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Advancing Research Data Management: A Social Capital Perspective on Functional Librarianship

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Introduction

This chapter investigates librarianship in the area of research data management (RDM) through the lens of social capital theory. If social capital theories and concepts have the potential to bring to light the invisible or non-quantifiable value of academic library services (Bracke 2016; Corral 2015), we postulate that they will lend a generative lens to explore the symbolic, network and normative effects of engagement within the academic library. Using librarian and archivist-authored RDM literature as a case study, we will explore the dynamic relationships between network structures and the effects of functional librarianship on the social capital of academic libraries.

User studies of scientists and case studies of library RDM programs (Perrier et al. 2017) are common in the literature, but their underlying theoretical frameworks are limited to individual behaviourism (Fecher, Friesike & Hebing 2015), normative and historical institutionalism (Akers et al. 2014; Zenk-Möltgen et al. 2018), 'wicked problem' theory (Cox, Pinfield & Smith 2014) and organisational subculture theory (Cox & Verbaan 2016). Insights about the unique positionality of libraries within the academic community (Gold 2007) and potential leadership opportunities (Flores et al. 2015) have been mentioned but have yet to be clearly theorised to the level of a useful framework for deeper analysis or practical application of RDM research.

A social capital perspective will offer a theoretical framework which contextualises the potential benefits born of functional engagement, including access to information attributed to network positionality and bridging connections, mutual supports found in communities with dense ties and group cohesion, and agency for enhancing reputation (Lin et al. 2001). As the presence of social capital can be used as a predictor of healthier institutional, disciplinary and departmental climates, this examination will highlight opportunities for strengthening social

capital in libraries. We will also suggest modalities for libraries and related organisations to more consciously transform themselves using identified relationship building strategies.

We provide a review of current RDM literature which summarises the existing theoretical assumptions applied in the research to describe the development of RDM services and solutions in light of existing challenges. This is followed by an introduction of classic symbolic, normative and network views of social capital theory, which are synthesised and applied to our sample during our coding exercise. Several essential themes surface in our axial coding exercise and they are summarised in our results and findings.

Literature review

In her 2007 article, Anna Gold predicted that research data services could lead to an upstream trajectory for library research support at the beginning of the research lifecycle. While the acquisition of necessary data skills and a deeper domain knowledge would be an investment for librarians to acquire, she maintained that acquiring this human capital was a worthwhile journey, as libraries are uniquely-positioned stakeholders in that they exhibit a culture of collaboration across institutional boundaries (Gold 2007, section 2.4). While this early social capital perspective on RDM did not see further exploration, in the last decade RDM services have seen gradual establishment in many higher education institutions worldwide (Tenopir et al. 2015; Tenopir et al. 2017; Yoon & Schultz 2017; Koltay 2019).

According to a scoping review by Perrier et al. (2017), 301 elements of literature on RDM, including interviews and case studies, have emerged prior to April 2016. In these texts, individual behaviourism and normative institutionalism form the theoretical backbone which underlies most studies focusing on researchers' individual motivations and concerns about data sharing (Perrier et al. 2017, p. 9). When outside pressures are included in these analyses, for example, social policies or cultural norms, they are seen as eventually taking effect on individuals through attitudes, perceived benefits (Fecher, Friesike & Hebing 2015; Kim & Stanton 2016) and capacity for control (Zenk-Möltgen et al. 2018) at the cognitive level.

The reality of RDM appears much more complicated than what can be solved by combining 'carrots and sticks' as suggested by individual behaviourism and normative institutionalism. Instead, as a series of studies (Cox, Pinfield & Smith 2014; Awre et al. 2015) reveal, RDM challenges have met the criteria of a 'wicked' problem, in that it is viewed differently by different stakeholders, constrained by complicated cultural, political and economic factors, has no finite list of solutions and is under great resistance to change (Awre et al. 2015, p. 361). New types of leadership and new modes of addressing the challenges are needed, and among them, relationship building and collaboration are key (Cox, Pinfield & Smith 2014, p. 13; Awre et al. 2015, p. 368).

A comparison of historical institutionalism approaches has been applied to describe the different pathways for establishing RDM services at variety of institutions (Akers et al. 2014;

Bryant, Lavoie & Malpas 2018). In these studies, different institutional resources and contexts are compared and analysed and the results suggest that in spite of their uniqueness, institutions seem to take a similar route to engage with RDM, involving the following: environmental scan, needs assessment, creation of policy and service institutionalisation on one or more dimensions of the three RDM capacities which include education, expertise and infrastructure. Wicked problem theory and historical institutionalism highlight the multifaceted challenges of RDM and dynamic institutional RDM strategies. What remains absent is how individual researchers, libraries and other stakeholders are socially connected in this global RDM movement.

Another thread of theory (Verbaan & Cox 2014; Cox & Verbaan 2016; Jackson 2018) looks at the research library as an organisation in parallel with other research support units such as IT, ethics review boards and research administrators. These entities hold either complementary or differing views on RDM and thus could be perceived as partners as well as competitors for libraries when claiming authority over this growing area of research support. Research in this area helps libraries to better coordinate with these partners and creates a sense of momentum among libraries by highlighting the risk of missing this opportunity for leadership.

Coates (2014) reminds us that momentum for library leadership in RDM extends beyond a need for libraries to demonstrate their ongoing relevance to the academy. She underscores that advancing RDM is fundamentally about a cultural change, and as she states, 'A change in culture is long overdue' (Coates 2014, p. 599). This cultural change can be characterised by a more open, collaborative and participatory way of enacting science, but is experienced as a slow and complex process (National Academies 2018; Nemer 2018; Guédon et al. 2019). Could libraries be more conscious about our social and human capital and lead the engagement of researchers towards the open science culture envisioned worldwide?

Based on their experiences with researcher and library communities, a group of research fellows of the Council on Library and Information Resources (CLIR) and the Digital Library Federation (DLF) advocate that libraries should leverage their relationships at different levels both internally and externally to assume a leadership role in fostering a more collaborative RDM landscape for researchers (Flores et al. 2015, p. 83). Due to the uneven development of RDM policies and practices at varying levels, they predict that demands and opportunities for library support at these different levels will flourish (Flores et al. 2015, pp. 88-90). Here, we see a tacit articulation of a need for social capital theory to analyse libraries based on their special network positionality.

Theories of social capital

To structure our analysis, we examined symbolic, network and normative views of social capital (Angelusz & Tardos 2001, p. 299). This section will briefly introduce these approaches and their key distinguishing elements from which we have derived the scheme for our content analysis and interpretation.

Symbolic

A symbolic view of social capital carries an association with the work of Pierre Bourdieu. Bourdieu identifies three forms of capital: economic, cultural and social capital, and underscores the fluidity of connection between them (Bourdieu 1986). An individual's volume of social capital can be measured by 'the size of the network of connections he can effectively mobilize and on the volume of the capital (economic, cultural or symbolic) possessed in his own right by each of those to whom he is connected' (Bourdieu 1986, p. 249). Bourdieu's networks are not value neutral, they are class-based power-laden structures that can shift to maintain particular group membership and exclude the other.

As will be seen with the normative and network approaches, network maintenance is critical for retaining social capital. Bourdieu (1986) advises that material and/or symbolic exchanges are required for maintenance and reinforcement of social capital, although a titular endowment ensures a socially instituted and guaranteed position. In this way, social capital is institutionalised through expressive acts between individuals that reinforce a privileged group and can be equated with the maintenance and reproduction of the dominant class. Our symbolic analysis of the literature considers status, privilege, solidarity, group membership and the reproduction of reputation and inequality.

Normative

The normative view of social capital is often associated with the work of Coleman (1988; 1994) and Putnam (1993; 2000) and can be characterised in terms of social cooperation and norms of reciprocity and cooperation, often realised most readily through network closure. We see evidence of Durkheim's rational choice theory in that actors build social capital as a by-product while aspiring towards the maximisation of their utility (Häuberer 2011, p. 41). Coleman (1988, p. S119; 1994, p. 312) identifies several forms of social capital: 'obligations and expectations, which depend on trustworthiness of the social environment, information-flow capability of the social structure, and norms accompanied by sanctions' and authority relations. The individual actor is assumed to have a set of resources that can be contributed to a greater social structure on which a group can draw. Coleman (1988, pp. S105-S108) believes that networks that have closure are especially useful as they maintain a level of trust.

For Putnam (2000, p. 19), as for Coleman, social capital refers to efficiencies enjoyed by way of the norms of reciprocity and trustworthiness that arise from the connections among individuals. Putnam (2000, pp. 222-3) diverges from Coleman by dividing social capital into two main non-interchangeable categories which he terms 'bridging social capital' and 'bonding social capital'. Bridging social capital most resembles Coleman's view of social capital, in that it generates broader identities and a need for reciprocity, while bonding social capital acts as a form of 'sociological superglue such as that found in families that runs the risk of excluding the other' (Field 2017, p. 18).

Our coding for normative elements includes evidence of network closure, group obligations, endorsement of behaviours, identity building, and social capital as an aid with the acquisition of credentials.

Network

The network approach is often discussed in terms of the work of Nan Lin (2001) and Ronald S. Burt (1992; 2004). They both view social capital in terms of how individuals mobilise resources for personal gain with a nod to the benefits or constraints of an individual's or group's network positionality.

Häuberer (2011, p. 87) explains that in Burt's theory actors can leverage their 'possession of financial, human and social capital generated from their position in the social structure'. The possession of these forms of capital determine an actor's ultimate access to social capital. In contrast to normative views of social capital, Burt (1992 cited in Häuberer 2011, p. 92) argues that social capital can be found in open networks that contain non-redundant connections between contacts called 'structural holes'. Burt's optimal efficient network is where 'an actor reaches a network through just one contact' (cited in Häuberer 2011, p. 92).

For Lin (2001, p. 54), social capital revolves around the individual actor and their potential for finding and exploiting available resources; it is a given that individuals are ordered hierarchically in society, and that their position affects their ability to form networks with others and the degree of benefit they will obtain from their interaction. Lin (2001, p. 29) defines social capital as 'resources embedded in a social structure that are accessed and/or mobilized in purposive actions'. In general, Lin (2001, p. 48) indicates that preferred partners are those with slightly higher social statuses, as they offer a 'prestige effect'. In Lin's theory, actors can engage in either expressive or instrumental actions. 'Expressive action' is motivated by asserting one's claims to resources and/or sharing sentiments, while 'instrumental action' is motivated by resource gain in the form of economic, political and/or social returns (Lin 2001, p. 75).

Our content analysis considers network elements including non-redundancy of contacts, bridges between networks, network positionality, and expressive and instrumental action. Having laid out these three theoretical positions on social capital, we'll now proceed with describing our process.

Methodology

From an extensive bibliography of recent library literature discussing RDM services, a sample of 20 texts was assembled to represent RDM services at various levels and among different stakeholders, including published papers, white papers, website descriptions, reports from the field and case studies. This original material was imported into Dedoose software for analysis.

We completed two rounds of coding. For the first round, the corpus was coded deductively against a baseline coding scheme of key social capital concepts. The second round of coding

followed a grounded theory approach. An axial coding strategy was employed and excerpts were re-examined to identify key themes that are relevant to the observed phenomena identified during the coding process.

Unlike qualitative studies which directly interview research subjects based on a predesigned instrument, the material we gathered was not written for the purpose of this particular research. We were conscious of this limitation of the evidence with respect to the theoretical social capital aspects we intended to examine. Other limitations of our sample included a narrowing to North American coverage and the potential for bias due to a disciplinary slant, the backgrounds of the authors and the attributes of scholarship intended for library audiences. Nevertheless, these sources offered ample data for examining the dynamics of social capital.

Results and discussion

From a quantitative perspective, the first round of coding offered minimal insights. We worked with a corpus of 20 texts, 12 top-level codes and 105 sub-codes. Coding yielded 304 excerpts with 706 code applications. We noted that code application favoured network characteristics of social capital with 47% of our assigned codes describing network-related phenomena, 22% describing normative behaviours and 5% speaking to symbolic elements. The codes most often used spoke to network concepts: bridging ties at 5%, expressive action at 5% and network positionality at 4%.

These three most frequently applied codes demonstrated interesting code co-assignments. As an example, the code *expressive action* was found to be co-assigned with *human capital*, *facilitation of flow of information*, *instrumental action*, *network positionality*, *building self-identity* and *reputation*. This finding is supported by the literature, where Lin (2001, p. 45) explains that expressive actions are actions geared to preserving and maintaining one's resources; actions that are expressive in nature often take the form of broadcasting one's position in a network, however the outcome remains 'primarily expressive: acknowledging ego's property rights or sharing ego's sentiment'.

For the code *bridging ties*, we saw frequent code co-assignment with *partnership*, *network position*, *instrumental action*, *expressive action* and *heterophily*. Here we see a reference to Putnam's view, which, while primarily normative in classification, does offer a network element. For Putnam, bridging social capital brings together people from diverse backgrounds which is better for linkage to external assets and for information diffusion (Field 2017, p. 18). The co-assignment with heterophily is also to be expected, as 'heterophilous interaction' refers to an exchange of resources between actors with dissimilar resources, which is anticipated in the context of a bridging tie (Lin, 2001, p. 47).

For the code *network position*, frequent code co-assignment was found with *offset lack of other forms of capital*, *group expectations and obligations* and *network closure as exclusion*. This is an interesting code co-assignment as it suggests a relationship between the inherent benefits of

normative structures and how they can offset challenges of lower network positionality. We will discuss below examples of how libraries form normative structures at higher administrative levels, which help to better establish libraries as a partner, thus opening up opportunities that would be much more difficult to access without the establishment of normative expectations.

While the first round of coding offered minimal insights, the second round of coding yielded several themes more relevant to an exploration of RDM in the library context. These themes examine and interrogate points of intersection between different theoretical views of social capital and are further explored below.

Symbolic positioning

A symbolic analysis in the area of faculty-librarian relations necessitates a discussion of cultural capital. Bourdieu (1986, p. 248) writes that ‘academic qualification ... institutes an essential difference between the officially recognized, guaranteed competence, and simple cultural capital, which is constantly required to prove itself’. From a symbolic perspective, with the understanding that the degree requirements for ALA accreditation for professional librarians reside at the master’s level (ACRL 2018), there is potential that a disparity of cultural capital exists between librarians and faculty by way of elevated base requirements for faculty credentialing.

This disparity may also extend to a librarian’s rank and status in the academy, where the availability of tenure to librarians in the academy is variable. As an example, Gillman’s research of 664 doctorate-holding librarians shows that only 37% hold tenure-track status (Gillman 2008). We see in the literature, however, that equivalence in rank and status is not a panacea for symbolic positionality. Librarians with a Master of Library Science (MLS) who have faculty status still face symbolic obstacles: ‘The fact that faculty status can be given to an individual holding only a master’s degree may also invite resentment from other faculty members holding PhDs, some authors have noted’ (Silva et al. 2017, p. 430).

We observe limited articulation of inequality between faculty and librarians in our study. Poole and Garwood (2018, p. 814) speak to faculty misconceptions that libraries ‘don’t hire the type of person who... has the technical knowledge’ to advance DH work. They also surface in their literature review that librarians may struggle from timidity born of an ‘academic inferiority complex’ (Vandegrift & Varner, 2013, p. 76). Dearborn (2018, p. 35) adds that the field of archivy also faces challenges with inclusion: ‘While data management is certainly a space where archivists belong, it does not mean the sense of belongingness comes easily’.

As libraries are forming connections with researchers (Witt 2012; Akers et al. 2014; Ippoliti et al. 2018), schools and departments (Hiom et al. 2015), interactions run the risk of the library being perceived as service provider, where librarians are not seen as equal research partners in the relationship. Claibourn (2015) describes a case where a library’s RDM effort and leadership on campus surfaced feelings of territoriality. This was overcome by leveraging the pre-existing research identity of the new RDM librarian: ‘Bringing in an academic with existing ties to the

internal community proved vital. My prior experience helped to lessen some faculty's sense of the Library as 'the other' and to enhance the Library's credibility among several key departments' (Claibourn 2015, p. 102) .

Symbolic resistance to the role of libraries in the field of RDM, however, is not the general case. Our sample includes successful outcomes where librarians are principal investigators on research projects and substantially contribute to scholarly production: 'the involvement of librarians has ranged from helping to create a plan from scratch to reviewing plans, writing letters of support for grant proposals, and being named on grants as co-principal investigators and senior personnel' (Witt 2012, p. 181).

Regardless of perceived symbolic positioning, libraries, prior to engaging in broader campus outreach, tend to mobilise their own functional and subject liaison units or librarians and connect with or form working groups, training programs or support teams (Witt 2012; Akers et al. 2014; Ippoliti et al. 2018). Connections with IT services also helps to bolster an initial RDM offering as the relationship between the library and IT is described as homophilous and complementary: libraries offer data preservation and curation expertise, and IT departments offer data storage, security and potentially HPC capacity, which promotes a reciprocity of referrals based on specific needs (Witt 2012). One might surmise from these actions that libraries are electing to bolster other forms of capital to offset a potential perceived lack of symbolic capital, but we are unable to assert this from our sample.

Bridging and bonding: leveraging and addressing low network density

An examination of our sample shows that libraries and their services suffer from a lack of understanding and visibility to their potential user groups. Surkis et al. (2017, p. 186) note 'a widespread lack of awareness of many available library services', while Poole and Garwood (2018, p. 813) describe an assumption about the range of library expertise 'I really don't think if I went into the library I would have learned from someone who's a staff member [...] how to use MongoDB'. Whether these assumptions are borne of a lack of interaction: 'It could be just that there's a lack of communication between my field and the librarians, so I may not know what they can do for me' (Poole & Garwood 2018, p. 817), or not being understood, it underscores the necessity for libraries to leverage their capacity for network building.

Our sample shows that the liaison model is a helpful tool for establishing bridging (low-density) ties across the institution. It also underscores the challenges of disseminating information: '... the importance of individual contacts within schools and faculties cannot be underestimated; they have been fundamental in establishing workshops and promoting the event amongst researchers' (Hiom et al. 2015, p. 479); 'departments with the highest attendance ... indicat[ed] that direct outreach to a user community is highly effective ... The uptick in registrations with each new means of outreach indicated that there was no sole means of reaching the entire medical center community' (Surkis et al. 2017, p. 189).

The above quote by Surkis et al. (2017) suggests that the density of networks between and among faculty and across departments/schools can be characterised as low, and that there is a lack of bonding (high-density) connections between them. Scholars tend to find connection and belonging within their discipline or subdiscipline and are often a challenge to reach with any measure of reliability via institutional channels. The library liaison strategy directly addresses this challenge by building bridges to disparate networks and user communities, often one scholar at a time. This allows for personal channels by which to broadcast information to the campus community. In this way, liaisons have the capacity to bridge structural holes in the organisation.

Acting as a bridge between networks over a structural hole is a powerful position from a social capital perspective and affords four levels of brokerage: (1) an ability to communicate between networks, (2) the facility to share best practices with both groups, (3) the skill of drawing analogies between ostensibly different groups to translate and share beliefs or practices of utility and (4) the ability to synthesise new beliefs or behaviours that combine elements from both groups (Burt 2004, p. 355).

We observe that libraries make use of all four levels of brokerage internally as a result of the intersection of liaison with functional models. When librarians with RDM, metadata and subject domain expertise work with each other, they bring together information from their individual brokerage positions to the table. This is a powerful mechanism which allows for the synthesis of effective new services/programs in the libraries.

Libraries do not rely exclusively on low-density bridging strategies. We see in our sample many attempts to combat the challenge of outreach to disparate networks by building network density and functional groups on many levels. These can be seen internally within the library, such as described by Akers et al. (2014, p. 181) where library research data services ‘permeate throughout the entire library culture’. We also see the model of embedding librarians into research groups which establishes a sense of normativity with respect to librarians having a key role in advancing RDM services. As described by Clement et al. (2017, p. 110): ‘The planned makeup of the institutional teams, each consisting of a faculty principal investigator, two student researchers, a librarian, and an educational technologist or IT support person, was a deliberate attempt to bring together stakeholders with diverse perspectives and complementary skill sets’.

Further to these examples, we note the forming of partnerships as a key strategy to increase institutional awareness of library expertise. Frequently mentioned partnerships include the forging of relationships with IT and sponsored research departments as mentioned by Clement et al. (2017). Other partnerships include national consortia working on ‘a process for identifying data curators, expertise and activities ... as part of a broader “network-building” initiative’ (Moon et al. 2019, p. 1). Partnerships are also significant from a normative perspective, as is noted by Hiom et al. (2015, pp. 488-489), where success of embedding into faculty projects is determined by the ability to ‘align our educational programs with current disciplinary cultures and norms, as well as with local practices and needs’ (Carlson et al. 2013, p. 207).

Leveraging network positioning

Whether it is at the level of the dean/library director or via established groups, forming connections with administrative entities is pivotal to the success of establishing libraries as key partners and leaders for RDM at the institutional level (Akers et al. 2014; Hiom et al. 2015; Ippoliti et al. 2018). It is notable that many of the outreach and partnership efforts in our sample are initially spearheaded by the dean/library director. This has theoretical significance from both a symbolic and network view of social capital.

From a symbolic perspective, Bourdieu theorises that an action may yield different returns 'according to the extent to which one is able to mobilize by proxy the capital of a group' (Bourdieu 1980, cited in Field 2017, p. 5). Functioning at an administrative level, a dean/library director has the symbolic authority and status to speak on behalf of the resources of their unit, which provides a more powerful and potentially more convincing voice at the table.

From a network perspective, a dean/library director functions at a higher level of network positionality within the institution and serves as an intermediary between library academic and professional staff and university administration. The notion of the intermediary is significant in social capital theory. An 'intermediary, with its embedded and commanded resources, projects better social credentials, so that its willingness to serve as an intermediary assures or elevates the credentials' of the other (Lin 2001, p. 61). The prestige hypothesis (Laumann 1966) is also significant here, as it indicates that:

'preferred partners for interactions are those occupying slightly higher social statuses... The implication is that such interaction is expected to enhance the prestige of the less advantaged actors' (Lin 2001, p. 48).

Hence, examining a dean/library director's expressive action on behalf of the library elevates the credentials and the status of library activity in a particular area.

Normativity and the effectiveness of groups

Social capital is theorised by Putnam (1993, cited in Field 2017, p. 16) to have normative effects, as it

'contributes to collective action by increasing the potential costs to defectors; fostering robust norms of reciprocity; facilitating flows of information, including information on actors' reputations; embodying the successes of past attempts of collaboration; and acting as a template for future cooperation'.

These effects are predicated on the formation of social networks, and in particular groups, which give rise to norms from which trust and reciprocity may arise (Field 2017, p. 18). Trustworthiness is not automatic and will more likely develop when social structures are closed, or relationships exist among all actors, as obligations and expectations can be raised and sanctioned effectively (Coleman 1988, p. S107; Häuberer 2011, p. 43).

Examples of normativity abound in the library profession and are particularly visible in planning documents that outline norms for group engagement. As an example, Atwood et al. (2017) share a breakdown of planning committee roles, offering a roadmap for others in the field to establish their own communities of practice. The norms introduced within the article can be interpreted as a social contract of sorts, laying out expectations for terms of engagement.

The Research Data Alliance (RDA 2018) similarly offers an expression of normative expectations established by a group. Nurnberger (2018, p. 27) speaks to the norms established by the RDA which are coalesced under the concept of ‘radical collaboration’:

‘Lacking the strategic oversight of TAB [Technical Advisory Board] or a similar group that is focused on inclusion, balance, and processes enabling representation, participants in an institutional setting must be self-conscious in considering with whom they are sharing a collaboration, who else should be involved, and how they will establish an environment that normalizes the behavioral expectations required for radical collaboration’.

The forming of groups to effectively deliver RDM services within and beyond the institution is prevalent in our sample. In some cases, authors characterise directly the normative benefits of group membership: ‘by investing in approaches to train and educate the research data management community in transparent, open, and welcoming ways, archivists and allies can frame the act of making good practices as an easy choice that contributes to a common, sustainable good’ (Soyka 2018, p. 51). In others, we see a tacit reference to normativity in the formalisation of networked resources that are committed to sustainability and mentorship:

‘And the human sustainability is fostered through the active mentoring and expertise transfer between the Senior Technical Consultant and the Data Management Consultants and the close collaboration between the DMS [data management services] and DC [Data Conservancy] teams’ (Shen & Varvel 2013, p. 555).

These examples illustrate a recognition of the library community with respect to the effectiveness of group creation and the inherent nature of social capital as a structural asset that emerges out of networks of relations with individuals or collectives with the character of a public good (Häuberer 2011, p. 145).

Durability of ties

There is agreement among theorists that social capital is subject to diminish without an actor’s investment in its regular renewal. This section reflects on the durability of network structures in use by libraries.

Networks emerging from grant-funded projects require considerable investment from a limited number of participants and institutions. Librarians involved in these projects form dense ties due to the intensity of interactions required to successfully meet their mandates. For example, the Data Information Literacy (DIL) project was focused on RDM training for graduate students

(Carlson et al. 2013) and the Data Curation Network (DCN) remains focused on data curation (Johnston 2018). While they have clear project goals, these networks are less durable as they are vulnerable to sustainability challenges due to fixed terms of funding. Project-based networks would do well to invest in forming and renewing connections with related actors and communities to maximise the success of expressive action and ensure that outputs produced are communicated as valuable resources for the broader community.

Event-based regional RDM networks, particularly those anchored by rotating regional host institutions, hold the potential for greater network longevity (Atwood et al. 2017). While the conference and roundtable formats of these events tend to offer bridging opportunities, these connections are with librarians in close proximity who are encouraged to share practical experiences and learn from each other through mechanisms of discussion, lightning talks and workshops. Events of this nature evoke Bourdieu's (1986, p. 248) definition of social capital where these meetings help to create 'a durable network of more or less institutionalized relationships of mutual acquaintance and recognition – or in other words, membership in a group'.

The Canadian Portage Network, prior to joining the Digital Research Alliance of Canada (the Alliance), actively cultivated network durability. The network offered no shortage of opportunities for the community to join working and 'expert' groups and members worked closely and intensively within the active projects (Moon et al. 2019). These working groups enabled the constant renewing of ties within the community and offered opportunity to broadcast ongoing successes to keep the project front of mind. Portage also invested in renewing external connections by consciously building relationships with national partners. As both a close community of RDM experts in academic libraries and a formal and active national organisational coordinated structure, Portage embraced the opportunity to leverage library successes to secure their involvement as critical players within the future RDM landscape. The success and sustainability of Portage and its merger with the Alliance to integrate advanced research computing and research software can likely be attributed to its ability to renew and build meaningful relationships with other RDM stakeholders, especially the growing disciplinary RDM initiatives, at institutional, national and international levels.

Conclusion

In this chapter we have investigated library involvement in RDM through a social capital lens with a focus on how libraries build and leverage social capital to advance their work. The concepts and theories discussed helped us to look at library interactions with the academic community beyond the lens of individual behaviourism and normative institutionalism. We found that researchers and RDM stakeholders are social entities connected dynamically on symbolic, normative and network dimensions and that libraries demonstrate a tacit understanding of how to leverage social capital.

Symbolic capital was often created and expressed through partnerships that multiply symbolic weight and value, and was utilised by deans/library directors who leveraged their network positionality to bridge structural holes in the institution and to connect personnel with contacts at higher levels. Consciously integrating normative elements of reciprocity, trust and clarity of obligations and expectations into governance and policy at all levels effectively leveraged the affordances of network closure. Functional and subject liaison models, particularly in partnership, created bridging ties over structural holes and performed expressive action to maintain network positionality and awareness

At best, the strategies identified in this chapter refer to the RDM literature in aggregate, which brings a variety of successes to light, but does not associate winning strategies with the differing resources libraries may have at their disposal. It is also not possible to tell why the libraries in our sample chose particular courses of action and how they reasoned between choices. A suggestion for future research would be to identify groupings of libraries based on perceived levels of social capital, and to examine methods in light of these different conditions to help decide between approaches. Should this research come to pass, creating a guidance document in the style of *Starting the Conversation: University-wide Research Data Management Policy* (Erway, 2013) would help libraries with formulating successful strategies that best reflect their respective climates.

As an international cultural movement, RDM requires the full social and cultural engagement of researchers and related stakeholders to evolve social and technical infrastructure. As academic libraries continue to actively create new forms of social capital in partnership with a broad base of collaborators, an emphasis on professional education in the field to build an understanding of social capital for both students and practitioners would make available a useful theoretical frame of reference for strategy and practice. As academic libraries and the higher education sector seek innovative solutions for ever expanding challenges within a context of growing fiscal constraint, the social capital perspective is a framework that can help practitioners and leaders recognise and critically evaluate their social positioning and assets, as well as strategically develop, leverage and deploy their resources.

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