degree (Oh and Kim, 2020). Instead of listing these degrees by default, an analysis should be done to demonstrate how the degree(s) would help the candidate to fulfill the job responsibilities (Thielen & Neeser, 2019). Also, see if an institution offers any benefits (such as tuition reimbursement) that would allow a candidate to earn another degree while working, and if so include them in the job posting.

The term “data intensive field” was often used to describe the discipline of an equivalent (n = 30) or additional degree (n = 27). This term is often used in RDS. It is hypothesized that libraries are using this term to denote that they would like a candidate with research data experience but do not want to list specific disciplines. However, from a DEI&A lens, this term is subjective, perhaps leaving a candidate unsure if their degree meets this qualification. It is suggested to avoid this ambiguous term in job postings. Further, individuals from underrepresented groups are less likely to apply to positions if they do not meet all of the qualifications (Mohr, 2014), so including ambiguous jargon will make them less likely to apply.

Over a third of the data professional positions (n = 63) did not use the word “librarian” in the job title; this may impact the degree qualifications. Of the positions that include this word in the job title (n = 117), 36% (n = 42) only accept an MLIS degree. Conversely, of the positions without this word in the job title (n = 63), 2% (n = 1) only accept an MLIS degree. The difference in degree qualifications is an excellent example of how libraries are writing job positions that seek to diversify this sub-discipline.

Another indication that many libraries are looking to recruit outside of the LIS pipeline is that of the positions that wanted candidates to have previous academic library experience (n = 87), only 45% of these mentions (n = 39) occurred in the required qualifications section.

In addition to degrees, previous experiences mentioned in the job positions also indicate an emphasis on areas traditionally considered outside the scope of LIS. Experience working with research data was a common qualification (n = 108), most frequently listed as a required qualification. Finally, it is important to note that almost 20% of the positions (n = 35) mentioned additional academic experiences (lab or research experience, academic background, and others) as a required or preferred qualification. This could be a way for a candidate to demonstrate knowledge of a particular area without having an academic degree. Asking for these types of additional academic experiences, instead of an additional degree, is another excellent way to incorporate DEI&A principles into a job posting.

Research Data Activities

Overall, the research data activities that were most frequently mentioned in the data professional job positions show that this sub-discipline of academic librarianship values areas traditionally outside of LIS (such as general data management, data repositories, and various types of data analysis). General data management (n = 155) was the second most commonly mentioned variable in the job positions, second to the MLIS degree (n = 159).

Unsurprisingly, general data management was the most frequently mentioned research data activities variable (n = 155). Interestingly, although general data management was most commonly mentioned in the preferred qualifications (n = 73), “experience” (n = 58) was the most frequent degree of complexity for this variable. This suggests that libraries want a candidate with experience managing research data, but know that it may not be feasible to ask for this as a required qualification. Data repository is the variable with the highest number of occurrences in the required
qualifications section \((n = 51)\). This shows that there is much interest in hiring candidates with these skills and, therefore, offering these services on campus. Overall, at least 1 of the 4 types of data analysis were mentioned in over 60% of positions \((n = 111)\); note that a position could list multiple types. Assisting patrons with data analysis is not a traditional area of LIS, but this result indicates that libraries consider this an unmet need that they are trying to fulfill on their campuses.

Academic libraries are seeking to hire specialist data professionals as well as generalist data professionals; 42% of the positions \((n = 75)\) were seeking to hire a specialist data professional, while the other 58% \((n = 104)\) were seeking to hire a generalist. The occurrence of these specialist data professional positions is another indication that libraries are trying to recruit candidates from outside the traditional LIS pipeline.

**Other Responsibilities and Skills**

Many of the common variables in this section need further explanation or different terminology entirely in order to recruit candidates from outside of LIS. Public or customer service perspective was mentioned in almost 40% of the postings \((n = 69)\), with two-thirds of those mentions in the required qualifications section. Public or customer service is not necessarily a tenant of other fields like it is in LIS, so providing further context to this requirement would give candidates a better understanding of what this qualification entails and why it is valued in this context.

Liaison duties are another example of library jargon in these positions. Almost 30% of positions \((n = 51)\) had liaison duties. It is unlikely that someone outside of LIS would understand what the term “liaison” means. Instead of saying “liaison to the Political Science Department”, this could be rephrased as “Librarian for the Political Science Department.” Small changes like this could have a huge impact on whether candidates outside of LIS decide to apply for a position. Additionally, of those listing liaison duties, three-fourths \((n = 37)\) listed being a liaison to a specific department(s). While listing these departments adds specificity to the job position, it also may discourage applicants who do not have an academic background or experience with the subject area(s). Writing something like “departments will be assigned based on the candidate’s background and interests,” will help to recruit a more diverse candidate pool.

Instruction was mentioned in three-fourths of the positions \((n = 138, 76\%)\) and consultation was mentioned in two-thirds of the positions \((n = 121, 67\%)\). Both of these activities are common across job sectors within the LIS profession. The high number of mentions of these two variables shows that academic libraries, while embracing new ways of engaging with patrons, believe that these traditional means of engagement are still vital parts of the services they offer on campus.

It is encouraging to see that the mentions of DEI&A have increased during the time period studied (Figure 11). However, there is still room for improvement because, over the 5 years in this study, less than half of the positions \((n = 75, 42\%)\) included this variable. DEI&A related to the position was the focus, as opposed to generic statements about the university or library, because this was felt to be a demonstration of commitment to these principles rather than an Human Resources requirement. Having a required qualification for all job positions related to DEI&A could concretize academic libraries’ commitment to these principles and practices.

**What is the Median Salary and Salary Range of Data Professional Positions?**

This study cannot give a definitive answer to this research question because only 26% \((n = 47)\) of the job positions listed a quantitative salary value. Most frequently, salary was not mentioned \((n = 77, 43\%)\). An additional third of
the job positions \( n = 57 \) only used qualitative descriptors for salary such as “competitive” or “commensurate”. However, of the 47 positions listing a salary value or range, the median salary was $57,000.

Not mentioning salary or only providing qualitative salary descriptors is problematic from a DEI&A lens. This practice favors those already working in academic libraries as they will have inside access to and knowledge about common practices and resources, disadvantaging recent LIS graduates, and those outside of the traditional LIS pipeline. For example, those already working in academic libraries may have access to internal salary documents and databases or be able to ask their professional networks about salary information and practices. It also favors those working in the part of the country where the job is located, because they may have an idea of data professional salaries in their geographic area. For example, a competitive salary at a university in San Francisco, California will be very different from a competitive salary at a university in rural Michigan. Furthermore, these practices could hinder a candidate’s ability to effectively negotiate salary and individuals from underrepresented groups are less likely to negotiate salaries (Silva & Galbraith, 2018).

Listing a salary range indicates that candidates can negotiate; not doing so furthers inequity between those who already hold privilege from those who do not.

Additionally, the salary values listed for the job positions may not be an accurate reflection of the person hired for a position. A new employee’s salary could be higher or lower than the stated salary due to their qualifications and experiences. A follow-up study could survey recently hired data professionals, asking them for their salary upon hire.

**Study Limitations**

This study does have some limitations. First, the sources of the job postings were chosen because they were known to attract postings for data professionals in academic libraries. However, these sources were not exhaustive for data professional job postings in academic libraries from 2013-2018. Additionally, job positions were only included in this study when the full job posting was available. As noted above, seven job positions were excluded because the full job postings were not available. This study also only included job positions within the US; data professionals are a growing sector in academic libraries worldwide. A follow-up study could analyze job postings for data professionals outside of the US.

An inherent limitation of job posting analyses is that job postings tend to be very aspirational, meaning that a data professional’s actual responsibilities could vary greatly from those listed in the job posting. A follow-up study could carry out in-depth interviews with data professionals to compare how their actual responsibilities align with those in the job posting.

Finally, this study is undercounting the number of data professionals working in academic libraries, especially those working at Master’s or Baccalaureate institutions. Many could have RDS roles or responsibilities added to their job duties after hiring as data needs emerge on campus. Additionally, at many small and mid-sized institutions, a librarian may be responsible for providing RDS but this responsibility is not large enough to be reflected in their job title (which was the initial screening mechanism to determine if a position should be included in this study).

**Conclusion**

Studies such as this do not have an impact unless the results are put into action. The following recommendations will help the reader to use this data to take steps toward incorporating DEI&A principles and practices into job postings:
Write each and every sentence within a job posting using the lens of DEI&A principles and practices

List a quantitative salary value; it is a simple way to make the hiring process more transparent and less prone to inequitable practices. Listing a range indicates the possibility of negotiation, which is helpful for underrepresented groups

Carefully consider which degrees to include as required or preferred qualifications. For example, think critically about how an MLIS or an additional graduate degree would help the applicant perform the job responsibilities. Many positions in this study required an MLIS or asked for multiple degrees, which automatically limits the applicant pool. Due to inequalities built into our societal and educational systems, not everyone has access to attain a graduate degree. Consider undergraduate degrees or academic background as a way for an applicant to demonstrate expertise

Include DEI&A as a required qualification in the job posting to demonstrate that the institution is committed to hiring applicants who understand the value and importance of DEI&A

Write the job description that the candidate will perform; job postings should be realistic not aspirational. One way to accomplish this is to limit preferred qualifications

Finally, this data can be used to initiate conversations; showing quantitative evidence of how disparities are inadvertently woven into hiring practices and providing evidence based suggestions for improvement can be a valuable tool for data-driving decision-making. This set of recommendations is also transferable to other sub-disciplines of librarianship

Job postings are a small yet very important part of the hiring process. It is hoped that this article will inspire reviews of hiring processes as a whole. The data is openly available in the Dryad Repository https://datadryad.org/stash/dataset/doi:10.6078/D1K419; the authors strongly encourage other researchers to further analyze this data.

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Appendix A
Metadata about Data Professional Job Postings
(Note, this appendix only includes the 177 job postings analyzed in this study)

| University Name         | Carnegie Classification                                      | Position Title                                      | Posting Date   | Notes                  |
|-------------------------|-------------------------------------------------------------|-----------------------------------------------------|----------------|------------------------|
| American University     | Doctoral Universities: High Research Activity               | Research Data Librarian                             | 2013-01        |                        |
| Auburn University       | Doctoral Universities: Very High Research Activity          | Research Data Management Librarian                  | 2017-03        |                        |
| Boston College          | Doctoral Universities: Very High Research Activity          | Data and Visualization Librarian                    | 2016-12        |                        |
| Brown University        | Doctoral Universities: Very High Research Activity          | Scientific Data Management Specialist               | 2013-11        |                        |
| Brown University        | Doctoral Universities: Very High Research Activity          | Scientific Data Curator                             | 2013-03        |                        |
| Bryn Mawr College       | Baccalaureate Colleges: Arts & Sciences Focus               | Social Sciences and Data Librarian                  | 2018-02        |                        |
| California State        | Master’s Colleges & Universities: Larger Programs           | Business & Data Librarian                           | 2013-01        |                        |
| University Northridge   | Doctoral Universities: Very High Research Activity          | Data Services Librarian                              | 2014-05        |                        |
| Carnegie Mellon         | Doctoral Universities: Very High Research Activity          | Data Services Librarian                              | 2014-05        |                        |
| University             | Doctoral Universities: Very High Research Activity          | Research Data Specialist                            | 2018-01        |                        |
| Case Western Reserve    | Doctoral Universities: Very High Research Activity          | Research Data Specialist                            | 2018-01        |                        |
| University              | Baccalaureate Colleges: Arts & Sciences Focus               | Social Sciences Data Librarian                       | 2014-02        |                        |
| Colby College           | Doctoral Universities: Very High Research Activity          | Data Management Specialist                          | 2017-11        |                        |
| Colorado State University| Doctoral Universities: Very High Research Activity        | Data Management Specialist                          | 2016-01        |                        |
| University              | Doctoral Universities: Very High Research Activity          | Research Support & Data Services Librarian          | 2014-04        |                        |
| Columbia University     | Doctoral Universities: Very High Research Activity          | Research Support & Data Services Librarian          | 2014-10        |                        |
| Columbia University     | Doctoral Universities: Very High Research Activity          | Data Services Librarian                              | 2014-12        |                        |
| Columbia University     | Doctoral Universities: Very High Research Activity          | Data Services & Emerging Technologies Librarian     | 2014-05        |                        |
| Columbia University     | Doctoral Universities: Very High Research Activity          | Research Support & Data Services Librarian          | 2015-04        |                        |
| Institution                                | Degree Level                     | Position                                                       | Start Date | End Date |
|-------------------------------------------|----------------------------------|---------------------------------------------------------------|------------|----------|
| Cornell University                        | Doctoral Universities: Very High Research Activity | Social Science and Geospatial Data Librarian                    | 2017-09    |          |
| Cornell University                        | Doctoral Universities: Very High Research Activity | Research Data and Environmental Sciences Librarian               | 2014-02    |          |
| CUNY Graduate School and University Center| Doctoral Universities: Very High Research Activity | Data Librarian                                                  | 2014-12    |          |
| Dartmouth College                         | Doctoral Universities: Very High Research Activity | Data & Visualization Librarian                                 | 2015-12    |          |
| DePaul University                         | Doctoral Universities: High Research Activity | Data Services & Government Information Librarian                | 2016-06    |          |
| Drake University                          | Doctoral/Professional Schools    | Data and Business Librarian                                    | 2015-04    |          |
| Drexel University                         | Doctoral Universities: Very High Research Activity | Director, Data & Digital Stewardship                           | 2015-10    |          |
| Drexel University                         | Doctoral Universities: Very High Research Activity | Director, Informatics for Research Engagement                  | 2014-02    |          |
| Duke University                           | Doctoral Universities: Very High Research Activity | Senior Research Data Management Consultant                     | 2016-08    |          |
| East Carolina University                  | Doctoral Universities: High Research Activity | Data Services Librarian                                        | 2017-03    |          |
| Florida Institute of Technology           | Doctoral Universities: High Research Activity | Research Data Specialist                                       | 2014-11    |          |
| Florida Institute of Technology           | Doctoral Universities: High Research Activity | Data Librarian                                                  | 2018-05    |          |
| Florida State University                  | Doctoral Universities: Very High Research Activity | Data Research Librarian                                        | 2013-11    |          |
| Florida State University                  | Doctoral Universities: Very High Research Activity | Social Sciences Research & Data Librarian                      | 2016-10    |          |
| George Washington University              | Doctoral Universities: Very High Research Activity | Data Services Librarian                                        | 2017-10    |          |
| George Washington University              | Doctoral Universities: Very High Research Activity | Data Services Librarian                                        | 2014-07    |          |
| Georgia Southern University               | Doctoral Universities: High Research Activity | Discovery Services and Data Curation Librarian                 | 2014-12    |          |
| Georgia State University                  | Doctoral Universities: Very High Research Activity | Team Leader, Research Data Services                            | 2016-01    |          |
| Georgia State University                  | Doctoral Universities: Very High Research Activity | Quantitative Data Specialist for the Social Sciences           | 2017-08    |          |
| Institution                           | Type/Category                                      | Position/Responsibilities                                      | Start Date | End Date |
|--------------------------------------|----------------------------------------------------|-----------------------------------------------------------------|------------|----------|
| Georgia State University             | Doctoral Universities: Very High Research Activity | Business Data Services Librarian                                | 2014-06    |          |
| Harvard University                   | Doctoral Universities: Very High Research Activity | Librarian for the Social Sciences and Visualization            | 2014-10    |          |
| Harvard University                   | Doctoral Universities: Very High Research Activity | Research Data Management Librarian for the Sciences             | 2018-04    |          |
| Harvard University                   | Doctoral Universities: Very High Research Activity | Research Data & Collections Librarian                           | 2017-05    |          |
| Indiana University                   | Doctoral Universities: Very High Research Activity | Research Data Management Librarian                              | 2016-06    |          |
| Indiana University Bloomington      | Doctoral Universities: Very High Research Activity | Research Data Management Librarian                              | 2015-08    |          |
| Indiana University Bloomington      | Doctoral Universities: Very High Research Activity | Research Data Management Librarian and Head of Scholarly Communication Department | 2016-05    |          |
| Johns Hopkins University            | Doctoral Universities: Very High Research Activity | Data Management Services Manager                               | 2015-12    |          |
| Johns Hopkins University            | Doctoral Universities: Very High Research Activity | Data Informationist                                            | 2016-03    |          |
| Johns Hopkins University            | Doctoral Universities: Very High Research Activity | Data Services Manager                                          | 2017-01    |          |
| Johns Hopkins University            | Doctoral Universities: Very High Research Activity | Data Management Consultant                                    | 2015-04    |          |
| Johns Hopkins University            | Doctoral Universities: Very High Research Activity | Data Management Specialist                                     | 2016-02    |          |
| Kenyon College                      | Baccalaureate Colleges: Arts & Sciences Focus      | Social Sciences and Data Librarian                             | 2016-03    |          |
| Lehigh University                   | Doctoral Universities: High Research Activity      | Business/Data Librarian                                        | 2015-11    |          |
| Lewis & Clark College               | Baccalaureate Colleges: Arts & Sciences Focus      | Science & Data Services Librarian                              | 2014-10    |          |
| Louisiana State University          | Doctoral Universities: Very High Research Activity | Data Curation Librarian                                        | 2015-01    |          |
| Massachusetts Institute of Technology| Doctoral Universities: Very High Research Activity | Program Head, Data Management Services                        | 2016-11    |          |
| Michigan State University           | Doctoral Universities: Very High Research Activity | Data Librarian                                                  | 2016-04    |          |
| Middlebury College                  | Baccalaureate Colleges: Arts & Sciences Focus      | Data Services Librarian                                        | 2015-05    |          |
| Montana State University            | Doctoral Universities: High Research Activity      | Data Management Librarian                                      | 2013-08    |          |
| New York University                 | Doctoral Universities: Very High Research Activity | Knowledge Management Librarian                                 | 2014-10    |          |
| University                      | Type of Institution                                      | Position Description                                                                 | Years          |
|--------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------|----------------|
| New York University            | Doctoral Universities: Very High Research Activity       | Data Services Librarian                                                               | 2015-03        |
| New York University            | Doctoral Universities: Very High Research Activity       | Research Data Management Librarian                                                    | 2014-11        |
| North Carolina State University| Doctoral Universities: Very High Research Activity       | Research Data & Infrastructure Librarian                                              | 2018-03        |
| North Carolina State University| Doctoral Universities: Very High Research Activity       | Research Librarian for Engineering and Biotechnology                                  | 2015-09        |
| Northwestern University        | Doctoral Universities: Very High Research Activity       | Data Scientist                                                                        | 2017-03        |
| Oakland University              | Doctoral Universities: High Research Activity            | Research Data Librarian                                                               | 2015-11        |
| Occidental College             | Baccalaureate Colleges: Arts & Sciences Focus            | Data and Information Specialist for the Social Sciences                                | 2017-08        |
| Ohio State University          | Doctoral Universities: Very High Research Activity       | Data Management Services Librarian                                                    | 2013-05        |
| Oregon Health & Science        | Special Focus Four-Year: Medical Schools & Centers       | Basic Science Liaison/Research Data Management Librarian                              | 2015-12        |
| Oregon State University        | Doctoral Universities: Very High Research Activity       | Data Management Specialist                                                           | 2015-12        |
| Pennsylvania State University  | Doctoral Universities: Very High Research Activity       | Science Data Librarian                                                               | 2014-11        |
| Princeton University           | Doctoral Universities: Very High Research Activity       | Data Services Specialist                                                             | 2013-06        |
| Princeton University           | Doctoral Universities: Very High Research Activity       | Interdisciplinary Quantitative Research Librarian                                    | 2015-08        |
| Purdue University              | Doctoral Universities: Very High Research Activity       | Data Repository Outreach Specialist                                                  | 2015-08        |
| Purdue University              | Doctoral Universities: Very High Research Activity       | Research Data Specialist                                                             | 2015-02        |
| Purdue University              | Doctoral Universities: Very High Research Activity       | Digital Data Repository Specialist                                                   | 2014-12        |
| Reed College                   | Baccalaureate Colleges: Arts & Sciences Focus            | Data Services Librarian                                                               | 2015-07        |
| Rice University                | Doctoral Universities: Very High Research Activity       | Data and Government Information Librarian                                            | 2017-11        |
| Rice University                | Doctoral Universities: Very High Research Activity       | Head, Kelley Center for Government Information, Data & Geospatial Services           | 2014-06        |
| Rutgers University             | Doctoral Universities: High Research Activity            | Data Services Librarian                                                               | 2013-06        |
| San Diego State University     | Doctoral Universities: High Research Activity            | Social Science & Data Librarian                                                      | 2018-01        |
| San Jose State University      | Master’s Colleges & Universities: Larger Programs        | Data Services Librarian                                                               | 2017-05        |
| Institution                                | Field                                      | Position                                                   | Years       |
|-------------------------------------------|-------------------------------------------|------------------------------------------------------------|-------------|
| Southern California University of Health Sciences | Special Focus Four-Year: Other Health Professions Schools | Knowledge Management & Data Specialist                      | 2015-09     |
| Stanford University                      | Doctoral Universities: Very High Research Activity | Data Services and Visualization Librarian                   | 2017-05     |
| Stanford University                      | Doctoral Universities: Very High Research Activity | Engineering Librarian for Data and Collections              | 2018-06     |
| Temple University                        | Doctoral Universities: Very High Research Activity | Research and Data Services Librarian                        | 2018-05     |
| Texas A&M University                     | Doctoral Universities: Very High Research Activity | Data Librarian                                             | 2016-09     |
| Tufts University                         | Doctoral Universities: Very High Research Activity | Librarian for Research Data                               | 2016-09     |
| Tufts University                         | Doctoral Universities: Very High Research Activity | Social Science Data Librarian                              | 2017-05     |
| University of Arizona                    | Doctoral Universities: Very High Research Activity | Research Data Management Librarian                        | 2017-03     |
| University of Arkansas at Little Rock    | Doctoral Universities: High Research Activity   | Data Services Librarian                                     | 2018-06     |
| University of California - Irvine        | Doctoral Universities: Very High Research Activity | E-Research and Digital Scholarship Services Librarian      | 2014-10     |
| University of California - Los Angeles   | Doctoral Universities: Very High Research Activity | Sciences Data Informationist                               | 2016-11     |
| University of California - Los Angeles   | Doctoral Universities: Very High Research Activity | Grand Challenges Data Administrator                      | 2016-09     |
| University of California - Los Angeles   | Doctoral Universities: Very High Research Activity | Director of UCLA Libraries Social Science Data Archive      | 2016-06     |
| University of California - San Diego     | Doctoral Universities: Very High Research Activity | Data Services and Collections Librarian                    | 2014-03     |
| University of California - San Diego     | Doctoral Universities: Very High Research Activity | Director, Research Data Curation Services                  | 2013-01     |
| University of California - San Diego     | Doctoral Universities: Very High Research Activity | Metadata Specialist                                        | 2018-06     |
| University of California - San Diego     | Doctoral Universities: Very High Research Activity | Data Science Librarian                                     | 2017-09     |
| University of California - San Diego | Doctoral Universities: Very High Research Activity | Director, Research Data Curation Services | 2013-01 |
| University of California - San Diego | Doctoral Universities: Very High Research Activity | Research Data Metadata Librarian | 2017-11 |
| University of California - San Diego | Doctoral Universities: Very High Research Activity | Research Data Curation Program Technical Analyst | 2013-07 |
| University of California Berkeley | Doctoral Universities: Very High Research Activity | Science Data & Engineering Librarian | 2015-07 |
| University of California Berkeley | Doctoral Universities: Very High Research Activity | Business & Data Librarian | 2015-08 |
| University of California Berkeley | Doctoral Universities: Very High Research Activity | Research Data Management Service Design Analyst | 2015-01 |
| University of California Berkeley | Doctoral Universities: Very High Research Activity | Data Services Librarian | 2017-01 |
| University of California Davis | Doctoral Universities: Very High Research Activity | Associate Director, Data Management Program | 2015-08 |
| University of California Davis | Doctoral Universities: Very High Research Activity | Data Management Analyst | 2017-03 |
| University of California San Francisco | Special Focus Four-Year: Medical Schools & Centers | Data Services and Assessment Librarian | 2016-12 |
| University of California Santa Barbara | Doctoral Universities: Very High Research Activity | Humanities Data Curator | 2015-09 |
| University of California Santa Barbara | Doctoral Universities: Very High Research Activity | Geospatial Data Curator | 2013-08 |
| University of California Santa Barbara | Doctoral Universities: Very High Research Activity | Data Services and Digital Scholarship Librarian | 2018-05 |
| University of Chicago | Doctoral Universities: Very High Research Activity | Biomedical Data Librarian | 2017-12 |
| University of Chicago | Doctoral Universities: Very High Research Activity | Social Science Data and Sociology Librarian | 2017-04 |
| University of Chicago | Doctoral Universities: Very High Research Activity | Data Research Services and Biomedical Librarian | 2017-04 |
| University of Colorado Boulder | Doctoral Universities: Very High Research Activity | Data Services Librarian | 2017-07 |
| University                                      | Doctoral Universities: Very High Research Activity | Position                                      | Years       |
|------------------------------------------------|---------------------------------------------------|-----------------------------------------------|-------------|
| University of Florida                          | Data Management Librarian                          |                                               | 2015-04     |
| University of Houston                          | Social Science Data Librarian                      |                                               | 2014-03     |
| University of Houston                          | Data Services Librarian                            |                                               | 2016-11     |
| University of Houston                          | Research Data Management Librarian                 |                                               | 2018-05     |
| University of Illinois Urbana-Champaign         | Director, Research Data Service and Open-Rank Professor |                                               | 2013-10     |
| University of Illinois Urbana-Champaign         | Data Curation Specialist                          |                                               | 2014-11     |
| University of Iowa                              | Data Services Manager                              |                                               | 2017-02     |
| University of Kansas                            | Data Services Librarian                            |                                               | 2013-06     |
| University of Maryland                          | Data Services Librarian                            |                                               | 2017-01     |
| University of Maryland                          | Data Services Librarian                            |                                               | 2018-07     |
| University of Massachusetts Amherst             | Data Services Librarian                            |                                               | 2017-05     |
| University of Miami                             | Data Services Librarian                            |                                               | 2016-09     |
| University of Michigan                          | Data Workflows Specialist                          |                                               | 2017-01     |
| University of Michigan                          | Research Data Curation Librarian                   |                                               | 2014-11     |
| University of Michigan                          | Research Data Services Manager                     |                                               | 2013-12     |
| University of Michigan                          | Data Curation Librarian                            |                                               | 2017-07     |
| University of Michigan                          | Health Sciences Data Services Informationist       |                                               | 2015-11     |
| University of Minnesota                         | Biosciences Liaison Librarian and Scientific Data Curator |                                               | 2017-06     |
| University of Minnesota                         | Informatics/Data Services Specialist               |                                               | 2013-06     |
| University of Minnesota                         | Public Health Liaison and Data Curation Specialist |                                               | 2015-10     |
| University of Nebraska - Lincoln                | Data Curation Librarian                            |                                               | 2016-08     |
| University of Nebraska - Lincoln | Doctoral Universities: Very High Research Activity | Data Curation Librarian | 2013-12 |
|--------------------------------|--------------------------------------------------|------------------------|---------|
| University of Nevada Las Vegas | Doctoral Universities: High Research Activity    | Social Sciences Data Librarian | 2014-08 |
| University of New Hampshire    | Doctoral Universities: Very High Research Activity | Business and Data Reference Librarian | 2015-03 |
| University of New Hampshire    | Doctoral Universities: Very High Research Activity | Research Data Services Librarian | 2018-01 |
| University of New Mexico       | Doctoral Universities: Very High Research Activity | Director of Research Data Services | 2013-12 |
| University of New Mexico       | Doctoral Universities: Very High Research Activity | Data Curation Librarian | 2017-07 |
| University of North Carolina at Chapel Hill | Doctoral Universities: Very High Research Activity | Repository Librarian | 2015-04 |
| University of North Carolina at Greensboro | Doctoral Universities: High Research Activity | Research and Data Support Coordinator | 2013-10 |
| University of North Carolina Wilmington | Doctoral Universities: High Research Activity | Digital Program and Data Management Librarian | 2013-03 |
| University of Notre Dame       | Doctoral Universities: Very High Research Activity | Digital Library Data Curation Developer | 2015-07 |
| University of Pennsylvania    | Doctoral Universities: Very High Research Activity | Business & Data Analysis Librarian | 2018-04 |
| University of Pennsylvania    | Doctoral Universities: Very High Research Activity | Scholarly Communications & Data Curation Librarian | 2016-03 |
| University of Pittsburgh       | Doctoral Universities: Very High Research Activity | Data Services Librarian | 2017-07 |
| University of Pittsburgh       | Doctoral Universities: Very High Research Activity | Data Curation Librarian | 2018-06 |
| University of Rhode Island     | Doctoral Universities: High Research Activity     | Data Services Librarian | 2016-05 |
| University of Rochester        | Doctoral Universities: Very High Research Activity | Science & Engineering Outreach Librarian (Data) | 2018-01 |
| University of Tennessee        | Doctoral Universities: Very High Research Activity | Data Curation Librarian | 2013-03 |
| University of Texas at Arlington | Doctoral Universities: Very High Research Activity | Data & eScience Librarian | 2014-12 |
| University of Texas at Arlington | Doctoral Universities: Very High Research Activity | Social Sciences Data Librarian | 2014-11 |
|---------------------------------|---------------------------------------------------|--------------------------------|---------|
| University of Texas at Austin   | Doctoral Universities: Very High Research Activity | Data Management Coordinator   | 2015-09 |
| University of Vermont           | Doctoral Universities: High Research Activity      | Science and Data Librarian     | 2017-02 |
| University of Virginia          | Doctoral Universities: Very High Research Activity | Senior Research Data Scientist | 2014-05 |
| University of Virginia          | Doctoral Universities: Very High Research Activity | Data and Geographical Information Librarian | 2013-01 |
| University of Virginia          | Doctoral Universities: Very High Research Activity | Research Data Specialist      | 2017-02 |
| University of Virginia          | Doctoral Universities: Very High Research Activity | Clinical Data Research Specialist | 2017-02 |
| University of Washington        | Doctoral Universities: Very High Research Activity | Data Management Librarian      | 2015-05 |
| University of Wisconsin Madison | Doctoral Universities: Very High Research Activity | Science & Engineering Data & Information Specialist | 2018-04 | This posting was for two positions |
| University of Wisconsin Madison | Doctoral Universities: Very High Research Activity | Digital Curation Coordinator   | 2017-06 |
| University of Wisconsin Milwaukee | Doctoral Universities: Very High Research Activity | Data Services Librarian        | 2013-07 |
| Upstate Medical University      | Special Focus Four-Year: Medical Schools & Centers | Data Services Librarian        | 2018-05 |
| Vanderbilt University           | Doctoral Universities: Very High Research Activity | Business and Data Analysis Librarian | 2016-12 |
| Vassar College                  | Baccaulareate Colleges: Arts & Sciences Focus      | Social Sciences and Data Librarian | 2016-03 |
| Villanova University            | Doctoral Universities: High Research Activity      | Social Sciences and Data Services Librarian | 2015-12 |
| Virginia Commonwealth University | Doctoral Universities: Very High Research Activity | Research Data Librarian       | 2017-05 |
| Virginia Polytechnic Institute and State University | Doctoral Universities: Very High Research Activity | Data and Informatics Consultant | 2013-12 |
| Virginia Polytechnic Institute and State University | Doctoral Universities: Very High Research Activity | Social Science Data Consultant & Data Educator Coordinator | 2017-04 |
| Institution                                      | Type of University                                      | Position                                      | Years  |
|-------------------------------------------------|---------------------------------------------------------|-----------------------------------------------|--------|
| Virginia Polytechnic Institute and State University | Doctoral Universities: Very High Research Activity     | Research Data Consultant                      | 2014-05|
| Washington University in St. Louis               | Doctoral Universities: Very High Research Activity     | Data Specialist                               | 2015-04|
| Western Michigan University                      | Doctoral Universities: High Research Activity           | Data Librarian                               | 2018-02|
| Yale University                                 | Doctoral Universities: Very High Research Activity     | Data Librarian                               | 2017-11|
| Yale University                                 | Doctoral Universities: Very High Research Activity     | Data Librarian for the Health Sciences        | 2018-03|
| Yale University                                 | Doctoral Universities: Very High Research Activity     | Research Data Support Specialist             | 2016-07|
| Yale University                                 | Doctoral Universities: Very High Research Activity     | Librarian for Finance, Accounting & Business Data | 2018-04|
## Appendix B

### Codebook

| Variable                          | Attributes                                      |
|----------------------------------|-------------------------------------------------|
| **Education, experience, and salary**                                      |
| MLIS degree                      | Not applicable                                  |
| Description                      | Respon.                                         |
| Preferred Qual.                  | Required Qual.                                  |
| Equivalent degree                | Not applicable                                  |
| Description                      | Respon.                                         |
| Preferred Qual.                  | Required Qual.                                  |
| Equivalent degree level*         | Not applicable                                  |
| Bachelor's                       | Master's                                        |
| Doctorate                        | Advanced                                        |
| Data Intensive/Data Science      | Business Relevant                               |
| Business Relevant                | Not specified                                   |
| Academic library experience      | No                                              |
| 1-2 years                        | 3-5 years                                       |
| 5+ years                         | Length not specified                            |
| [Location in job posting]        | Not applicable                                  |
| Description                      | Respon.                                         |
| Preferred Qual.                  | Required Qual.                                  |
| Research data experience         | No                                              |
| 1-2 years                        | 3-5 years                                       |
| 5+ years                         | Length not specified                            |
| [Location in job posting]        | Not applicable                                  |
| Description                      | Respon.                                         |
| Preferred Qual.                  | Required Qual.                                  |
| Supervisory experience           | No                                              |
| 1-2 years                        | 3-5 years                                       |
| 5+ years                         | Length not specified                            |
| [Location in job posting]        | Not applicable                                  |
| Description                      | Respon.                                         |
| Preferred Qual.                  | Required Qual.                                  |
| Additional experience or degree  | Not applicable                                  |
| Description                      | Respon.                                         |
| Preferred Qual.                  | Required Qual.                                  |
| Additional degree level*         | Not applicable                                  |
| Bachelor's                       | Master's                                        |
| Doctorate or PhD                 | Advanced                                        |
| Data Intensive, Data Science, and others.                                 |
| Business Relevant                | Not specified                                   |
| [Discipline of additional degree*] | Not applicable                                  |
| Arts & Humanities                | Social Sciences                                 |
| STEM                             | Data Intensive, Data Science, and others.       |
| Business Relevant                | Not specified                                   |
| Additional experience* | Not applicable | Significant coursework or academic background | Subject knowledge | Lab or research experience | Other, specify: [free text] |
|------------------------|---------------|-----------------------------------------------|-------------------|---------------------------|--------------------------|
| Carnegie Classification of Institution | Baccalaureate | Master’s | Doctoral | Special Focus |
| [For doctoral institutions, specify the research intensity level] | Not applicable | Very high | High | Doctoral/Professional |
| Salary information* | Not applicable | Commensurate | Competitive | Other, specify: [free text] |
| Salary range or minimum | Not applicable | [Exact salary values] |

**Research Data Activities**

**Management**

| General Data Management | Not applicable | Implied | Familiarity | Knowledge | Experienced |
|-------------------------|---------------|---------|-------------|-----------|------------|
| [Location in job posting] | Not applicable | Description | Respon. | Preferred Qual. | Required Qual. |

| Data Management Plans | Not applicable | Implied | Familiarity | Knowledge | Experienced |
|-----------------------|---------------|---------|-------------|-----------|------------|
| [Location in job posting] | Not applicable | Description | Respon. | Preferred Qual. | Required Qual. |

**Discovery and Re-Use**

| Data Discovery | Not applicable | Implied | Familiarity | Knowledge | Experienced |
|----------------|---------------|---------|-------------|-----------|------------|
| [Location in job posting] | Not applicable | Description | Respon. | Preferred Qual. | Required Qual. |

**Collection**

| Data Organization | Not applicable | Implied | Familiarity | Knowledge | Experienced |
|-------------------|---------------|---------|-------------|-----------|------------|
| Description   | Required Qual. | Preferred Qual. | Respon. | Familiarity | Knowledge | Experienced |
|---------------|----------------|------------------|---------|-------------|-----------|-------------|
| Data Documentation | Not applicable | Description | Respon. | implied | familiarity | knowledge | experienced |
| Data Storage | Not applicable | Description | Respon. | preferred Qual. | required Qual. |
| Data Security | Not applicable | Description | Respon. | preferred Qual. | required Qual. |
| Analysis Data Visualization | Not applicable | Description | Respon. | preferred Qual. | required Qual. |
| General Data Analysis | Not applicable | Description | Respon. | preferred Qual. | required Qual. |
| Statistical Data Analysis | Not applicable | Description | Respon. | preferred Qual. | required Qual. |
| Spatial Data Analysis | Not applicable | Description | Respon. | preferred Qual. | required Qual. |
|                          | Not applicable | Implied | Familiarity | Knowledge | Experienced |
|--------------------------|----------------|---------|-------------|-----------|-------------|
| Qualitative Data Analysis| Not applicable | Description | Respon. | Preferred Qual. | Required Qual. |
| Programming Languages    | Not applicable | Implied | Familiarity | Knowledge | Experienced |
| Data Sharing             | Not applicable | Description | Respon. | Preferred Qual. | Required Qual. |
| Data Repository          | Not applicable | Implied | Familiarity | Knowledge | Experienced |
| Data Curation            | Not applicable | Description | Respon. | Preferred Qual. | Required Qual. |
| Data Policy              | Not applicable | Implied | Familiarity | Knowledge | Experienced |
| Instruction              | Not applicable | Implied | Familiarity | Knowledge | Experienced |
| Other Responsibilities or Skills | Not applicable | Description | Respon. | Preferred Qual. | Required Qual. |
| Location in job posting | Not applicable | Description | Respon. | Preferred Qual. | Required Qual. |
|-------------------------|---------------|-------------|---------|----------------|----------------|
| Consultation            | Not applicable | Implied | Familiarity | Knowledge | Experienced |
| Public/customer service perspective | Not applicable | Description | Respon. | Preferred Qual. | Required Qual. |
| Faculty status          | No            | Yes        |         |               |                |
| Tenure requirement      | No            | Yes        |         |               |                |
| Research/Publishing requirement | Not applicable | Description | Respon. | Preferred Qual. | Required Qual. |
| Liaison to department   | Not applicable | Description | Respon. | Preferred Qual. | Required Qual. |
| [Whether depts. are listed] | Depts. as assigned | Specific depts. listed | Not applicable | | |
| [List all depts. specified] | Not applicable | [List specific depts.] | | | |
| Research data role focused on specific discipline(s) | Not applicable | Description | Respon. | Preferred Qual. | Required Qual. |
| [Whether disciplines are listed] | Disciplines as assigned | Specific discipline listed | Not applicable | | |
| [List all disciplines specified] | Not applicable | [List specific disciplines] | | | |
| Assessment              | Not applicable | Description | Respon. | Preferred Qual. | Required Qual. |
| Scholarly Communication | Not applicable | Description | Respon. | Preferred Qual. | Required Qual. |
| Outreach                | Not applicable | Description | Respon. | Preferred Qual. | Required Qual. |
| Collaboration with other campus units | Not applicable | Description | Respon. | Preferred Qual. | Required Qual. |
### Diversity, equity, inclusion and accessibility

| Diversity, equity, inclusion and accessibility | Not applicable | Description | Respon. | Preferred Qual. | Required Qual. |
|------------------------------------------------|----------------|-------------|---------|----------------|----------------|

**NOTES**
* = select all attributes that apply

**Synonyms for attributes**
- Doctorate = terminal
- Advanced = graduate, professional
- Knowledge = understanding, competent, competence
- Experience = ability, demonstrated ability, aptitude
- Relevant = related, appropriate, comparable
- Commensurate = dependent

**Hierarchy for location**
Required qual > Preferred qual > Responsibilities > Description

### Operational Definitions

| Variable | Definition                                                                 | When to Use                                                                 | When NOT to Use                                                         | How to Use                                                                                                           | Definition source |
|----------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|
| Experience, education and salary | Master's of Library or Information Science degree (often abbreviated MLIS, MLS, MSI, and others) | Any reference of a Master's degree in Library and Information Science | Graduate degree other than a MLIS (or equivalent); Undergraduate degree(s) | Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) | --               |
| MLIS degree | A degree (besides a MLIS) that provides a relevant educational background | If phase like “equivalent degree” is used to describe the educational background needed for the position | Additional graduate degree or undergraduate degree; MLIS degree | Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) | --               |
| Equivalent degree |                                                                 |                                                                          |                                                                        |                                                                                                                     |                  |

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| Equivalent degree level(s) | The level of an equivalent degree that provides a relevant educational background | If the level of the degree is specified in the phase “equivalent degree” | Additional graduate degree or undergraduate degree; MLIS degree | Code level of degree: Not applicable, Bachelor's, Master's, Doctorate, Advanced, Not specified | -- |
|---------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------|----------------------------------------------------------------|-----------------------------------------------------------------|------|
| Equivalent degree discipline(s) | The discipline of the degree (besides a MLIS) that provides a relevant educational background | If the discipline of the degree is specified in the phase “equivalent degree” | Additional graduate degree or undergraduate degree; MLIS degree | Code for all disciplines specified: Not applicable, Arts & Humanities, Social Sciences, STEM, Data Intensive/Data Science, Business, Relevant, Not specified | -- |
| Academic library experience | Experience working in an academic library | Any experience working in an academic library (including work as a student) | Experience working in any setting outside of an academic library | 1) Code the length of experience (# of years) or length not specified (if not stated, code “No”); 2) Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) | -- |
| Research data experience | Professional experience working with research data, either inside or outside of a library context | Work experience relating to any aspect of the research data lifecycle, either in an academic library or outside (i.e., experience as a researcher) | Professional experience working in any other area (either inside or outside of a library); supervisory experience | 1) Code the length of experience (# of years) or length not specified (if not stated, code “No”); 2) Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) | -- |
| Supervisory experience | Professional experience working as a supervisor or manager | Supervisory or managerial experience | Other types of experience | 1) Code the length of experience (\# of years) or length not specified (if not stated, code “No”); 2) Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) | -- |
|------------------------|----------------------------------------------------------|-------------------------------------|--------------------------|-------------------------------------------------------------------------------------------------|---|
| Additional degree      | Experience or degree (undergraduate or graduate) mentioned in addition to the MLIS or equivalent degree | Experience or degree (undergraduate or graduate) mentioned in addition to the MLIS or equivalent degree | MLIS degree; equivalent degree | Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) | -- |
| Additional degree level | Level of degree (undergraduate or graduate) in any discipline other than library and information science | Level of degree (undergraduate or graduate) in any discipline other than library and information science | MLIS degree; equivalent degree | 1) Code level of degree: Not applicable, Bachelor’s, Master’s, Doctorate or PhD, Advanced; 2) Code for all disciplines specified: Not applicable, Arts & Humanities, Social Sciences, STEM, Data Intensive/Data Science, Business, Relevant, Not specified | -- |
| Additional experience  | Additional types of academic or professional experience | Additional types of academic or professional experience | Any mentions of degrees | Code for all experiences specified: Not applicable, Significant coursework or academic background, Subject knowledge, Lab or research experience, other, specify: [free text] | -- |
| Carnegie Classification of Institution | Identify name of the posting institution and then look up the Carnegie Classification on this website: [http://carnegieclassifications.iu.edu/classification_descriptions/basic.php](http://carnegieclassifications.iu.edu/classification_descriptions/basic.php) | 1) Code this classification by looking up the institution's name on this website: [http://carnegieclassifications.iu.edu/classification_descriptions/basic.php](http://carnegieclassifications.iu.edu/classification_descriptions/basic.php); 2) Code the level of research activity for Doctoral-granting universities or Not applicable |
| Salary information | Description of salary information such as “competitive” or “commensurate” | Code the salary descriptors used: commensurate, competitive, other, specify: [free text] |
| Salary range or minimum | Exact numerical salary values given (minimum, maximum, range, and others) | Salary descriptors such as “competitive” or “commensurate”; descriptions of any benefits |
| Research Data Activities |  |  |
| Management |  |  |
| Data Management | Any reference to the term “data management” or the actions associated with data management | Data management plans or other data plans (data sharing plans, data security plans, and others) |

Adapted from RDA Term Definition Tool
| **Data Management Plans** | A formal statement describing how research data will be managed and documented throughout a research project and the terms regarding the subsequent deposit of the data with a data repository for long-term management and preservation | Any reference to data management plans, DMPs, data sharing plans or any other type of written data plan required for a grant application | Data management | 1) Code degree of complexity sought for this variable (Not applicable, implied, familiarity, knowledge, experienced); 2) Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) | CASRAI Dictionary: Research Data Domain |
| **Discovery and Re-Use** |  |  |  |  |
| **Data Discovery** | Process of query or search to find (research) data of interest | Any reference to locating, discovering or re-using existing datasets (including research data, reference data, government data, and others). Other terms could include data access and data identification | -- | 1) Code degree of complexity sought for this variable (Not applicable, implied, familiarity, knowledge, experienced); 2) Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) | RDA Term Definition Tool |
| **Collection** |  |  |  |  |
| **Data Organization** | Process of creating a logical system for storing data files and folders | Any reference to creating a data file organization system; Examples of organization technique: file naming conventions and file structures | -- | 1) Code degree of complexity sought for this variable (Not applicable, implied, familiarity, knowledge, experienced); 2) Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) | -- |
| **Data Documentation** | The metadata or information about a data product (e.g., data table, database) that enables one to understand and use the data. Such information may include the scientific context underlying the data as well as who collected the data, why the data were collected, and where, when, and how the data were collected; Metadata: data about data, data that defines and describes the characteristics of other data | Any reference to creating documentation (print or electronic format) about data or documenting data (including metadata and metadata standards); Reference to cleaning or cleansing research data prior to sharing, publishing, and others; Other terms: data quality | 1) Code degree of complexity sought for this variable (Not applicable, implied, familiarity, knowledge, experienced); 2) Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) | Definition of metadata: CASRAI Dictionary Research Data Domain; Definition of documentation: DataONE Best Practices Primer |
| **Data Storage** | Recording of data on a storage media | Any reference to how and where to store data, including storage media, storage locations, storage hardware or storage devices | Data preservation | 1) Code degree of complexity sought for this variable (Not applicable, implied, familiarity, knowledge, experienced); 2) Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) |
| **Data Security** | Measures taken to protect data from unauthorized access, change, destruction, or other threats | Any reference to data security, preventing unauthorized access, and others. | De-identification of data | 1) Code degree of complexity sought for this variable (Not applicable, implied, familiarity, knowledge, experienced); 2) Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) | Adapted from Society of American Archivists' definition |
| --- | --- | --- | --- | --- | --- |
| **Analysis** | | | | | |
| **Data Visualization** | Visual representations of data | Any reference to data visualization or visualization software (such as Tableau, and others.) | -- | -- | |
| **General Data Analysis** | Analyzing data to search for trends or patterns | Any reference to data analysis that DOES NOT specify one or more of the three specific types listed below; quantitative data analysis | Spatial, geospatial, GIS, statistical, or qualitative analysis | 1) Code degree of complexity sought for this variable (Not applicable, implied, familiarity, knowledge, experienced); 2) Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) | -- |
| **Statistical Data Analysis** | Using statistics to analyze data for patterns and trends | Any reference to statistical analysis methods or tests; Common tests include ANOVA, Chi-square tests, T-tests, Factor Analysis and Cluster Analysis. References to common software packages (such as SAS, SPSS, and others) | Spatial, geospatial or GIS analysis | 1) Code degree of complexity sought for this variable (Not applicable, implied, familiarity, knowledge, experienced); 2) Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) |
| **Spatial Data Analysis** | Type of geographical analysis which seeks to explain patterns of human behavior and its spatial expression in terms of mathematics and geometry, that is, locational analysis | Any reference to spatial analysis, geospatial, or GIS analysis; Mentions of using specific software such as ArcGIS | Statistical analysis | 1) Code degree of complexity sought for this variable (Not applicable, implied, familiarity, knowledge, experienced); 2) Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) |
| **Qualitative Data Analysis** | The identification, examination, and interpretation of patterns and themes in textual data and determining how these patterns and themes help answer the | Any reference to qualitative data analysis, including text mining; Mentions of qualitative analysis software such as NVivo, Dedoose, ATLAS.ti, and others. | Any analysis of quantitative data (statistical or spatial) | 1) Code degree of complexity sought for this variable (Not applicable, implied, familiarity, knowledge, experienced); 2) Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) |

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Dartmouth Libraries Geospatial Information Systems research guide

Pell Institute Evaluation Tool Kit: Analyzing Qualitative Data
| **Programming Languages** | research questions at hand | qualifications, responsibilities, description | 1) Code degree of complexity sought for this variable (Not applicable, implied, familiarity, knowledge, experienced); 2) Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description); 3) List the specific programming languages mentioned (if none, use “Not applicable”) |

| **Programming Languages** | If the position needs to know one or more computer programming languages (Python, C, Java, HTML, and others) | Specific programming language(s) are mentioned | Providing programming for the campus community (i.e., planning events) |

| **Data Sharing** | The practice of making data available for discovery and reuse. This may be done, for example, by depositing the data in a repository or through data publication | Any reference to sharing or publishing research data (outside of a research team) through a variety of possible avenues (data repository, data journal, and others); Mention on assigning persistent identifiers (PURLs, DOIs, and others). Other terms include data publishing and data dissemination | Sharing within a research group or collaboration |

1) Code degree of complexity sought for this variable (Not applicable, implied, familiarity, knowledge, experienced); 2) Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description); 3) List the specific programming languages mentioned (if none, use “Not applicable”).

**CASRAI Dictionary:** Research Data Domain
| **Preservation** | **Data Repository** | A digital archive that provides services for the storage and retrieval of digital content. Any reference to using, creating, facilitating, and others. A data repository or data archive; other terms could include collecting datasets. -- | 1) Code degree of complexity sought for this variable (Not applicable, implied, familiarity, knowledge, experienced); 2) Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description). Data Curation Network: Data Curation Terms and Activities Report |
| **Data Curation** | The encompassing work and actions taken by curators of a data repository in order to provide meaningful and enduring access to data. These activities include ingest, appraisal, curation, access and preservation. Any reference to data curation, curating research data or related data curation activities; Other term: data curator -- | 1) Code degree of complexity sought for this variable (Not applicable, implied, familiarity, knowledge, experienced); 2) Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description). Data Curation Network: Data Curation Terms and Activities Report |
| **Other** | An organization’s stated data/information management processes designed to assist and protect research data assets. Any reference to data policies (a library’s policies, university’s policies, funder policies, and others) including data management plan policies, deposit policies, intellectual property policies, data -- | 1) Code degree of complexity sought for this variable (Not applicable, implied, familiarity, knowledge, experienced); 2) Code where it occurs in the job posting (required qualifications, preferred qualifications, intellectual property policies, data). Adapted from RDA Term Definition Tool |
Other Responsibilities or Skills

| Instruction | Teaching (online or in-person) researchers about any research data management activities (including the variables listed in the Research Data Activities section of this codebook) | Reference to teaching (in-person or online) sessions, workshops, courses, and others on research data management; Creating or maintaining tutorials, online modules, and others for asynchronous instruction | 1) Code degree of complexity sought for this variable (Not applicable, implied, familiarity, knowledge, experienced); 2) Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) |
| --- | --- | --- | --- |
| Data Consultation | A meeting in which a data librarian or research data staff and patron discuss research data management issues and potential solutions | Any reference to providing consultations or reference interactions for patrons to discuss research data management issues | 1) Code degree of complexity sought for this variable (Not applicable, implied, familiarity, knowledge, experienced); 2) Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) |
| Public/customer service perspective | Mindset focused on providing high quality public/customer service | Description of a mindset focused on providing high quality public/customer service | Code where it occurs in the job posting (required qualifications, preferred qualifications, description) |
| **Faculty status** | The position has faculty status at the institution (as opposed to being staff, academic staff, and others) | Faculty status is mentioned | Tenure-track position | Code if this variable appears in the job posting (Yes, No) |
|-------------------|-------------------------------------------------|--------------------------|----------------------|---------------------------------------------|
| **Tenure requirement** | If this position is a tenure-track position at the institution | Tenure-track is mentioned | Status at the institution (faculty, staff, academic staff, and others) | Code if this variable appears in the job posting (Yes, No) |
| **Research/Publishing requirement** | If the successful candidate needs to have a demonstrated record of research/publishing (books, book chapters, journal articles, and others) or they demonstrate the ability to do research/publish in the future | Any mention that scholarly research/publishing is a requirement of the position | Publishing data for patrons; need to know about current topics in scholarly communication | Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) |
| **Liaison to department** | This position will serve as the library liaison to one or more departments or units at the institution, in addition to their research data responsibilities; provide reference/research assistance, instruction, outreach, collection | Liaison activities or work are mentioned (either with or without naming specific departments or units that the position will be the liaison to) | Collaboration with other campus departments/units; Research data role focused on specific disciplines | 1) Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description); 2) Whether specific departments are listed in the job posting (depts. as assigned, specific depts. listed, not applicable); 3) List the **--** |
| **Research data role focused on specific discipline(s)** | This position focuses on the research data management needs of specific disciplines, schools, colleges, and others | This position focuses on the research data management needs of specific disciplines, schools, colleges, and others | Liaison to department; Collaboration with other campus departments/units | specific depts (free text, not applicable) |
|---|---|---|---|---|
| **Assessment** | If the position will be involved in assessment projects, relating to the research data responsibilities | Assessment is mentioned relating to research data responsibilities (such as assessment of patron satisfaction with the library’s research data services) | Assessment activities related to responsibilities outside of research data responsibilities (such as service work, liaison work, and others) | 1) Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description); 2) Whether specific disciplines are listed in the job posting (depts. as assigned, specific depts. listed, not applicable); 3) List the specific disciplines (free text, not applicable) |
| **Scholarly Communication** | If the position needs to know about the current landscape of scholarly communication | Mentions of knowing about scholarly communication | If the position required to publish | 1) Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) |
| Outreach | If the position will be conducting outreach to the campus community (outside of the library) to advertise the library's research data services | Mention of outreach, marketing or advertising the library’s research data services | Outreach for responsibilities outside of research data responsibilities (such as liaison activities) | Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) | -- |
|---|---|---|---|---|---|
| Collaboration with other campus units | If this position will collaborate with campus units outside of the library (such as IT, research office, Provost's office, and others) on research data projects | Collaboration with campus units outside of the library | Liaison duties to campus departments/units | Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) | -- |
| Diversity, equity, inclusion and accessibility | If the applicant needs to know about and recognize the importance of these issues within a library or university | Any mention of applicant being committed or recognizing the importance of diversity, equity, inclusion, and accessibility (such as having to submit a Diversity Statement as part of the application or having a commitment to fostering these on campus) | Language about the university’s commitment to diversity, equity, inclusion, and accessibility | Code where it occurs in the job posting (required qualifications, preferred qualifications, responsibilities, description) | -- |
**Sources**

| Sources of some Variables |  |
|---------------------------|--|
| Hall-Ellis (2005).         |  |
| Hall-Ellis (2006).         |  |
| Chen, H. L., & Zhang, Y. (2017). Educating data management professionals: A content analysis of job descriptions. The Journal of Academic Librarianship, 43(1), 18-24. |  |
| Xia & Wang (2014).         |  |
| Indiana University. (2017). Institution Lookup. In The Carnegie Classification of Institutions of Higher Education. Retrieved from https://carnegieclassifications.iu.edu/lookup/lookup.php |  |

| Sources of some Operational Definitions |  |
|----------------------------------------|--|
| DataONE Best Practices Primer          | https://www.dataone.org/sites/all/documents/DataONE_BP_Primer_020212.pdf |
| Research Data Alliance (RDA) Term Definition Tool | https://smw-rda.esc.rzg.mpg.de/index.php/Main_Page |
| CASRAI Dictionary Research Data Domain | http://dictionary.casrai.org/Category:Research_Data_Domain |
| Society of American Archivists Glossary | https://www2.archivists.org/glossary/terms |
| Dartmouth Libraries Geographical Information Systems research guide | https://researchguides.dartmouth.edu/gis/spatialanalysis |
| Pell Institute Evaluation Toolkit: Analyzing Qualitative Data | http://toolkit.pellinstitute.org/evaluation-guide/analyze/analyze-qualitative-data/ |
| Data Curation Network: Data Curation Terms and Activities report | https://conservancy.umn.edu/bitstream/handle/11299/188638/DefinitionsofDataCurationActivities%20%281%29.pdf?sequence=1&isAllowed=y |
**Appendix C**
**Supplementary Table**

Summary of mentions of 19 research data management activities: A) degree of complexity sought and B) location in the job posting.

| Activity                        | Experience | Knowledge | Familiarity | Implied | Not applicable |
|--------------------------------|------------|-----------|-------------|---------|----------------|
| General data management        | 58         | 31        | 10          | 55      | 26             |
| Statistical data analysis      | 45         | 12        | 10          | 9       | 104            |
| General data analysis          | 39         | 7         | 14          | 18      | 102            |
| Data repository                 | 34         | 32        | 17          | 38      | 59             |
| Data curation                  | 33         | 27        | 1           | 40      | 79             |
| Data visualization             | 31         | 7         | 7           | 29      | 106            |
| Data documentation             | 25         | 33        | 10          | 28      | 84             |
| Spatial data analysis          | 24         | 10        | 7           | 5       | 134            |
| Qualitative data analysis      | 21         | 3         | 7           | 5       | 144            |
| Programming languages          | 21         | 3         | 7           | 5       | 144            |
| Data management plans          | 18         | 13        | 5           | 40      | 104            |
| Data discovery                 | 13         | 11        | 6           | 67      | 83             |
| Data sharing                   | 7          | 7         | 7           | 64      | 95             |
| Data policy                    | 6          | 2         | 3           | 38      | 131            |
| Data storage                   | 2          | 6         | 1           | 22      | 149            |
| Data organization              | 1          | 1         | 0           | 17      | 161            |
| Data security                  | 0          | 3         | 3           | 11      | 163            |
## B)

|                          | Required qualifications | Preferred qualifications | Responsibilities | Description | Not applicable |
|--------------------------|-------------------------|--------------------------|------------------|-------------|----------------|
| Data repository          | 51                      | 32                       | 33               | 5           | 59             |
| Statistical data analysis| 45                      | 23                       | 5                | 3           | 104            |
| Data documentation       | 38                      | 30                       | 21               | 7           | 84             |
| Programming languages    | 33                      | 28                       | 0                | 0           | 119            |
| Data visualization       | 30                      | 15                       | 26               | 3           | 106            |
| Data management plans    | 24                      | 12                       | 33               | 7           | 104            |
| General data management  | 24                      | 73                       | 51               | 6           | 26             |
| Spatial data analysis    | 24                      | 17                       | 3                | 2           | 134            |
| General data analysis    | 18                      | 42                       | 15               | 3           | 102            |
| Data curation            | 17                      | 44                       | 38               | 2           | 79             |
| Qualitative data analysis| 13                      | 18                       | 4                | 1           | 144            |
| Data sharing             | 8                       | 12                       | 50               | 15          | 95             |
| Data discovery           | 7                       | 23                       | 57               | 10          | 83             |
| Data policy              | 6                       | 5                        | 31               | 7           | 131            |
| Data security            | 3                       | 3                        | 8                | 3           | 163            |
| Data storage             | 2                       | 7                        | 13               | 9           | 149            |
| Data organization        | 0                       | 2                        | 6                | 11          | 161            |