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Time to Adopt: Librarians' New Skills and Competency Profiles

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Abstract. On the one hand, libraries are at the forefront of the digital transformation and digital information infrastructures, on the other, they manage and curate cultural heritage collections. This brings about new ways of engagement with information and knowledge and the need to rethink skills and competency profiles – which enable librarians to support e-research all along the research cycle. This paper presents findings of the joint Task Force on Librarians' Competencies in Support of E-Research and Scholarly Communication.

Keywords. e-research, competencies, job profiles, libraries.

1. Introduction

Rapid changes in technology and associated shifts in research and scholarly communications are profoundly changing the role of libraries in the 21st century. The emergence of e-research, for example, is bringing about new ways of doing science across the globe, compelling libraries to adopt new services, such as assisting with the development of research data management plans, hosting collaborative virtual research environments, managing institutional repositories, and disseminating research outputs through open access mechanisms. These novel services require a range of new skills and expertise within the library community as well as a shift in organizational models for libraries.

In August 2013, the Association of Research Libraries (ARL), the Canadian Association of Research Libraries (CARL), the Association of European Research Libraries (LIBER), and the Confederation of Open Access Repositories (COAR) launched the joint Task Force on Librarians' Competencies in Support of E-Research and Scholarly Communication.[2]

Since then, the Task Force has been working on identifying emerging specialty roles, through performing literature reviews and collaboratively preparing a series of service areas and competencies documents for research data management, scholarly communication and Open Access, digital curation and preservation and support for digital scholarship.

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2 https://www.coar-repositories.org/activities/support-and-training/task-force-competencies.

2. Competencies and Skills under Review

The growing abundance of digital information and data affects the whole research workflow, including methods and tools as well as enabling infrastructures. Accordingly, there is an emerging need for a new type of workforce, and existing and emerging staff competencies and skills are under scrutiny. In particular, a lot of attention has been attracted by "data science", in particular in relation to "big data"; with Hal Varian, chief economist at Google declaring "the sexy job of the next 10 years will be statisticians" (Lohr, 2009). With a view on customers Affelt (2015) pointed out how librarians and information professionals – which have always been well-versed in working with data – can leverage their skills and training for big data applications that resonate with stakeholders.[3]

Librarians manage different types of published information and data, and also curate a wealth of information that awaits further exploration and exploitation based on digital methods and tools. To step up skills and competencies of librarians and to some degree research staff, several initiatives have looked into specific areas, e.g. open science, research data management, digital curation, digital humanities, eResearch, data science, etc.[4] Some of these initiatives focus on professional training, others target the development of higher education curricula and explore how librarians can contribute.

2.1. Defining Competencies and Skills

According to the European e-Competence Framework (e-CF) competence is the "demonstrated ability to apply knowledge, skills and attitudes to achieve observable results". Hence, a competence is not a skill; on the contrary, a competence *embeds* skills. Whilst competencies are holistic concepts, skills are precise and definite abilities, either hard technical, e.g. make a cost / benefit analysis, develop user interfaces; or soft, e.g. deploy empathy to customer needs, negotiate contract terms and conditions (e-CF, 2014). Job profiles typically combine several competencies, and one single competence may be assigned to a number of different job profiles. A core idea in this context is that competencies can be grouped by areas (plan, build, run, enable, manage) and can be categorized by proficiency levels, ranging from the ability to apply knowledge and skills to solve straightforward problems to the overall accountability and responsibility, and to solve critical problems in an innovative way (the e-CF's levels e-1 to e-5 are related to the European Qualifications Framework's levels 3 to 8) (e-CF, 2014).

In North America, ARL members have been engaged in identifying the issues around evolving competencies needed for the work of research librarians, and how these roles intersect with new functional specialists, documented in a series of

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3 See also: Florida Library Webinars, 31 August 2015, http://floridalibrarywebinars.org/the-accidental-data-scientist-a-new-role-for-librarians-and-info-pros-ondemand

4 E.g. Facilitate Open Science Training for European Research (FOSTER), https://www.fosteropenscience.eu/; MANTRA Research Data Management Training, http://datalib.edina.ac.uk/mantra/; Essentials for Data Support, http://datasupport.researchdata.nl/en/; Curriculum Framework for Digital Curation, Digital Curator Vocational Education Europe (DigCurV), 2013, http://www.digcur-education.org; EDISON, http://www.edison-project.eu.

publications entitled "New Roles for New Times" (Januszewski and Williams, 2013; Covert-Vail and Collard, 2012) and by Rockenbach *et al.* (2015).

3. Mapping E-Research and Service Areas

A range of descriptions of services areas and related competencies have been developed and shared with the community for comments by the joint Task Force on Librarians' Competencies in Support of E-Research and Scholarly Communication. Consolidated versions will be published in spring 2016.

3.1. Managing Research Data

Research data management (RDM) involves services and infrastructures in order to support the handling of research data across the data lifecycle (i.e. creating/collecting, processing, analyzing, publishing, archiving/preserving, re-using data). The various aspects of RDM are often distributed across different support services (research office, IT services, library) and academic departments. Interviews with researchers demonstrate that, while researchers need support in numerous areas across the entire research lifecycle: planning, organizing, security, documenting and sharing, preparing datasets for deposit and long-term preservation, as well as issues related to copyright, licensing and intellectual property more generally (e.g. Wilson, 2014; Parsons *et al.*, 2013).

Research data management encompasses a large group of activities that may differ significantly across the research data lifecycle. Generally it requires a high level of interaction with researchers and also working with other support services including technical services and research officers.

There are various strategies for service development and operation, some concentrate on discipline-specific services developed in the context of projects, others highlight multidisciplinary perspectives (e.g. Molloy and Snow, 2012; Carlson, 2015).

For RDM training close work with disciplinary experts is recommended to ensure that the terminology used is accurate and clear; discipline-specific examples and good practices are also highly valuable for engaging the audience and for putting basic principles in context (Molloy and Snow, 2012).

Based on funder requirements, the need to support researchers in creating and implementing data management plans has substantially grown over the last years. Several libraries have set up a service to support such needs, often in collaboration with other service units (e.g. research office, IT services, legal advisor, ethics committee). The development of such a service can even serve as a training ground for librarians and other institutional stakeholders (Davis and Cross, 2015).

Libraries' activities in research data management can be usefully conceptualized as falling into three broad categories: *providing access to data*; *supporting researchers and students in managing their data*; and *managing a data collection*. There are overlaps, but each of these areas has some distinctive roles for librarians. Providing access to data mainly involves consultation and reference services, e.g. to identify datasets, provide advice on discovery and analytic tools as well as how to cite/reference data. Advocacy and support for managing data is a wide area of activities ranging from promoting the institutional data policy, providing support and training, e.g. on how to

write a data management plan or how to identify and use data repositories, to develop data curation profiles, and to manage software related to data. The management of collections targets activities such as the preparation of data, its preservation, sharing and publishing. Further details on the core competencies needed to cover these areas can be found in the RDM skills and competency profile (cf. note 1).

3.2. Scholarly Communication and Open Access

Scholarly communication and Open Access (OA) involves changing modes of communication of research made possible in the digital environment. For example, the evolution from the traditional commercial publishing model where the author signs away their copyright to a work of original research scholarship to subscription-based journals to one of several OA models that have been emerging over the past two decades. Scholarly communication can be defined as "the system through which research and other scholarly writings are created, evaluated for quality, disseminated to the scholarly community, and preserved for future use. The system includes both formal means of communication, such as publication in peer-reviewed journals, and informal channels, such as electronic listservs" (ARL). Other informal scholarly communication channels include posts in social media, e.g. blogs, tweets, etc.

One of the most widely used definitions of OA is that from the Budapest Open Access Initiative, from a conference of that name held in 2001: "By 'open access' to this literature, we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited" (BOAI, 2002).

Some examples of how libraries have been involved in this process are:

- Providing consultation and training that encourages and enables faculty to manage their own copyright and improve the economics of, and access to, published research.

- Developing and contributing to scientific information infrastructures for the dissemination and linking of research outputs, e.g. digital repositories and their networks – on institutional, national and international levels (e.g. SHARE, OpenAIRE, LA Referencia, COAR).[5]

- Offering OA journal and/or book publishing services and other value-added services to scholars on their campus (work with the university press if there is any).

- Working with the acquisition department, library consortia and research funders to develop and maintain a publication fund, OA memberships and OA clauses in licenses.

- Providing access to services and resources that help measure quality and impact of scholarship, from traditional bibliometrics to emerging altmetrics.

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[5] SHARE, http://www.share-research.org/; OpenAIRE, https://www.openaire.eu/; LA Referencia, http://lareferencia.redclara.net/; COAR, https://www.coar-repositories.org.

Libraries' activities in scholarly communication and open access typically fall into one of these categories: *scholarly publishing services; copyright and open access advocacy and outreach; scholarly resource assessment*. Some level of subject knowledge is required in most of these roles. In particular, librarians will need to have a broad perspective and understanding of the traditional (commercial, society) and open access models of publishing, intellectual property issues, and economics of scholarly publishing. For example, librarians in this role may support graduate students and faculty members who wish to start new Open Access journals that the library may host, coordinate education and advocacy events such as Open Access Week, and serve on campus copyright committees to assist with campus policy development and interpretation.

3.3. Digital Humanities

Digital Humanities (DH) describes a multidisciplinary research community involving the application of computational methods to humanistic topics of inquiry, or, more broadly, the intersection between the arts and humanities and information technology and/or digital expression (for a discussion of research trends and views on DH see e.g (Burdick *et al.*, 2012; Holm *et al.*, 2015). Digital humanists utilize computational methods and/or digital tools to advance research and pedagogy. Methods and tools include, but are not limited to: 3-D representation, digital mapping, electronic textual analysis, digitization of materials, data visualization techniques, and interactive digital media including game-based systems.

Over the last decade, several universities have stepped up their support of humanities research by creating research centres and workspaces,[6] many of them in close collaboration and physically located with their respective university libraries.

Engagement with Digital Humanities is an evolving specialization in librarianship, one that requires a combination of a strong academic background in the arts and humanities (domain expertise), technical grounding in technologies and tools to support computational models of research and teaching in Humanities, and project management. The role has other important components such as advisor, advocate, and partner for special collections curators. The digital humanities librarian's role is also directly related to scholarly communication and data management.

The library's organizational structure will affect the services offered and roles played by digital humanities librarians, but across various models, the digital humanities librarian will likely work in a team environment, making collaboration and the ability to perform in a changing and dynamic role core competencies for this specialization.

When it comes to services and responsibilities digital humanities librarians engage in *scholarly communication and publishing, technical services* (in particular related to interaction with digital resources and collections), *partner with faculty and student for*

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6 Cf. centerNet, an international network of digital humanities centres, http://www.dhcenternet.org/, and European Association for Digital Humanities, Digital Humanities Centres, http://eadh.org/education/digital-humanities-centres. From a much broader perspective an increasing number of universities and colleges are also establishing digital scholarship centres to support researchers in their work with digital tools and large datasets, such as data visualization in the environmental sciences, data mining of large corpora of texts in the humanities, and developing GIS or other geolocation data representations in the social sciences (Lippincott, 2014).

digital humanities research and consulting, provide teaching and training activities, and develop and manage spaces (labs, collaboratories) for digital humanities work.

Accordingly, digital humanities librarians bring together a wide range of compentencies and skills. A base layer is typically advanced academic subject expertise and professional training in library and information science, particularly in scholarly communication and data management. When it comes to technical skills, many job descriptions note the emerging and evolving state of technology by requiring general competencies such as "demonstrated ability and interest in exploring and evaluating emerging technologies in support of digital humanities," and a "willingness to remain current with changing technology and its applications" (cited from job descriptions, cf. note 1). Technical skills and competencies include e.g. data visualization, text mining, metadata standards and schema, text markup and encoding, semantic web technologies. Essential for direct involvement and/or consultation with research activities are also project and program development and collaboration skills, e.g. grant writing and the development of technology-rich work spaces.

4. Conclusions

Not surprisingly, a number of other new areas could benefit from librarians' support – and this again comes with a need for developing/expanding skills to fulfill these new roles. One area which is evolving very fast is text and data mining (TDM), and libraries might already have a range of subscriptions and collections which come with appropriate licenses but have not yet stepped up to provide practical support for researchers to exploit these riches (Okerson, 2013). As already mentioned above support for TDM plays a key role in digital humanities research, e.g. allowing new views on texts, but other research areas such as economical and social sciences will benefit as well (Liber, 2014; ASIS&T, 2015).

In our discussion of competency profiles we have only briefly touched how librarians acquire the skills and competencies needed for these evolving and sometimes already well-established service areas. Strategies will vary depending on institutional and personnel resources and range from attending workshops or conferences and/or joining working groups, the development of institutional training programs for individuals and/or groups, participation in online learning course (e.g. MOOCs), etc. Most beneficial might be to combine newly hired experts and long-term staff in new teams which dedicate their efforts to developing and delivering new types of services. Such teams will often combine staff with different backgrounds, and bring new skills sets to the institution, e.g. from the publishing industry to build up / enhance a publishing unit, or from research disciplines or technology experts to develop and promote specialized data infrastructures and digital work environments. Not surprisingly, involvement in collaborative projects, national and internationally, are a good instrument to contribute own expertise and learn from others to build up prototypical services. However, additional effort will be needed to assess the results of these efforts and for sustaining both personnel and infrastructures.

It should be noted that job descriptions can be excessively demanding in terms of experiences and skills, as if the search is for the "Unicorn Librarian – that magical creature who can be all things to all people" (Johnson, 2014). Therefore, individuals and employers should consult the task force's competency profiles with some caution.

Typically it will be a group of individuals that bring together these competencies and skills, a collaborative work force which strengthens the library's capacities and which may also be an element of new organizational structures.

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