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Research Data Management (RDM) and the Evolving Identity of Academic Libraries and Librarians: A Literature Review

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ABSTRACT

Academic libraries and their staff are increasingly involved in the Research Data Management (RDM) practices and processes in their universities. This article explores the impact that such initiatives have on the image and identity of academic libraries. This paper proposes that involvement in and leadership of RDM university practices has the potential to re-shape the library's role, image, and identity within the university, and going forward, to contribute to the library's continuing relevance to research communities. It also points to the need to develop librarians' skills and competencies in RDM, and reflects on the dynamics associated with collaboration and competition in RDM. The article concludes with an agenda for future research.

KEYWORDS

Research Data Management; academic libraries; academic librarians; identity; image

1. Introduction

New technologies play an essential role in many areas of higher education. The dissemination of academic knowledge relies upon novel channels and practices of scholarly communication. Curation, preservation, storage and re-use of the research data generated by universities are pivotal to the maintenance of scientific progress (Verbaan & Cox, 2014). The governance of research data through the entire research lifecycle is referred to as Research Data Management (RDM). Whyte and Tedds (2011) define RDM as "the organisation of data, from its entry into the research cycle through to the dissemination and archiving of valuable results" (p. 1). RDM is significant for a variety of stakeholders inside and outside universities, including academics, researchers and their collaborators, students, industry and commerce, governmental bodies, and, finally, society as a whole (Beagrie & Pink, 2012). Lewis (2010) stresses that access to the outcomes of widely

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funded research is crucial for society, whilst Verbaan and Cox (2014) suggest that the quality of data management is a critical component in sustaining scientific progress. More specifically, RDM offers the following benefits:

- Data sharing potentially avoids researchers replicating research that has already been conducted.
- Preservation and curation activities ensure that costly and valuable data sets remain safe.
- The retrieval, co-analysis and comparison of data derived from different sources is viable, leading to multiple insights.
- Verification of findings through checking and replication of experiments contributes to research integrity.
- The development of novel, often cross-disciplinary research and cross-analysis of new with existing data (Lewis, 2010).

These considerations have generated an increasing interest in RDM implementation in numerous HEIs, such that the majority of UK universities have prioritised the development of an institutional RDM policy (Cox, Kennan, Lyon, & Pinfield, 2017; Cox & Pinfield, 2014; Verbaan & Cox, 2014; Higman & Pinfield, 2015).

Within universities, academic libraries make significant contributions to the various initiatives in the RDM area. For the academic library, involvement in the delivery of RDM services might be a remedy for the reinforcement of the relationship between the library and researchers, which has weakened in recent decades (McKnight, 2010) due, in part, to the move away from the library as a physical space (Delaney & Bates, 2015). In addition, the relationships that an organisation have with other organisations determines important aspects of their culture, identity and image (Gioia, Schultz, & Corley, 2000). Whilst there is an increasing body of research on the role of academic libraries in RDM, this research has focussed on RDM processes, practices and policies (Cox et al., 2017; Verbaan & Cox, 2014; Davis, 2008; Higman & Pinfield, 2015). There is very limited research or discussion regarding the impact of academic librarian's involvement in RDM on their perceived image and identity. Previous research has suggested that librarians may be viewed as having a lower status than other university professionals and that their skills are not fully acknowledged (Cannon, 2017; Davis, 2008). Therefore, it is important to understand whether academic libraries and librarians' involvement in RDM makes a positive contribution to their perceived image and identity. This article, thus, reviews the literature on the role of academic librarians and libraries in RDM in order to: (1) understand the librarians' role in RDM; (2) to make proposals as to the potential impact that this might have on the

image and identity of academic librarians, and (3) to offer proposals for further research into the role of for future research into the image and identity of librarinas in the evolving context of RDM.

2. Methodology

A narrative literature review approach was adopted to support the development of this article, and as a basis for integrating the body of scholarship on RDM. According to McGaghie (2015), in such reviews, the criteria for inclusion of articles are typically qualitative, and based on the reviewers' judgement. According to Rowley and Slack (2004), a narrative review has a number of purposes which include: supporting the identification of research topics, questions or hypotheses; identifying the literature to which the research will make a contribution and contexlising the research within that literature; and, building an understanding of theoretical concepts and terminology. In keeping with the nature of such reviews, the process adopted progressed through a number of stages, including: an initial scoping review, ongoing monitoring of the literature, and re-visiting the literature in the writing up stage. Key search terms/concepts that informed the literature review process included: identity, image, academic libraries, library skills, and Research Data Management. These terms were used in a variety of combinations in the searchers conducted during the various stages of the development of the article, in keeping with the norm for narrative reviews. In addition, due to the time span of the development of RDM, the focus was on articles published in the last ten years.

3. RDM and libraries

3.1. What is RDM?

To understand the role and nature of RDM, it is essential to reflect on the nature of research data. A straightforward yet sophisticated definition is provided by Briney (2015) "Anything you perform analysis on" (p. 6). Moreover, OECD's detailed and descriptive definition highlights the formats and the validity of research data: "Factual records (numerical scores, textual records, images, and sounds) used as primary sources for scientific research, and that are commonly accepted in the scientific community as necessary to validate research findings" (OECD, 2007, p. 13). Similar in meaning, although very different in expression, is Borgman's (2012) minimalistic definition of research data as the "lifeblood of research" (p. 1066).

Put most simplistically, RDM is the management of research data. Whyte and Tedds (2011) elaborate further and suggest that: "Research data management concerns the organisation of data, from its entry into the

research cycle through to the dissemination and archiving of valuable results". Borgman (2012) stresses the value of data and its governance: "As a significant output of research, data are costly to produce yet valuable if they can be reused" (p. 211).

Since most RDM involves digital data, RDM processes are often described as digital curation. The Digital Curation Centre suggests that: "Digital curation is concerned with actively managing data for as long as it continues to be of scholarly, scientific, research and/or administrative interest, with the aim of supporting reproducibility of results, re-use of and adding value to that data, managing it from its point of creation until it is determined not to be useful, and ensuring its long-term accessibility and preservation, authenticity and integrity" (DCC, 2017). In respect of the connection between Digital Curation and RDM, the Digital Curation Centre provides the following definition: "Digital curation involves maintaining, preserving and adding value to digital research data throughout its lifecycle. The active management of research data reduces threats to their long-term research value and mitigates the risk of digital obsolescence. Meanwhile, curated data in trusted digital repositories may be shared among the wider UK research community. As well as reducing duplication of effort in research data creation, curation enhances the long-term value of existing data by making it available for further high-quality research" (www.dcc.ac.uk).

Cox and Verbaan (2018) note that whilst data are created inside the research lifecycle, data also have a lifecycle. The UK Data Archive regards the data lifecycle as consisting of the following six phases: data creation, data processing, analysis, preservation, accessibility and, finally, re-use (Cox & Verbaan, 2018).

3.2. RDM policy and practice in academic libraries

Policies concerning RDM cover data sharing, storage, and security (Pinfield, Cox, & Smith, 2014). A written policy reduces misunderstanding and provides a clear path for involving stakeholders (Cox & Verbaan, 2018). Given the ambiguities in the RDM field with respect to the role of libraries, policies are important for RDM. Policies can be useful for those advocating RDM (Pryor, Jones, & White, 2014). They can support the development of cases for funding for IT infrastructure (Higman & Pinfield, 2015), clarify institutional positions (Brown & White, 2014) and outline roles and responsibilities (Brown & White, 2014).

Policy is a crucial element of RDM practice. In 2011, in the UK all Research Councils agreed to the Common Principles on Data Policy, which led to the Policy on Access to Research Outputs, known now as the Policy

on Open Access (Corti, Van den Eynden, Bishop, & Woollard, 2019). This initiative illustrates clearly that research data is a central topic for knowledge, education and society as a whole. Currently, only a few of the major UK research funders do not implement a policy for data sharing.

At the institutional level, the implementation of RDM policies lies with several stakeholders such as the library, IT services, the research office, the legal office, and academic suppliers (Cox et al., 2017). Such policies are influenced by several factors such as current trends, the mission and the particularities of the institution, other institutions' policies and the broader governmental perspective (Cox & Verbaan, 2018). In addition, Cox, Pinfield, and Smith (2016) showed that UK institutions were slower in implementing RDM programmes than those in the US. Further research revealed that the cause is not rooted in the lack of leadership by the libraries but in the institutional guidance in the areas of research governance, preservation and managing the rapidly increasing quantities of data (Higman & Pinfield, 2015).

Considering the topic from a global perspective, Cox et al. (2017) illustrate that the international environment is exceptionally diverse with regard to the role of libraries in the services associated with data and research. At a national level, the policy is influenced by library associations such as Research Libraries UK and CARL (Canadian Association of Research Libraries) and funding organisations and elected bodies, such as the Joint Information Systems Committee (JISC) (UK), the Australian National Data Service (ANDS), and Research Data Canada (Cox et al., 2017). In the UK, the governmental body responsible for the national funding agency investment in science and research was initially the Higher Education Funding Council for England (HEFCE); this has now been replaced by UK Research and Innovation (UKRI).

4. Academic libraries and their identity

4.1. The evolving organisational identity of academic libraries

In general, a strong identity in the contemporary world, in which consumerisation is a dominant condition, ensures the survival of an organisation (Kazi, 2012). In other words: "In an age where the proliferation of competitors and products and services are easily duplicated or replaceable, brands become an important means of simplifying the decision-making process for consumers' (Hariff & Rowley, 2011, p. 348). Whitley, Gal, and Kjaergaard (2014) define organisational identity as "the collective understanding of members of an organisation of the features that are presumed to be central, distinctive and relatively permanent about the organisation" (p. 19). Gioia et al. (2000) argue that organisational identity and image are interrelated,

involve individual and organisational matters and uncover the character and behaviours of individuals and organisations. According to Fagan, Ostermiller, Price, and Sapp (2021), academic librarians associate their professional identity with the library, especially when they support the provision of services. They also pay attention to their image, which is considered how they are perceived by others and, more specifically, by the users. Fagan implies that the identity notion has the meaning of self–perception or self-image and the image notion, on the other hand, is considered as the perceptions of others (Fagan et al., 2021). This assumption is crucial for understanding the dynamics that govern organisational change and how this change could be perceived (Gioia et al., 2000).

However, identity, for individuals or organisations, is not static and is characterised by fluidity and flexibility (Whitley et al., 2014). Identity is shaped by the social interactions to which organisations or individuals are exposed. In terms of libraries, this applies to the interactions with other organisations, users, and the community that the library serves. Fagan et al. (2021) studied the academic librarians' image and identity and argued that librarians' professional identity is closely coupled with that of the library in which they work. Flexibility relates to shifts in the organisation's environment and relationships with other organisations, resulting in differing perceptions of its members as to the unique and core characteristics of the organisation (Whitley et al., 2014). Flexibility is also a characteristic of organisational identity. Changes in the organisation's environment and relationships with other organisations are likely to require modifications to the way members interpret what is central and distinctive about their organisation. This means that organisational changes will require members to actively re-interpret and develop new representations to symbolically characterise their organisation (Whitley et al., 2014). Identity has a dynamic nature and is highly connected to the social conditions an individual or an organisation performs (Gioia et al., 2000). For example, in the past, print collections were an integral part of the identity of libraries (Dempsey, Malpas, & Lavoie, 2014). Now academic libraries are shifting their focus to the management of digital collections and re-shaping support services due to shifts on the scholarly ecosystem (Pinfield, Cox, & Rutter, 2017; Fowler & Hines, 2018). The dominance of technology has increasingly affected the information environment, leading to significant changes in the image and the identity of libraries and other organisations (Glusker & Exner, 2018; Rowley, 2006).

Cox, Pinfield, and Rutter (2018) suggests that major changes in technology and scholarly communication have affected libraries' identity through the re-shaping of activities, values, and brands. More specifically, the academic library is confronted with a convoluted path of developing new and

advanced services in order to remain a key player (Saunders, 2015). Organisational recognition and support for libraries and librarians is becoming challenging due to rapid technological developments, changes in local and international students' and researchers' expectations, off-campus information providers (Fowler & Hines, 2018; Cox et al., 2018), scholarly communication trends and data management. Cox, Kennan, Lyon, Pinfield, and Sbaffi (2019) point out that new activities involving bibliometrics, text and data mining, open scholarship, and open research data combined with external elements such as changes in government policies will have a significant effect on academic libraries. Another major factor linked to RDM and the activities mentioned earlier that leads to change and cannot be ignored is Artificial intelligence (AI) which is likely to impact significantly on data-related developments (Cox et al., 2018).

Tenopir, Sandusky, Allard, and Birch (2014) suggest that academic libraries have been driven to develop RDM services as a result of the establishment of the data management and data sharing requirements of research funding organisations. Such organisations include, for the US, the National Science Foundation, the National Endowment for the Humanities, and the National Institutes of Health, and, for Canada the Canadian Institutes of Health Research, the National Sciences and Engineering Research Council, and the Social Sciences and Humanities Research Council. In turn, involvement in RDM has significant consequences for the way that libraries operate within and beyond the university in respect of strategy, space, structures, partnerships and identity (Cox et al., 2018). Indeed, Verbaan and Cox (2014) demonstrate that university libraries are more important than IT services or Research support offices in the implementation of RDM policy and strategy. Academic libraries' identity has traditionally also been associated with space and place. Libraries have seen the freeing up of space as a result of the decrease of printed material (Saunders, 2015). In addition, academic libraries' increased focus on learning and teaching has led to rearrangement of physical spaces and the re-purposing of library buildings (Pinfield et al., 2017). Additionally, the structure and the culture of the library as an organisation has been affected not only by partnerships with other university services and departments but by the employment of other professional groups (Pinfield et al., 2017).

4.2. Library and librarians' identity and RDM

The collection of articles that consider library identity is diverse. For example, current literature (Brochu & Burns, 2019; Cox et al., 2018) discusses the impact that novel areas of scholarly communication have on the academic library, its identity and its development in the context of

infrastructure, staff skills, processes, and, cooperation with other professionals and services (Cox et al., 2017; Yu, 2017). Verbaan and Cox (2014) examined identity from the viewpoint of professional jurisdiction. The focal point of their research is how various professionals claim authority regarding RDM, and though they provide some critical notions about the authority of librarians, IT professionals and researchers regarding RDM, they do not specifically discuss librarian's identity. Another qualitative study by Pinfield et al. (2014) provides a comprehensive picture of the relationships between stakeholders and their relationship to the RDM programme. It offers notions about how their roles influence the processes, components, policies and services of an RDM programme. However, there has been no research that focuses on how RDM impacts or changes the identity of the contemporary academic library. It may be that the novel and urgent character of RDM (Chiware & Mathe, 2016) is responsible for the absence of research on RDM and academic libraries' identity. This may align with Cox, Verbaan, and Sen (2014) comment regarding the shift in the identity of libraries: "We might see such activities as part of a wider shift in the nature of the library's role away from being about buying in content for internal communities and towards managing their institutions' own outputs, and making them visible to the wider world" (p. 43).

RDM can provide fertile ground for the enhancement of the identity of the modern academic library. As Koltay (2016) suggests, only libraries can resolve difficult issues related to research data. In respect of RDM initiatives by the library, Saunders (2015) cites the ACRL lists of 2012 and 2014, which show ways of demonstrating value through RDM, especially if those initiatives are incorporated into a strategic plan. Consistent with this, Cox and Pinfield (2014) suggest that RDM is among the many possible roles through which libraries may provide research support. Keller (2015) agrees and provides evidence that academic libraries in Australia have improved their position within the university by working systematically in research support, including services such as bibliometrics, institutional repositories, open access and research data management.

On the other hand, others are wary of the potential risks associated with involvement in RDM. For example, Cox et al. (2018) argues that although library initiatives and leading the development of RDM could have a positive and vital impact on the university, this is very likely to put the library's identity at risk, as a result of teamwork with other university services and other professionals gradually eliminates the library's distinctiveness. This, in turn, may make it more challenging for the library to maintain its identity (Cox et al., 2018; Pinfield et al., 2017). On the other hand, Cannon (2017) disagrees and suggests that "the epistemological boundaries of LIS' become stronger through collaboration. The unavoidable multiple

collaborations in RDM generates a 'between' space in which both creative possibilities and tensions around identity exist both for staff employed to work principally on RDM and for professional library staff embedded in research groups (Verbaan & Cox, 2014). Despite these ambiguities, some librarians believe that delivering research data services contributes to both the library's and the institution's prestige and research impact and, most importantly, for the present discussion, is integral to the traditional role of librarians as scholarship agents (Tenopir et al., 2014). However, it is also possible to interpret academic libraries' involvement in RDM as essentially no more than an extension of traditional activities, including those associated with advisory and support services (such as information literacy training) and repository management (including collection management, metadata management and resource discovery) (Cox et al., 2019). Ultimately, to be recognised and valued for its contribution to RDM, the library needs acceptance by users and others, and to be recognised for the services that they supply, and more generally, their wider contribution to the university (Delaney & Bates, 2015).

Notwithstanding discussions regarding the potential challenges to the LIS profession associated with RDM and other changes, it is important to acknowledge that, compared to other professions the LIS profession has a long history, established traditions, and a strong identity (Cox & Pinfield, 2014; Verbaan & Cox, 2014). Verbaan and Cox (2014) use Abbott's theory, which places the profession in the centre surrounded by various other professions. Each profession fights for a place in order to generate their own sub-culture, knowledge, ethics and some degree of autonomy. Fagan et al. (2021) point out that the library profession should promote its expertise in a constant and active manner as for the benefit of both academic libraries and librarians. Nevertheless, there is evidence that librarians have demonstrated their value as leaders in RDM initiatives (Koltay, 2016). Verbaan and Cox (2014) stress that libraries are proactive, initiate institution's RDM policy and play a central role in the delivery of RDM services. Many research libraries in the US and Canada are the main actors in running RDM activities (Tenopir et al., 2014). Additionally, according to Bryant et al. (2018), it is no surprise that there are opportunities for the academic library to undertake leading roles in areas of scholarly communication including RDM, because there is a well-established base for all these activities in the library's expertise.

5. Developing librarians' skills and competencies for RDM

An important facilitator of academic libraries' contribution to RDM is the development of appropriate skills and competencies, which, in turn, has

implications for the librarian's professional identity (Cox & Pinfield, 2014). Some commentators point to the challenges associated with the development of these skills and competencies, given that: librarians lack confidence in this area (Cox, Verbaan, & Sen, 2012), and that most do not have personal experience of research (Verbaan & Cox, 2014). However, more recent literature argues that librarians, in many cases, hold postgraduate degrees, (Cannon, 2017) and there is evidence that not only have senior librarians realised the need to update their knowledge, but also less experienced professionals recognise their need to enhance their skills in RDM (Cox et al., 2012). According to ACRL, librarians and academic library leaders, advocate that RDM, alongside text data mining and altmetrics, is an arena in which there are significant skill gaps (Gwyer, 2015). Koltay (2016) points out that RDM requires an extensive portfolio of skills and competencies, extending from interpersonal relationship skills to detailed technical knowledge such as that associated with metadata creation.

Some commentators have suggested that "soft skills' are central to the successful engagement of academic librarians in RDM. However, according to Matteson, Anderson, and Boyden (2016), the notion of soft or softer skills is quite vague and not easily described. One interpretation is that soft skills are connected to emotional intelligence, leadership competencies and high criticality (Carter, 2017). Pinfield et al. (2017) based on a survey, label skills in strategy, relationship management and negotiation as "softer skills". Cox et al. (2017) regard effectiveness in the workplace as requiring soft skills. Carter (2017) echoes this view and states that: "identifying the data needed to make decisions, knowing how to collect, analyse and gain insight from that data and presenting the accompanying narrative to explain it to others' (p. 131) is important. Cox et al. (2012) identified several skill requirements in support of RDM. Amongst these are leadership abilities, data analysis, and strategic understanding and influencing skills, all of which are regarded by commentators as soft skills (Carter, 2017; Matteson et al., 2016).

On the other hand, whilst there is a significant body of research on academic librarians' soft skills, much less attention has been directed towards 'hard skills', which are typically associated with 'technical' skills. Indeed, Matteson et al. (2016) question this dichotomy, asking "*what, after all, makes hard skills "hard" and soft skills "soft"?* (p. 84). What is "hard" skill is not clearly defined and whether it is the reverse of the "soft". Pinfield et al. (2017), for example, imply that technical skills are the contrast to soft skills. Read and Cox (2020) and Saunders (2015) perceive hard skills to consist of technical competencies, such as those associated with repository management and metadata creation, whilst soft skills are typically associated with advisory support (Cox et al., 2019). Both are important in the delivery of RDM services.

Whilst some soft skills are transferrable from different contexts, if librarians are to contribute to the delivery of RDM services, they need the opportunity to participate in systematic training in order to develop their skillset (Tenopir et al., 2014). More specifically, Brochu and Burns (2019) suggest that training in data science can remedy any lack of confidence or self-efficacy in this area. Read and Cox (2020) suggest that a proactive approach to the rapid technological changes is needed to complement the softer skills of librarians in the delivery of Scholarly Communication-related services such as RDM. However, Cannon (2017) warns that the low levels of Continuing Professional Development (CPD) in LIS may undermine the credibility of the profession, which may, in turn, impact on its competence and contribution in RDM. Similarly, professional librarians opinions agree that there is a scarcity of training opportunities in matters related to research data and associated competencies (Read & Cox, 2020). RDM programs in iSchools and continuing education for professionals could be beneficial (Cox et al., 2017). It is critical to point out that RDM requirements in skills and personnel are not addressed in the same way by all libraries. Their practice are likely to be influenced by the size of the university, whether it is research or teaching-oriented, and if the RDM support is embedded in other research support services.

6. Collaboration and competition through RDM

Successful RDM requires collaboration and competition; all the key stakeholders must collaborate in order to fulfil the required goals of RDM and deliver an effective service (Chiware & Mathe, 2016). However, there can be ambiguity regarding leadership and role allocation (Cox & Verbaan, 2018), which can mean that it is not clear who is responsible for what (Cox et al., 2019). As a result, competition between the various stakeholders often occurs (Verbaan & Cox, 2014). In addition, there are indications in the literature to support the view that this collaboration might negatively affect the library's identity (Cox et al., 2017) and contribute to blurring the identity of the LIS profession (Gwyer, 2015).

There is no doubt that RDM is a collaborative endeavour (Cox & Pinfield, 2014), and that libraries need to establish relevant collaborations (Verbaan & Cox, 2014) and effective knowledge sharing practices (Lewis, 2010). Typically, collaborations within the university focus on those with IT services, campus research offices, and academics in the open access and the research data field (Corrall, 2012). Interestingly, although the University Library and IT Services are key research support stakeholders in most universities, they may not necessarily have a tradition of working in close collaboration (Cox et al., 2017). Collaborative relationships can also

occur at the level of individual professionals within the library and beyond (Pinfield et al., 2017). However, collaboration can also contribute to the erosion of the library's identity (Gwyer, 2018). Cannon (2017) suggests: "Whilst the opportunities for collaboration may allow the strengthening of the epistemological boundaries of LIS, they are also a source of weakness when redefining new epistemological boundaries' (p. 145).

Turning now to competition, Rowley (2006) claims that the need for librarians to improve their skills in the library's collaborative and competitive environment has never been greater. According to Pan and Hovde (2010), this need is driven by the "technological imperative', or the rapid technological change that characterises modern academic libraries. Complementing this, Hughes (2000) suggests that the increase in the number of information services suppliers shows that "the role of the library as primary aggregator and purveyor of content to its community is less and less unique" (p. 32). There is a danger that for-profit information providers might be able to act as a substitute for academic libraries. Gibbons (2001) argues that in a competitive marketplace if the services provided by an organisation are not relevant and vital, then this organisation faces a serious risk of being supplanted. According to Gwyer (2018), in some cases, collaboration translates into competition over jurisdiction of an area of work. Most specifically, in RDM, competition occurs in the field of professional authority and identity, as might, for example, be evident in competition over the branding and web page hosting of RDM supported services (Verbaan & Cox, 2014). Similar tensions also arise between commercial suppliers and other organisations in the context of activities that also require cooperation (Cox et al., 2019).

7. Conclusion

7.1. Summary

There is considerable interest in the role of academic libraries in RDM. This is accompanied by an ongoing debate regarding the processes associated with and the impact of involvement in RDM on academic librarians and the impact that this might have on the librarians and library's identity, and perceptions of their contribution to research within their university. These are important considerations because unless the contribution of librarians is valued and visible, some of their roles will be taken over by other professionals, and other aspects of their roles will be downgraded, impacting, in turn, on status and salaries.

A number of researchers have explored various aspects of the librarians' role in the context of RDM. These include the skills and competencies required for RDM, training needs, collaboration and competition with

other professionals, and the impact of rapid technological changes, leadership, and policy formulation. Throughout the discussion, there is widespread acknowledgement of the importance of the academic librarian's involvement and/or leadership in RDM, and an acknowledgement of the impact that this might have on their identity, but there is very limited previous research that focuses on this didactic relationship. Hence, this more detailed analysis of the image and identity of librarians in the evolving context of RDM has the potential to inform both research and practice.

7.2. Agenda for future research

Since RDM practices and processes are still in a state of flux, and experience with these services varies considerably between different universities and their academic libraries, it is reasonable to anticipate that practices will evolve further over the next few years. Accordingly, there will be an ever-developing agenda as regards RDM, which should be adequately supported and informed by an ongoing programme of research. This section identifies some of the most interesting research streams at the present time.

One of the most topical issues is the nature of the key skill sets and competencies needed by RDM's. Recent nascent research conducted by the authors of this article demonstrates, for instance, that job descriptions in RDM vary considerably in scope and focus between universities. Hence there is considerable scope for developing understanding of the roles of RDM's in different types of academic libraries. Linked to this is the question of the professional identity and allegiance of research data managers. Do RDM's view themselves as librarians, technologists, researchers, or a mix of the three. The important research question is: what are the consequences of the RDM's professional allegiance to, for example, service delivery, development, and career prospects for RDM managers. Another related strand of enquiry relates to the RDM's interaction and interface with other professional groups in the university, such as those associated with managing open access publishing and research performance management. There is likely to be overlap in skill sets between these various professional groups, and these skill sets are likely to evolve in time.

More generally, RDM is a transformational force for academic libraries and librarians and, as such, is impacting on the evolution of policies, processes and technologies. Hence, it will be useful to record how and to what extent there is a change in identity and/or image in the libraries associated with different universities. For example, it would be valuable to compare the approaches being adopted by universities whose missions as regards research and teaching vary, and the extent to which any differences impact on the identity and image of RDM's. Inherent in any decision making will

be the priority accorded to budgets for RDM, and other related areas such as the funding of open access publishing. This decision making both represents and drives perceptions of the library's identity and image. Finally, radical technological developments such as the use of Blockchain for RDM processes, that are likely to involve and facilitate policy agreements between a range of different stakeholder groups is another arena through which notions of the library's identity and image

References

Beagrie, N., & Pink, C. (2012, November 26). *Benefits from research data management in universities for industry and not-for-profit research partners*. Charles Beagrie Ltd and University of Bath.

Borgman, C. L. (2012). The conundrum of sharing research data. *Journal of the American Society for Information Science and Technology*, *63*(6), 1059–1078. Retrieved from https://onlinelibrary.wiley.com/doi/full/10.1002/asi.22634.

Briney, K. (2015). *Data management for researchers: Organise, maintain and share your data for research success*. Exeter: Pelagic Publishing.

Brochu, L., & Burns, J. (2019). A Literature review: Commentary from a senior professional and a new professional librarian. *New Review of Academic Librarianship*, *25*(1), 49–58. Retrieved from https://www.tandfonline.com/doi/full/10.1080/13614533.2018.1501715?tab=permissions&scroll=top#metrics-content.

Brown, M. L., & White, W. (2014). Case study 2: University of Southampton – a partnership approach to research data management. In G. Pryor, S. Jones, & A. Whyte (Eds.), *Delivering research data management services* (pp. 135–162). London: Facet Publishing.

Bryant, R., Clements, A., de Castro, P., Cantrell, J., Dortmund, A., Fransen, J., … Ennielli, M. (2018). *Practices and patterns in research information management: Findings from a global survey*. Ohio: OCLC Research. Retrieved from https://www.oclc.org/research/publications/2018/oclcresearch-practices-patterns-research-information-management/report.html.

Cannon, P. (2017). A review of professionalism within LIS. *Library Management*, *38*(2/3), 142–152. Retrieved from https://www.emerald.com/insight/content/doi/10.1108/LM-07-2016-0053/full/html.

Carter, D. (2017). Creativity in action–the information professional is poised to exploit the fourth industrial revolution: The business information survey 2017. *Business Information Review*, *34*(3), 122–137. Retrieved from https://journals.sagepub.com/doi/full/10.1177/0266382117722440.

Chiware, E., & Mathe, Z. (2016). Academic libraries' role in Research Data Management Services: A South African perspective. *South African Journal of Libraries and Information Science*, *81*(2), 1–10. Retrieved from https://sajlis.journals.ac.za/pub/article/view/1563/1445.

Corrall, S. (2012). Roles and responsibilities: Libraries, librarians and data. In G. Pryor (Ed.), *Managing research data* (pp. 105–133). London: Facet.

Corti, L., Van den Eynden, V., Bishop, L., & Woollard, M. (2019). *Managing and sharing research data: A guide to good practice*. London: SAGE.

Cox, A., & Verbaan, E. (2018). *Exploring research data management*. London: Facet.

Cox, A., Verbaan, E., & Sen, B. (2012). Upskilling liaison librarians for research data management. *Ariadne,* 70. Retrieved from https://www.ariadne.ac.uk/issues70/cox-et-al.

Cox, A., Verbaan, E., & Sen, B. (2014). Rising to the research data management challenge. *SCONUL Focus*, 60, 42–44. Retrieved from https://www.sconul.ac.uk/sites/default/files/documents/13_13.pdf.

Cox, A. M., Kennan, M. A., Lyon, L., & Pinfield, S. (2017). Developments in research data management in academic libraries: Towards an understanding of research data service maturity. *Journal of the Association for Information Science and Technology*, *68*(9), 2182–2200. Retrieved from https://asistdl.onlinelibrary.wiley.com/doi/full/10.1002/asi.23781.

Cox, A. M., Kennan, M. A., Lyon, L., Pinfield, S., & Sbaffi, L. (2019). Maturing research data services and the transformation of academic libraries. *Journal of Documentation*, *75*(6), 1432–1462. Retrieved from https://doi.org/10.1108/AJIM-11-2017-0251.

Cox, A. M., & Pinfield, S. (2014). Research data management and libraries: Current activities and future priorities. *Journal of Librarianship and Information Science*, *46*(4), 299–316. Retrieved from https://www.tandfonline.com/doi/full/10.1080/13614533.2018.1466342.

Cox, A. M., Pinfield, S., & Rutter, S. (2018). The intelligent library: Thought leaders' views on the likely impact of artificial intelligence on academic libraries. *Library Hi Tech, 37*(3), 418–435. Retrieved from https://www.emerald.com/insight/content/doi/10.1108/LHT-08-2018-0105/full/html.

Cox, A. M., Pinfield, S., & Smith, J. (2016). Moving a brick building: UK libraries coping with research data management as a 'wicked' problem. *Journal of Librarianship and Information Science*, *48*(1), 3–17. Retrieved from https://journals.sagepub.com/doi/full/10.1177/0961000614533717.

Cox, J. (2018). Positioning the academic library within the institution: A literature review. *New Review of Academic Librarianship*, *24*(3–4), 217–241. https://www.tandfonline.com/doi/full/10.1080/13614533.2018.1466342.

Davis, C. (2008). Librarianship in the 21st century–crisis or transformation? *Public Library Quarterly, 27*(1), 57–82. https://doi.org/10.1080/01616840802122401

Delaney, G., & Bates, J. (2015). Envisioning the academic library: A reflection on roles, relevancy and relationships. *New Review of Academic Librarianship*, *21*(1), 30–51. Retrieved from https://www.tandfonline.com/doi/full/10.1080/13614533.2014.911194.

Dempsey, L., Malpas, C., & Lavoie, B. (2014). Collection directions: The evolution of library collections and collecting. *Portal: Libraries and the Academy*, *14*(3), 393–423. doi:10.1353/pla.2014.0013

Digital Curation Centre. (2017). How-to guides & checklists. Retrieved January 6, 2021, from https://www.dcc.ac.uk/resources/how-guides.

Fagan, J. C., Ostermiller, H., Price, E., & Sapp, L. (2021). Librarian, faculty, and student perceptions of academic librarians: Study introduction and literature review. *New Review of Academic Librarianship*, *27* (1), 38–75.

Gibbons, S. (2001). Growing competition for libraries. *Library Hi Tech*, *19*(4), 363–367.

Gioia, D. A., Schultz, M., & Corley, K. G. (2000). Organisational identity, image, and adaptive instability. *The Academy of Management Review*, *25*(1), 63–81.

Glusker, A., & Exner, N. (2018). Responding to change: Reinventing librarian identities in the age of research mandates. In G. J. Fowler & S. S. Hines (Eds.), *Challenging the "Jacks of all trades but masters of none" librarian syndrome* (pp. 91–115). Bingley: Emerald. Retrieved from https://www.emerald.com/insight/content/doi/10.1108/S0732-067120180000039007/full/html.

Gwyer, R. (2015). Identifying and exploring future trends impacting on academic libraries: A mixed methodology using journal content analysis, focus groups, and trend reports.

New Review of Academic Librarianship, *21*(3), 269–285. Retrieved from https://www.tandfonline.com/doi/full/10.1080/13614533.2015.1026452.

Gwyer, R. (2018). This is an opportunity for librarians to reinvent themselves, but it is about moving out of their areas: New roles for library leaders? *New Review of Academic Librarianship*, *24*(3–4), 428–441. Retrieved from https://www.tandfonline.com/doi/full/10.1080/13614533.2018.1473258.

Hariff, S., & Rowley, J. (2011). Branding of UK public libraries. *Library Management*, *32*(4/5), 346–360. Retrieved from https://www.emerald.com/insight/content/doi/10.1108/01435121111132338/full/html.

Higman, R., & Pinfield, S. (2015). Research data management and openness: The role of data sharing in developing institutional policies and practices. *Program: Electronic Library and Information Systems*, *49*(4), 364–381. Retrieved from https://www.emerald.com/insight/content/doi/10.1108/PROG-01-2015-0005/full/html.

Hughes, C. A. (2000). Information services for higher education: A new competitive space. *D-Lib Magazine, 6*(12). Retrieved from http://www.dlib.org/dlib/december00/hughes/12hughes.html

Kazi, N. (2012). *The identity crisis of libraries in the attention economy*. Library Philosophy and Practice, Paper 684, Retrieved from https://www.emerald.com/insight/content/doi/10.1108/S0732-067120180000039007/full/html.

Keller, A. (2015). Research support in Australian university libraries: An outsider view. *Australian Academic & Research Libraries*, *46*(2), 73–85. Retrieved from https://www.tandfonline.com/doi/full/10.1080/00048623.2015.1009528.

Koltay, T. (2016). Facing the challenge of data-intensive research: Research data services and data literacy in academic libraries. In D. Baker & W. Evans (Eds.), *Innovation in libraries and information services* (pp. 45–61). Bingley: Emerald Publishing. Retrieved from https://www.emerald.com/insight/content/doi/10.1108/S0732-067120160000035008/full/html.

Lewis, M. (2010). Libraries and the management of research data. In S. Mcknight (Ed.), *Envisioning future academic library services: Initiatives, ideas and challenges* (pp. 145–168). London: Facet.

Matteson, M. L., Anderson, L., & Boyden, C. (2016). "Soft skills": A phrase in search of meaning. *Portal: Libraries and the Academy*, *16* (1), 71–88. Retrieved from . doi:10.1353/pla.2016.0009

McGaghie, W. C. (2015). Varieties of integrative scholarship: Why rules of evidence, criteria, and standards matter. *Academic Medicine*, *90*(3), 294–302. Retrieved from https://doi-org.mmu.idm.oclc.org/10.1097/ACM.0000000000000585.

McKnight, S. (2010). *Envisioning future academic library services: Initiatives, ideas and challenges*. London: Facet.

OECD. (2007). Principles and guidelines for access to research data from public funding. Retrieved from https://www.oecd.org/sti/scitech/38500813.pdf

Pan, J., & Hovde, K. (2010). Professional development for academic librarians: Needs, resources, and administrative support. *Chinese Librarianship: an International Electronic Journal*, 29, 1–9. Retrieved from http://www.iclc.us/cliej/cl29PH.pdf

Pinfield, S., Cox, A. M., & Rutter, S. (2017). *Mapping the future of academic libraries: A report for SCONUL*.

Pinfield, S., Cox, A. M., & Smith, J. (2014). Research data management and libraries: Relationships, activities, drivers and influences. *PLoS One*, *9*(12), e114734.

Pryor, G., Jones, S., & White, A. (Eds.). (2014). *Delivering research data management services: Fundamentals of good practice*. London: Facet.

Read, A., & Cox, A. (2020). Underrated or overstated? The need for technological competencies in scholarly communication librarianship. *The Journal of Academic Librarianship*, *46*(4), 102155. doi:10.1016/j.acalib.2020.102155

Rowley, J. (2006). *Information marketing*. Abingdon: Routledge.

Rowley, J., & Slack, F. (2004). Conducting a literature review. *Management Research News*, *27*(6), 31–39.

Saunders, L. (2015). Academic libraries' strategic plans: Top trends and under-recognised areas. *The Journal of Academic Librarianship*, *41*(3), 285–291. Retrieved from https://www.sciencedirect.com/science/article/pii/S009913331500052X.

Tenopir, C., Sandusky, R. J., Allard, S., & Birch, B. (2014). Research data management services in academic research libraries and perceptions of librarians. *Library & Information Science Research*, *36*(2), 84–90. Retrieved from https://www.sciencedirect.com/science/article/pii/S0740818814000255.

Verbaan, E., & Cox, A. M. (2014). Occupational sub-cultures, jurisdictional struggle and third space: Theorising professional service responses to Research Data Management. *The Journal of Academic Librarianship*, *40*(3–4), 211–219. Retrieved from https://www.sciencedirect.com/science/article/pii/S0099133314000251.

Whitley, E. A., Gal, U., & Kjaergaard, A. (2014). Who do you think you are? A review of the complex interplay between information systems, identification and identity. *European Journal of Information Systems*, *23*(1), 17–35. Retrieved from https://www.tandfonline.com/doi/abs/10.1057/ejis.2013.34.

Whyte, A., & Tedds, J. (2011). Making the case for research data *management*. DCC Briefing Papers. Digital Curation Centre. Retrieved from http://www.dcc.ac.uk/resources/briefing-papers.

Yu, H. (2017). The role of academic libraries in research data service (RDS) provision opportunities and challenges. *The Electronic Library*, *35*(4), 783–797. Retrieved from https://www.emerald.com/insight/content/doi/10.1108/EL-10-2016-0233/full/html.