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Toward Core Competencies for Entrepreneurship Librarians

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Abstract

This paper shares the results of a survey of North American academic librarians engaged with campus entrepreneurship to identify unique job responsibilities and tasks, the skills and experience they employ to carry out this work, and the impact that campus context has on librarian engagement with this community. A contextual approach draws on a variety of sources to first identify competencies which were adapted and then ranked. Research services and engagement; market research; innovation and problem solving, relationship building, and critical thinking are identified as key competencies. Participant demographics and work experience as well as institutional engagement were also considered.

Toward Core Competencies for Entrepreneurship Librarians

Entrepreneurship is one of the fastest growing areas on academic campuses in Canada and the United States. As universities and colleges place increasing emphasis on entrepreneurship as a key strategic initiative, academic libraries are adding this subject area to the suite of services they provide, whether through creating new positions or adding to the portfolios of existing librarians and staff.

No longer solely within the domain of the business school, entrepreneurship education is a fast-growing, interdisciplinary practice. Defined by the Kauffman Foundation in a 2013 report *Entrepreneurship Education Comes of Age on Campus* as "the teaching of skills and cultivation of talents that students need to start businesses, manage risk, and innovate in the course of their careers" (p. 1), post-secondary entrepreneurship programming in the United States grew from around 250 courses and 104 formal programs in 1975 to over 5,000 courses in 2008 (Kauffman, 2008, p. 16) and over 500 formal programs (including certificates, minors, and majors) in 2006 (Kauffman, 2008, p.6). Outside the classroom, campus incubator and accelerator programs – which provide startups with some combination of mentorship, space, training, and funding – are appearing at an rapid rate; according to a 2012 *New York Times* article, approximately 33% of the 1,250 incubators in the U.S. were located on university campuses, compared to 20% in 2006 (Pappano, 2012, cited in Kauffman, 2013, p. 1). In Canada, a Higher Education Quality Council of Ontario (HEQCO) report found there were 288 entrepreneurship courses offered at that province's publicly funded colleges and universities in the 2013-2014 academic year (Sá, Kretz, & Sigurdson, 2014, p. 12), and all but one of those institutions had a campus-based accelerator program of some kind (Ontario Centres of Excellence (OCE), 2017a & 2017b).

This area of librarianship reflects some of the ways in which our profession is changing as a whole. An earlier Kauffman Foundation report, *Entrepreneurship in American Higher Education* (2008), outlined the various forms that institutional activity can take, starting with the discrete, general/foundational courses, either optional or mandatory, that "brings entrepreneurship into the mainstream of students' discourse about their own education and helps them apply it when they turn to more specialized study" (p. 10). Undergraduate and graduate offerings range from the "discrete course [to] the disciplinary program, the major or concentration" (p. 11). Meanwhile, co-curricular offerings such as incubators and accelerators as well as workshops and events are described as a natural fit for campus entrepreneurship, which "cannot be limited to the classroom. Students interested in it and committed to it will want the opportunity to try it out, to actually do it" (p. 13). This echoes the trend toward experiential learning that is currently reaching across disciplines; Kauffman (2013) describes the range of available courses as "staggering" (p. 9). Outside curriculum, administrative entrepreneurial practices can include incorporation into the tenure process, translational research, technology transfer offices and entrepreneurship centers, work spaces, industry partnerships, and an executive priority/mandate in a strategic plan or other document. Not explicitly stated in the report but inferred from the examples of innovative programs at selected post-secondary institutions is the impact of community; proximity to accelerators, workspaces, technology clusters, innovation parks, and hubs such as Silicon Valley can also influence campus activity.

In response to this growth, we have seen a corresponding emphasis on entrepreneurship support at academic libraries across Canada and the United States. As in the broader business landscape, campus entrepreneurs seek information to inform their ideas, validate their assumptions, and reduce their risk. On campus, the library is uniquely positioned to meet this

demand for information. Given the varied nature of entrepreneurship at different institutions, the librarians providing this support occupy a variety of different roles and possess a range of skills and experience. Similarly, the work that these librarians do also varies based on a number of factors, such as the size of the population they serve, their budgets for collections and programs, and their institution's reputation in the entrepreneurship field.

As new areas of librarianship arise, so does the need for updated competencies. The goal of this research is to begin to distinguish the core set of skills, knowledge, attitudes, and attributes that these individuals share, or if not, to establish the range of competencies they employ. This paper will share the results of a survey of librarians engaged with entrepreneurship on Canadian and American campuses to answer the following research questions: What are the primary job responsibilities and tasks that are unique to entrepreneurship librarians at academic institutions? What skills and experience do entrepreneurship librarians employ to carry out this work? What impact does campus context (e.g., mandate for entrepreneurship activity) have on the degree to which librarians are involved in this area? By identifying the core skills employed by entrepreneurship librarians, we can help to identify standards and determine what education, training, and professional development may be required by those seeking to specialize in this area and those searching for the best candidates to fill new roles, in order to best serve their user communities. We also seek to understand the relationship between an institution's emphasis on entrepreneurship and the degree to which the library has matched this, through staffing and services.

As we originally planned to draw on an analysis of job advertisements for entrepreneurship librarian positions at post-secondary institutions, we found two barriers: one, the number of newly created positions in this field is still quite small, and omits the large

percentage of academic librarians who are already supporting this area; and two: the job description does not necessarily reflect the work that librarians supporting entrepreneurship do every day, and how that might differ from the description in the job posting. Our hope is that our findings will assist in the production of future job descriptions that more effectively capture the relevant subsect of competencies that this community of professionals possesses, to varying degrees.

While similar investigations have been conducted into other emerging areas of librarianship, and specific aspects of library services and support for campus entrepreneurship have been explored since Pensyl (1991), we could not find any broad-based survey of professionals in this niche in the literature. No competencies for entrepreneurship librarians currently exist, despite the origins of the concept in the area of business and management where many of us operate. Rosenstein (2012) tracks the idea of "core competencies" to a 1990 *Harvard Business Review* article by Hamel and Prahalad, titled "The Core Competencies of the Corporation." Peter Drucker drew upon the notion for his own 1994 *Harvard Business Review* article "The Theory of the Business," and again in 1995, where his definition certainly echoes modern blog posts on what entrepreneurs refer to as "product-market fit": "It rests on core competencies that meld market or customer value with a special ability of the producer or supplier" (cited in Rosenstein, 2012, p. 17). Rosenstein marks the transfer of core competencies from companies to individuals, paraphrasing Drucker who "implored people to know their strengths and build upon them" (p. 17). This distinction between those librarians who have made a core focus out of entrepreneurship and those in closely related fields such as business and management or engineering is a key focus of our analysis. Drucker, who coined the phrase "knowledge worker," also made early use of a current buzzword in higher education when he

called upon institutions to embrace the "core competence of innovation" as part of the "organization's personality" (Rosenstein, 2012, p. 17).

Early discussion of competencies in librarianship were rooted in library science education, to prepare new librarians for work in what Griffiths and King (1986) called "a particularly dynamic environment…[in which] needs and requirements for information professional competencies are constantly changing" (p. 24). They proceed to outline a process for identifying and measuring changing "knowledge, skills, and attitudes" as these new librarians enter library school, complete their education, and proceed out into the workforce.

By the end of the nineties, librarianship had responded to the call for clearly defined "abilities, skills, capabilities and values that embody the essence of librarianship" (Moran, 2005, p. 146). Moran (2005) positions the work of the ALA Core Competencies Task Force, formed in 1999, as an antidote to the anxiety about the future of libraries in a newly connected world. In an ARL SPEC Kit, McNeil (2002) takes Griffiths and King's fresh graduates and combine them with Drucker's onus on the individual to define core competencies in librarianship as "the skills, knowledge and abilities, and attributes that employees across an organization are expected to have to contribute successfully within a particular organizational context" (p. 7).

Ammons-Stephens, *et al.* (2009) take up Drucker's focus on leadership competencies, providing a helpful summary of the evolution of core competencies in this area of librarianship, including a critical view. Limitations described by Hollenbeck and McCall (2006) and Roy (2008) include generalizations toward a single path to success, a checklist approach in which more individual, unrelated competencies collected together somehow suggest a better leader, a top-down approach prescribed by management onto staff, and a reliance on competency models by human resources departments (in Ammons Stephens *et al.*, 2009, p.71). The rebuttal by Selzer

to Hollenbeck and McCall in the same 2006 article also applies to this paper; as with entrepreneurship programs, there is no one-size-fits-all prescription for an entrepreneurship librarian. The findings below are intended as a first step toward understanding a specialty which is still evolving.

In attempting to describe an emerging area of librarianship, it is helpful to reference core competencies research done into other, now-no-longer-emerging areas of the profession. This research, often based on roles or services around new technology, abounds in the literature and employs a variety of methods. Buttlar and Ruhig Du Mont (1989) asked alumni of the Kent State University library science program to rank 53 library science competencies in order of importance via a mailed survey. Ammons-Stephens *et al.*(2009) were part of an American Library Association Emerging Leaders project that conducted a series of interviews with library leaders selected based on their professional area of focus, sector, involvement in ALA, and cultural diversity to identify ideas and concepts and develop a leadership competency model. Sutton (2011) and then Hartnett (2014) draw on a tradition of job advertisement analysis to develop a "codebook" (Hartnett, 2014, p. 249) of unique qualifications and responsibilities of electronic resources librarians. Bishop, Cadle and Grubesic (2015) applied the objective, external perspective of a job analyst via a survey validation to understand the job tasks as well as the core competencies in emerging roles in librarianship such as geographic information.

Luo (2008) identifies core competencies for chat reference service, one of the landmarks in "the ever-changing library landscape" (p. 298). She draws on Griffiths and King (1986), who establish identification and validation as the two key stages to competency research, and takes a contextual approach by drawing on a variety of relevant sources to first identify competencies which are then validated via a survey of practitioners. The author prioritized the results, and then

divided them into thematic categories. Applied to our study, this "contextualized view" (Luo, 2008, p. 299) allows for considerations such as how entrepreneurship librarians apply interdisciplinary knowledge or subject expertise outside of traditional business information to their practice or, conversely, focus on specific areas within business research such as market intelligence.

As Luo (2008) notes with regards to chat reference, the literature describing entrepreneurship support at academic libraries is concentrated on individual case studies. Around the same time that Hamel and Prahalad were outlining their corporate core competencies, Pensyl (1991) wrote of increased demand for "unique and innovative uses" of the services of her unit, Computerized Literature Search Service, by the technology transfer office at MIT, namely patent searching, bibliometrics, and research partnerships. The following quote could have appeared in any of the more recent articles cited below:

> Although many in academe still regard librarians in traditional ways, do not understand what information professionals can do for them, and are not attuned to the idea of information as a key component in technology transfer, there are signs that this is changing.…[F]aculty and researchers involved in information-intensive activities are increasingly recognizing the need for information support and are seeking guidance from professionals. (p. 31)

Nearly 20 years later, Chung (2010) highlights the impact of outreach on faculty liaison relationship building at North Carolina State University. Fitzgerald, Anderson, and Kula (2010) describe a unique staffing and service partnership between the University of Toronto Libraries and the local Regional Innovation Centre via an embedded librarians program. Kirkwood and Evans (2012) and Watstein (2015) explore techniques and approaches to integrating information

literacy into entrepreneurship courses at Purdue University and University of North Carolina, Wilmington, respectively. Feldmann (2014), Griffis (2015), and Hoppenfeld and Malafi (2015) describe academic-public library partnerships supporting entrepreneurs, while Hoppenfeld *et al.* (2013) outline an entrepreneurship bootcamp serving military veterans. Sayre, Lilyard and Schoenborn (2017) illustrate the importance of interdisciplinary librarian teams when supporting research commercialization at the University of Minnesota. These articles highlight the ways in which academic librarians supporting entrepreneurship both align with and differ from traditional liaison activities of outreach and engagement, instruction, research and reference services, collection development, and scholarly communication.

A few articles use a wider lens to examine aspects of entrepreneurship librarianship. Brian Mathews, then Associate Dean for Learning and Outreach at Virginia Tech, published a white paper in 2012 imploring libraries to "'zoom out' rather than 'zoom in'…using insight into startup culture and innovation methodologies" (p. 1), echoing Drucker's call for the integration of the core competency of innovation. Restivo (2014) identifies parallels between the startup mindset and the librarian's skill set, arguing for making space at libraries to support innovation and at startups for library and information science graduates. Addressing one of the most pressing issues facing entrepreneurship librarians, Aagaard and Arguello (2015) provide context and clarity on questions of commercial vs non-commercial use of licensed resources as well as suggestions for vendor negotiation and building user awareness. In her editorial for a special issue of the *Journal of Business and Finance Librarianship* in which several of the above articles were published, Macdonald (2015) focuses on entrepreneurship outreach as a new role, spurred on by the growth of tech transfer offices and campus entrepreneurship programs, as well as on the trend toward experiential learning across disciplines.

The 2000s saw a flood of core competencies documents and research, which are constantly updated to reflect the dynamic environment of librarianship[1]. To identify the combination of knowledge, skills, and attitudes employed by entrepreneurship librarians, we drew upon a combination of three existing core competencies documents. The Ohio State University Libraries' *Framework for the Engaged Librarian* (Connell *et al.*, 2011) describes and guides the work of subject librarians, breaking the core competencies into five: engagement, research services, collection development, scholarly communication and teaching and learning with best practices for each. Whether assigned to a subject or faculty, or within a functional specialist role, many entrepreneurship librarians are engaged in more than one of these activities as part of their daily work. This document also addresses recent changes in higher education "marked by simultaneous hyperspecialization and interdisciplinarity" (p. 1), which characterize entrepreneurship support.

To outline subject knowledge and skills specific to business researchers, we drew upon a public draft of the American Library Association (ALA) Reference & User Services Association division's Business Reference and Services Section (RUSA BRASS) Business Research Competencies document. This 2016 draft, produced by the BRASS Research Competencies Task Force, starts with competencies regarding the business information environment, research strategies, and discipline-specific theory, and then more specifically treats industry, company, market, international business, financial, and business law research. For our purposes, this document required some adaptation for two reasons: first, they are aimed at researcher (i.e.

[1] The American Library Association keeps a list of knowledge and competencies statements developed by relevant professional organizations at http://www.ala.org/educationcareers/careers/corecomp/corecompspecial/knowledgecompetencies

student) rather than librarian competencies; second, they don't include skills such as patent and technology research.

To address the attitudes/attributes aspect of core competencies, we incorporated the "enabling competencies" from the Special Libraries Association's 2016 *Competencies for information professionals*. Often called soft skills, these nine "essential competencies…are shared by professionals in other fields…[and] are vital for professional success and career development" (n.p.). These enabling competencies include:

- Critical thinking, including qualitative and quantitative reasoning
- Initiative, adaptability, flexibility, creativity, innovation, and problem solving
- Effective oral and written communication, including influencing skills
- Instructional design and development
- Leadership, management, and project management
- Lifelong learning
- Marketing
- Mentoring
- Relationship building, networking, and collaboration, including the ability to foster respect, inclusion, and communication among diverse individuals. (SLA, 2016, n.p.)

Together, these documents provided the relevant sources from which to identify potential competencies as Griffiths and King outlined, and which were then delivered in a survey to practitioners to validate.

Methodology

Qualitative and quantitative data was collected using an online survey tool via non-probability sampling to academic librarians in Canada and the United States engaged with entrepreneurship as part of their professional practice. Campus entrepreneurship was defined in recruitment and consent materials as including students, faculty, staff, alumni or affiliated researchers associated with the librarian's institution who are launching new companies or ventures as part of curricular, co-curricular, or extracurricular activities such as but not limited to courses, programs, clubs, competitions, accelerators, incubators, internships, and/or fellowships, or informally in their extra time. Librarians did not have to have "entrepreneurship" or related terms in their job title to be eligible to participate. While the researchers tip their hats to those entrepreneur*ial* librarians who start their own companies or concerns, information-focused or otherwise, they were not included as a focus of this study.

Nonprobability sampling enabled the researchers to use their judgment to construct a relevant sample of a niche population (Saumure & Given, 2008). The researchers used a combination of purposive and snowball techniques. Purposive sampling is a method of pre-selection based on certain criteria (Saumure & Given, 2008); our recruitment started with a preliminary email to assess the potential sample size of the population. Those who responded were sent an email when the survey was live, inviting them to participate. Further participants were recruited via a web link distributed to mailing lists and listservs of relevant professional associations such as the American Library Association business librarians' subdivision RUSA BRASS; BUSLIB-L hosted at Northern Arizona University in Flagstaff, AZ; the Special Libraries Association; the American Society for Engineering Education; and others, including an informal group of Canadian entrepreneurship librarians. Using a form of snowball sampling, which solicits further potential participants from previous participants (Saumure & Given, 2008),

all recipients were encouraged to share the link among their networks. Compensation was not offered. Given the specificity of this research, the limitations of nonprobability sampling regarding transferability were outweighed by the reasoning in favor of this method (Saumure & Given, 2008).

The survey instrument itself contained 70 open-ended and closed structured questions, including Likert scales, rankings, and multiple choice formats. Where appropriate, participants were given the opportunity to elaborate on a structured response in an open-ended follow up question. Closed questions often included an option to select "other" and add information not previously considered by the researchers in the participant's own words. Favoring this nondirective approach was appropriate given the research goal to identify those competencies which were most important to the participants (Roulston, 2008).

The survey was divided into three parts: demographics (Q1-17), institutional engagement (Q18-27), and skills and competencies (Q28-70). Section One sought to contextualize the skills and experience that these librarians use to carry out their work. Survey participants who answered no to Q1 ("Are you a librarian supporting entrepreneurship at a North American college or university?") or Q2 ("Are you engaged with campus entrepreneurship as part of your work?") were exited from the survey as per the eligibility requirements. The remaining 88 participants were asked to provide their job titles, job type (e.g. liaison librarian, functional specialist), subject area(s), and institution size and type, as well as past job experience, past degrees and experience working in startups. This was required to understand the breadth of experience and skills that they bring to their roles. Questions 6-10 assessed the level of engagement with entrepreneurship, in an attempt to identify those participants for whom entrepreneurship is a core aspect of their work. Section Two explored institutional activity and

library administration support for entrepreneurship. Based on Kauffman (2008), six multiple choice questions (Q18-23) assessed the presence of curricular, co-curricular, administrative and community offerings at the respondent's institution. The remaining questions were open-ended, and designed to assess relative library engagement and impact, according to the librarian. This section addresses the influence of campus context on the degree of involvement of librarians in supporting entrepreneurship.

Section Three is the core of the survey, with 43 questions dedicated to the validation of potential competencies for academic librarians supporting entrepreneurship. This section is divided into three parts, each of which draws upon an existing competencies document to identify potential knowledge, skills, attitudes and attributes unique to entrepreneurship librarians, which the participants are then asked to validate based on frequency of use and importance to their support of this community. Part one, general librarian competencies (Q28-42), sought to prioritize the primary job responsibilities and tasks that are characteristic of entrepreneurship librarians at academic institutions. This part is based on the *Ohio State University Libraries Framework for the Engaged Librarian* (Connell *et al.*, 2011), and asked participants to rate the importance and frequency of five core competencies as well as provide a library-specific example of each; participants then ranked the five competencies in order of importance (Q43).

Part two (Q44-69) focuses on subject expertise, adapted from and using examples from the ALA RUSA BRASS Business Researcher Competency draft document (2016). This part sought to identify the specific skills and experience that entrepreneurship librarians employ to carry out this work. Questions were added for interdisciplinary information (Q54-55), patent research (Q60-61), and research commercialization or technology transfer (Q62-63) for a total of 12 entrepreneurship research skills. Acknowledging the narrow focus of this section, participants

were given an opportunity (Q68) to include up to 3 other specialized skills or knowledge areas that weren't listed above. Then they were asked to rank the 12 existing skills based on how central they were to their work (Q69). Part 3 looked at the more intangible attributes and attitudes of those librarians working in this specialization. This section was based on the "enabling competencies" from Special Libraries Association (2016), and included one question (Q70): participants were asked to select three of the nine enabling competencies and explain why they were crucial to their work with entrepreneurship.

Prior to rollout of the survey tool, it was reviewed by the Institution Survey Research Centre, and pre-tested for technical and methodological errors by a convenience sample of academic librarians familiar with entrepreneurship support but ineligible for the survey, generally due to having moved on to different roles. Participants were asked to respond to the same set of questions used in the survey, after which they were asked to respond to questions about usability, content, and design of the study. Based on their input, the survey instrument was modified slightly to improve clarity and better estimate time needed for completion.

The web-based survey was created using SurveyMonkey, and distributed via email in January and February 2017. Every measure was taken by the co-investigators to protect the anonymity of participants and to preserve the confidentiality of data. The survey tool enables a limitation of one response per IP address, as well as the option to make responses anonymous, so collector data that makes participants personally identifiable was not included in survey results. Participants were not asked to provide their names, contact information, institution name, or location. Data was aggregated to prevent the chance that individuals could be identified by others in the profession given their unique roles and relatively small numbers. There was no way to connect those who expressed interest during recruitment or as a follow up with those who

completed the survey. This was outlined in the letter of informed consent; participants could furthermore withdraw their participation at any time. The software collected response data from incomplete surveys; withdrawal midway through the survey instrument did not result in the deletion of data that has already been collected.

Preliminary data analysis used SurveyMonkey's built-in quantitative summary tools as well as NVIVO qualitative analysis software for word frequency searching. The bulk of the statistical analysis as well as the heat maps was conducted by the Statistical Consulting and Collaborative Research Unit at Institution. Because only the first two questions were mandatory, the number of participants varied from question to question; this is noted throughout the findings section. Statistical significance is also noted where testing was possible. Qualitative analysis by the co-investigators used thematic coding as a data reduction method. This descriptive strategy enabled the identification of patterns and important concepts which we felt was appropriate based on the exploratory nature of this research (Ayres, 2008).

Findings

Overall, the participants represented an experienced group of librarians, with the majority (51.14%) claiming 8 to 25 years as librarians (Q5, N=88). However, the majority of participants (56.82%) have spent four or fewer years supporting entrepreneurship (Q9; N=85). Asked to describe their roles (Q4; N=88), the participants in this survey are primarily liaison librarians (53.41%) and subject specialists (20.45%). When asked what other subject area(s) they support (Q11), overwhelmingly these librarians selected business and management (82.95%, N=88). Word frequency tallies found that 47 participants (53.41%) had the term "business" or "management" explicitly stated in their title (Q3; N=88).

The majority of participants spend a minority of their time dedicated to startups and entrepreneurship. While 63.64% agreed that entrepreneurship was a central area or focus of their work (Q6; N=88), many said that this focus was limited by other responsibilities. Those for whom entrepreneurship was central explained that the subject was emphasized in the curriculum, while others referenced partnerships with campus entrepreneurship centres or technology transfer offices and Small Business Development Centers, ran makerspaces, supported collections and instruction, either as a designated liaison or more informally. Several referenced the growing presence of entrepreneurship on campus, to which library engagement was a response. For those who said it was not central to their role (26.14%), the reason was most often one of competing demands, as for this respondent: "I am liaison to 10 subject areas in the social sciences and humanities, only five of those are business related. Entrepreneurship is just a small part of my responsibilities but there is a lot of demand on campus and in the community so I pursue it as much as I can." Others saw entrepreneurship as an "emerging" role, which could perhaps assume a greater percentage of their work going forward.

Taking this issue of time into consideration, we sought to identify the subgroup of participants which had more time dedicated to entrepreneurship. Breaking out the responses to Q8, only 25.00% of participants (Q8; N=88) spent over 30% of their time supporting entrepreneurship or startups. We broke out this group in statistical analysis to see if there was any difference in demographics, and significant results are noted below.

When we cross-tabulated the results of Q8 based on this time commitment of over or under 30% with the participants' job titles (Q3; N=88), we found a correlation between that quarter of participants who spent over 30% of their time and selected keywords of interest including "entrepreneurship," "entrepreneurial," "innovation," and "community" paired with

"engagement" or "outreach" (see Table 1). A total of 13 respondents (14.77%) had job titles that contain the keywords listed above, whereas 75 did not (85.23%). A Chi-square test showed strong evidence that the presence of keywords in the job title is influenced by the percentage of work dedicated to supporting entrepreneurship or startups, $\chi^2(1, N = 88) = 8.69, p = 0.004$.

When asked how they came to support the entrepreneurship community on campus (Q7; N=88), 43.18% said it developed on an ad-hoc or informal basis as the need arose (see Table 2). While we couldn't perform a Chi-square analysis on this cross-tabulation due to sample size, qualitatively there appears to be a greater percentage of those who spend over 30% of their time on entrepreneurship for whom that support was part of the job description when they took on the role (36.36%), compared with those who spend less than 30% (19.70%) and of the group overall (23.86%).

The majority of these librarians don't do this work alone. When asked to briefly elaborate on the roles of other librarians on campus who support entrepreneurship (Q10), some revealed elaborate networks of collaboration, as in this example: "About six of our librarians work on tech transfer competitive intelligence reports. We have two of us that works with the entrepreneurship center on campus. Plus we have a space in the library that supports digital humanities and some of those projects are spun off to long-term projects, there are two more librarians that support startups coming from this space" [sic]. Common partnerships included engineering, GIS, data and statistics, health sciences, and other business librarians. Although there appears to be a larger portion of participants (68.18%) among those who spent more than 30% of their work time supporting entrepreneurship who had colleagues or other librarians on campus (see Table 3), there is no statistical evidence that the presence of other librarians on campus who supports

entrepreneurship is affected by the participants' percentage of work dedicated to support entrepreneurship or startups, $\chi^2(1, N = 88) = 1.24, p = 0.26$.

Many participants possess work experience uniquely relevant to supporting entrepreneurship. Nearly a quarter of participants said they had founded a company or venture (24.42%; Q15; N=86) or worked at a startup in a role other than as founder (20.69%; Q16; N=87). Other relevant work experience ranged from marketing and communications to management and sales (Q17). Educational background didn't reveal any notable trends. Nearly all participants (97.70%) hold a library/information science degree or equivalent (Q13, N=87), and 40.70% hold a second graduate level degree (Q14; N=86). Past degree(s) were distributed evenly over arts and humanities (50.00%), business/management/commerce (45.35%), and social sciences (40.70%) with a smaller representation of applied science and engineering, and life or medical science, and other disciplinary degrees equally represented by 5.81% of the survey population (Q12; N=86).

Institutional engagement

The institutions represented by participants in study are engaged with entrepreneurship at all levels: curricular, co-curricular, administrative, and community-wide. However, statistical analysis did not find many correlations between either library- or librarian-level engagement and institutional engagement with entrepreneurship. This is an area for further, more systematic study, which is less reliant on individual reporting on institutional offerings.

This section attempted to measure engagement at a variety of levels, based on a framework provided by Kauffman (2008):

1) Curricular offerings

a) Foundational, institution-wide mandatory or optional courses

b) Undergraduate courses, programs, and concentrations

c) Graduate courses, programs, and concentrations

2) Co-curricular activities (library or other campus workshops or events, accelerators, workspaces, clubs, internships, student businesses, awards, other)

3) Administrative initiatives (awards, innovation culture or educational emphasis, impact metrics and tenure requirements, entrepreneurship centres and technology transfer offices, industry partnerships, strategic mandate, other),

4) Community activities (accelerators or incubators, coworking spaces, Government Data Center, established technology hub or cluster, Regional Innovation Centre or Small Business Development Center, startup job or career fair, smaller sponsorships of campus events and awards, larger sponsorships of campus facilities, research chairs, other)

Possible curricular offerings ranged from a mandatory entrepreneurship course for e.g. all incoming students to a graduate research project or thesis. We were surprised that 74.68% of participants said there was an optional foundational entrepreneurship course at their institution (Q18; N=79), because this is not supported by responses to later questions that would reflect this level of cross-campus commitment; for instance, a relatively small number of participants reported the presence of a stated executive priority, strategic mandate or goal in support of entrepreneurship (44.87%) or an explicit educational emphasis on innovation (43.59%) (Q22; N=78). The Kauffman Foundation, itself a proponent of campus-wide entrepreneurship programs, funded only 18 campuses across the U.S. as of 2006 (Kauffman, 2013). While we are willing to accept that this number has grown, a further search of the business education literature did not produce any further evidence; on the contrary, a recent ARL SPEC Kit on campus-wide

entrepreneurship (Armann-Keown & Bolefski, 2017) found that, while interest is growing, in many cases "coordination is lacking" (p. 3).

At the undergraduate level, participants reported that 89.74% of their institutions offer one or more entrepreneurship courses in a disciplinary program, and that 70.51% offer at least one concentration or stream at the undergraduate level (Q19; N=78). In keeping with educational trends, 65.38% have a for-credit capstone or experiential learning course (Q19; N=78). Fewer offer an undergraduate level entrepreneurship minor (48.72%) or discrete program or major (44.87%) (Q19; N=78). The Fisher' Exact test showed that the effect of job title containing keywords of interest (Q3) has no effect on how the respondents answer Question 19, $p = 0.05$. However, as seen in Table 4, 46.15% of those whose job titles contain the keywords of interest identified in the previous section selected 5 or 6 of the options available (compared with 21.54% of those without keywords and 25.64% of the total survey population), suggesting that those institutions with dedicated entrepreneurship librarians have more than enough demand for their services from undergraduates alone.

At the graduate level, 65.82% of participants' said their institutions had one or more entrepreneurship courses in a disciplinary program, while 54.43% had a concentration or stream (Q20; N=79). Capstones were less common at 37.97%, as were programs or majors (31.65%), and minors (24.05%), while 26.58% said their institutions offered opportunities for a dedicated research project or thesis. It is possible that this reduction is due in part to the absence of graduate level education at some participating institutions. Compared to undergraduate curricular offerings, the number of graduate services at schools with dedicated entrepreneurship librarians (based on job title keywords) was more distributed (see Table 5).

Campus training and events such as pitch competitions, hackathons and makerspaces were the most common category of co-curricular activity selected by participants (94.87%; Q21; N=78). Next were dedicated student clubs and groups (82.05%), followed by campus accelerators and incubators (73.08%). Library-run workshops and events such as pitch competitions, hackathons and makerspaces were fewer but still prevalent (44.87%).

Administratively, the most common offerings reported (Q22, N=78) were the presence of a technology transfer office on campus (62.82%) and industry-sponsored research or other partnerships (61.54%). Campus entrepreneurship centres were fewer (47.44%). Looking to the broader community (Q23, N=79), 81.01% reported the presence of accelerators or incubators, 78.48% reported proximity to a Regional Innovation Centre or Small Business Development Center, and 73.42% reported sponsorship of campus events, awards, and other smaller commitments.

The next four questions sought to gain insight into the library's support for this ecosystem of curricular, co-curricular, institutional and community activities. When asked how established their library's support of campus entrepreneurship (Q24, N=79), most said it was slightly well established (36.71%) or moderately well established (31.65%). Descriptions ranged from traditional reference and instructional support to new initiatives such as makerspaces, but many stressed the need for more time to allow these new services and spaces to, as in one comment, "[trickle] down to departments/campus culture" (Q24). Another explained: "Those who know about us love us. Many have no idea we offer support" (Q24). Several participants explained that they were working alone, or hiring new dedicated staff to support entrepreneurship, and had more supports planned. Funding was a commonly cited barrier, as in this comment: "established in that the librarians are doing it, but no additional resources" (Q24).

Perhaps modestly, some who had similar levels of support reported that they were not established at all (5.06%). On the other end of the spectrum, those who selected well established (18.99%) or very well established (7.59%) described activities such as teaching for-credit courses or serving as a library "entrepreneur in residence," and described positions such as "true partner," "co-creator," and "co-researcher," with a "long history of support" (Q24).

When asked where participants felt they had made the most impact as librarians supporting the entrepreneurship community (Q25, N=71), coding showed an emphasis on finding research information, including market research (61.97%). Closely related, 15.49% of participants specified one-on-one consultations and meetings. This is summarized in one response: “Pulling together important starting points for planning and research, being a sounding board as students work through the ideation process, and offering tailored sessions to complement our current entrepreneurship coursework” [sic] (Q25). While that kind of support may not be unique to entrepreneurship, others described more tailored research services: “we provide custom reports using patent, market and grants resources to assist in evaluation of and strategy for inventions and startup ideas” (Q25). This emphasis on research services is corroborated by responses to questions on general librarian competencies, below. The next area where librarians felt they had made the most impact for campus entrepreneurs was in workshops and instruction (29.58%), followed by outreach, partnerships, and networking (25.35%). One comment shows how these two areas overlap, with workshops often serving as outreach to a dispersed community: “Outreach efforts (e.g. resource fairs) and workshops increase awareness of databases and the awesomeness to conduct market analysis and segmentation with geospatial technology” (Q25). Several comments highlighted the importance of supporting specialized areas such as business plans (8.45%) and patents (5.63%), as well as unique considerations

around collections (5.63%), as in these comments: "establishing licensing for information products so that the resources are useable in these cases" and "[u]nderstanding the business/policy information landscape and aligning local collections to meet identified needs" (Q25).

When asked about the challenges that face librarians supporting entrepreneurship (Q26, N=70), the issue identified by the greatest number of participants was awareness and buy-in of library support (35.71%). This is perhaps unique to new areas of support such as entrepreneurship, while other issues such as the lack of time (25.71%) or funding (25.71%) could apply across a majority of academic librarian positions. Other unique challenges include the learning curve to stay up to speed on new and constantly changing industries, technologies, resources, and campus ecosystems (17.14%); restrictive licensing agreements (15.71%), as in this response: "[h]aving databases that can help (Mintel, Bizminer) but in which user licenses expressly state not for commercial purposes," (Q26) and, perhaps resultingly, inadequate resources to meet the needs of the applied business researcher, such as market research reports and in-depth local data sources (18.57%). When asked to describe how they tackled these challenges (Q27, N=67), common responses included professional development, building and maintaining relationships, and engagement and outreach, or as one respondent said: "[e]ducation and PR. Neverending" (Q27).

General librarian competencies (Q28-42)

Research services is the top-ranked competency in this category (see Table 6), followed by engagement, teaching and learning, collection development, and scholarly communication

(Q43; N=66)[2]. When asked for examples of research services activities (Q36; N=64), nearly two-thirds of the participants mentioned "[o]ne-off consultations with entrepreneurship researchers or entrepreneurs," as individuals or small groups of students or faculty, in support of courses, referred from campus entrepreneurship centres, or ad-hoc (60.94%). Many provided examples of reference question topics, summarized in this example: "[f]inding sample business plans, finding demographic information, mapping locations of business types" for ventures ranging from local cafés to mobile applications to human trafficking counter-efforts. Other common examples included supporting the creation of business plans (8), and providing instructional support (7). Specialized services included patent searching, custom research services, and support for technology transfer offices (3 mentions each). One respondent said he or she worked with community entrepreneurs outside the university.

In addition to this ranking question, participants were also asked to rank each individual competency in this section (collection development, engagement, research services, scholarly communication, and teaching and learning) based on Likert scales measuring frequency and importance, and provide an example of each from their library relevant to entrepreneurship (Q28-42). To understand the relationship between these two scales and to compare different activities, we visualized responses using heat maps[3]. We found that the heat maps showed

[2] While 70 participants answered this question, six of those did not complete it by ranking all five competencies in this section. We retained two participants' responses because they ranked the most important and/or the least important competency. The other four participants' responses were removed from the summary.

[3] The vertical axis collapses eight original options from the survey into five, with 1 being "never" and 5 being "daily." Between those two extremes, 2 combines "Once a year or less" and "A few times per year," 3 combines "Once a month" and "A few times per month," and 4 combines "Once a week" and "A few times per week."

consistency with the rankings in Q43. While the frequency with which participants carry out research services activities for the entrepreneurship community (Q34; N=73) is relatively evenly distributed over a time range from a few times per year (16.44%) to a few times per week (20.55%), the majority of participants said these activities were very important (45.21%) or important (35.62%) (Q35; N=73). The heat map (see Figure 1) shows a concentration on the right, signifying high importance of research services, and on the top, signifying high frequency. These services are central to the activities of an entrepreneurship librarian and also in high demand, as illustrated by this participant comment: “This is the crux of our impact -- actually answering questions from entrepreneurs (everything from "how many cataract surgeries were there last year" to "who manufactures this device")” (Q36).

Engagement ranked second of the five core librarian skills (Q43; see Figure 2), despite a relatively low frequency for a majority of participants (Q31; N=73), ranging from a few times per year (31.51%) to a few times per month (20.55%). Nevertheless, these activities were described as very important (Q32; N=72) by 36.11% and important by 25.00%, which aligns with the results of Q25 as discussed in the findings for section 2 above. The heat map shows this distributed reporting of engagement activities among participants, suggesting that some may pursue it more actively than others (see Figure 2). This divide can also be seen in the examples given for engagement activities relevant to entrepreneurship (Q33; N=71), the most common of which was attending or participating in events (26 mentions); just over half of those (53.85%) specified active involvement such as advising bootcamps, judging pitch competitions, hosting roundtables, and teaching workshops, while the rest (46.15%) only described attending similar events. Eight participants said they offer office hours for startups and entrepreneurs, some of these embedded in incubators or faculties. Targets for outreach such as meetings, presentations

and newsletters included faculty (7 mentions), entrepreneurship centers (6 mentions), student clubs (5 mentions), incubators (5 mentions), community partners outside the university (4 mentions), and technology transfer offices (2 mentions) (Q33). Coding found only three participants mentioned physical spaces in the library dedicated to entrepreneurship (Q33). More insight into the importance of the role of outreach and engagement is provided by responses to the question of enabling competencies below (Q70).

Teaching and learning (see Figure 3) ranked third of the five core competencies in this section, with nearly half of participants (49.32%) carrying out these activities only a few times per year (Q40; N=73), and 38.89% of participants considering them important vs very important (27.78%) or moderately important (20.83%; Q41; N=72). Examples provided in the follow up question (Q42) skewed toward information literacy instruction in support of courses (50.00%) and workshops on topics such as market research held in the library or for an incubator or student club (20.69%). Seven participants specified online instruction, and four said they teach full credit courses in business or entrepreneurship topics. Three mentioned participation in curriculum and/or program assessment.

Given that database acquisition and other collection development activities often take place annually, it was not surprising that 40.54% of respondents to Q28 (N=74) said they carried it out a only few times per year, with another quarter reporting undertaking this work even less frequently: once a year or less (13.51%) or never (12.16%) (see Figure 4). Most respondents to Q29 said this work was slightly important (32.43%) to moderately important (28.38%). Over one-third of participants (34.38%) gave database acquisition as an example of activity in this area (Q30, N=64), with some elaborating on roles in acquiring or lacking funding (9 mentions), negotiations (4 mentions), and licensing (3 mentions): “Try to partner to acquire market research

report databases where licenses will allow entrepreneurial use (clear up guidelines between commercial and non-commercial uses).” Mentioned by one-third of participants, books are also popular (32.81%), although these are not typically academic monographs: “Buying books about startups, lean startups, starting a business. These aren't scholarly books, but rather 'how to' business books, easy reading but with step by step action items” (Q30). Five participants referred to journal purchasing and two described buying individual market research reports (Q30).

Scholarly communication ranked last of the five core competencies for academic subject librarians (see Figure 5). Over half of participants could not provide an example of this activity relating to their work supporting entrepreneurship (Q39; N=57). One possible reason for this suggested in the examples provided is the presence in many institutions of other staff or librarians who meet this need, such as “a strong scholarly communications librarian” or a campus Office of Technology Management” which handles intellectual property issues. Those who could provide examples mentioned promoting institutional repositories, or the preference for open data resources over copyrighted materials. However, other comments suggest there may be reduced demand among entrepreneurs for advice regarding issues such as author copyrights, perhaps because, unlike traditional graduate students and faculty, publication is not the goal: “Not relevant to this community--they are practitioners only.” “Not many here -- they're focused on a very different thing.”

Subject expertise competencies (Q44-69)

Based on average scores, industry research and market research tied for top position out of the 12 research skills participants were asked to rank, based on how central they were to their

work (Q69; N=60).[4] Given the large number of options, in our analysis we looked mainly at the top five and the bottom three (see Table 7). Despite the tied average score, more participants chose market research as their number one (33.87%) or number 2 (32.26%) most important skill over industry research (16.13% and 29.03% respectively). As with Part One, we created heat maps to visualize the relationships between frequency and importance provided in Q44-69. Looking at the heat maps for market research and industry research in Figures 6 and 7, the two are nearly identical, and indeed in practice industries and markets are very closely related and often intertwined.

In third place came company research, followed by research strategies and business information environment (see Figures 8, 9, and 10 respectively). Insight into these responses can be found in examples of teaching and learning activities (Q42), such as this one, which summarizes what the participant calls the "basics": "I speak every quarter at the introduction to entrepreneurship classes. I cover the basics of finding industry, company/competitor, product/service, and customer data." Another response gives an example of the kind of market research expertise librarians can provide: "Conducting hands on sessions with Marketing students about finding demographic information for users of a specific product using a sophisticated database such as Simmons OneView." Further insight into the importance of research strategies specifically is found in the summary of Q70 below.

[4] A total of four participants did not complete the ranking of all 12 skills and knowledge options. After going over the responses individually, we completed the ranking of two participants because they missed out one ranking (possibly by accident). Among the two remaining participants, one ranked only the most important skills. We retained this respondent's answer. The remaining respondent's responses were excluded from further analysis.

Just outside of the top five, notably, interdisciplinary research ranked sixth. In the bottom three we see business law research, patent research, and research commercialization. A subgroup of participants are nevertheless deeply engaged in these more specialized areas, evidenced by their rankings (see Table 7).

Enabling competencies (Q70)

"Initiative, adaptability, flexibility, creativity, innovation, and problem solving" was the enabling competency chosen by the greatest number of participants (61.54%) followed by "Relationship building, networking, and collaboration, including the ability to foster respect, inclusion, and communication among diverse individuals" (58.46%) and in third place, a tie between "Critical thinking, including qualitative and quantitative reasoning" (43.08%) and "Effective oral and written communication, including influencing skills" (43.08%; Q70; N=65). These groupings and wordings are from Special Libraries Association (2016).

Participants' explanations for their choices provided insight into why these skills would be useful in supporting a new and fast-moving area like campus entrepreneurship. The first choice not only contains that buzzword "innovation" but perhaps more importantly, initiative and problem-solving. This relates directly to core services such as research support, as explained by these commenters: "Researching new ideas - new markets and technologies - requires a high level of creativity and "out of the box thinking" - you're not looking for straightforward, easy-to-find information," and "People don't come to me with easy questions. They answer those on their own. So by the time a question gets to me, creative thinking is required" (Q70). In entrepreneurship circles, this attitude is referred to as a startup mindset: "You're often trying new things and it helps if you are comfortable taking these risks and learning from what works and

changing what doesn't. These are innovative researchers so it helps if you think like a start up too!" [sic] (Q70).

As we've seen throughout the results, building relationships is key to this enterprise; as this commenter explains, "[p]eople don't always think of the business librarian as an ally in this area" (Q70). To find opportunities to communicate value requires going to where our users are: "Our entrepreneurship community is full of people who travel in circles, attending many of the same events. In order to reach that audience, we attend many local events to network with local entrepreneurs and other community partners so that they know we are able to help the people that they are also trying to help, but in a different way" (Q70). As discussed in Q26, relationship building, both inside the library and across campus and beyond, can help librarians increase awareness about the value the library can bring. And it has an impact on how we measure our own success as well: "Building relationships, though, takes regular time and is directly related to the referrals and collaborations that are the most closely measured metrics for my work" (Q70). Also included in this competency grouping is collaboration, which was not a focus of the comments here but was highlighted in responses to sections 1 and 2 of the survey; given the multidisciplinary nature of many ventures, having a strong team of library colleagues for collaboration and referrals is important to success.

Critical thinking skills shed light on the importance of research strategies, as highlighted in this comment: "This is essential in order to come up with research strategies to suggest for specific industry or market research for an entrepreneur" (Q70). Research services were identified by participants in Q43 as the top core activity to support campus entrepreneurs, so it is not surprising that it resurfaces in this context. Startups operating in new or emerging industries often find a shortage of readily available relevant data, and as such have to create their own

estimation models from a variety of sources, often across disciplines, in order to make sound business decisions and minimize risk. These researchers may also wish to apply an extra layer of scrutiny to the many business sources which are not peer reviewed, and for which methodology is sometimes opaque.

The third most common enabling competency identified by the participants was effective communication and influencing skills, used in this context for, as in this comment, "communicating across worlds" (Q70). While efficient communication could arguably be an important skill for any professional, it is particularly important when dealing with the startup world, which deals in pitch competitions and value propositions requiring succinct expressions of benefit. "I need to be able to convince people that the information resources are valuable, and I need to be able to explain to and influence information users how to use the data we found to make their point." Furthermore, effective communication can help save librarians' time: "Consulting with people is time intensive, and makes direct difference on their projects if it's done well. I'm trying to be more efficient with these, to help people in less time (for both of our benefits) [sic]."

Discussion

Academic librarians who support entrepreneurship are in many ways in creating something new within the library profession. Research services and outreach, market research, innovation and problem solving, relationship building, and critical thinking were identified as key competencies. The prevalence of research services in terms of frequency (Q34), importance (Q35), and impact (Q25) over instruction or collection development suggests that this is one area of the academic library in which the demand for reference support is growing. The complexity of

the research questions entrepreneurship librarians are presented with often extend beyond the mainstream industry sectors or public company profiles found in traditionally held business databases, suggesting the need for alternative resources looking at technology and market research. If and when information is found, librarians can provide strategies and frameworks to help researchers successfully integrate it into their business models. It is also important to acknowledge the time commitment required to provide research consultations, which might help to explain why many survey participants reported that they have less time for other services and activities.

Outreach was also identified as a key activity, as we seek to establish the library as a partner in this world dominated by disruptive forces to libraries, such as Amazon and Google. As campus entrepreneurship is a developing and often fragmented ecosystem, libraries have an opportunity to use their position as campus-wide entities to carve a niche helping newcomers understand the landscape and brokering connections between different groups. To be successful, however, libraries may need to find new ways to describe themselves and the services they provide, even going so far as to eschew the terms “library” and “librarian” altogether. Similarly, many individuals starting new ventures don’t identify with the STEM- and business-oriented terms “entrepreneur” or “startup,” and so that shorthand can also alienate or exclude of our potential user community.

The interdisciplinary nature of many campus ventures, often operating in new or emerging markets, is creating opportunities for business librarians to develop new skills and/or collaborate with colleagues in areas such as engineering, GIS, data and statistics, health sciences, and law. These collaborations are especially important for those who cannot, due to workload or

mandate, step outside their liaison areas to serve users in other departments – or who have no departmental affiliation at all.

While collection development ranked low, that may be because most academic libraries still buy for a general business collection rather than a dedicated entrepreneurship budget. Market research as the number one subject-specific skill supports the idea that there is growing demand for this kind of content, and generally for applied business resources outside the traditional scope. The demand for applied research materials reflects a trend in entrepreneurship education that seeks to find a balance "between the two poles of theory and practice," (Kauffman, 2013, p. 9); this shift away from strictly academic sources toward experiential applications is changing how we look at business collections, and how we define use cases and user groups in our licenses. Licensing and access barriers against commercial use and by community members outside the traditional students-staff-faculty boundaries may also increase reliance on open data sources, which don't carry the same restrictions; as one respondent to Q39 said, "open data practices are more important in my work."

The prevalence of business librarians in the sample (Q11) might be seen as contradicting the assertion that entrepreneurship is no longer exclusive to the business school. This could be attributed to an overrepresentation of business listervs in the recruitment process, except that Armann-Keown and Bolefski (2017) found the same prevalence of business librarians in their ARL SPEC Kit of campus-wide entrepreneurship. Although the landscape is changing as engineering and other faculties rise to the fore, entrepreneurship education still finds its roots in the business schools, and the business librarians who bring core subject knowledge and expertise to address questions of market-fit, feasibility, and risk – if not design or patentability. The topic of makerspaces, with their focus on technologies and design experimentation, has been well

documented in recent library literature yet did not feature notably in this study. Other developing trends include long-term, project-based interdisciplinary spaces in libraries, such as those at Duke University, Georgia Institute of Technology, and Virginia Institute of Technology, point to another way libraries can participate in this space. A longitudinal study could reveal how this participation evolves over time.

Even as things change, there is much to learn from those librarians who are deeply engaged with this community, suggesting an avenue for further research. The importance of a "long history of support" (Q24) was noted several times by participants, and culture is notoriously slow. Our attempts to contextualize library support in institutional culture were made difficult by our relatively small sample size, and this also is a potential source of future investigation.

The knowledge, skills, and attitudes that these academic librarians possess position them well to support campus entrepreneurship. How this relationship will evolve as the number of entrepreneurship librarians continues to grow will depend on how well we continue to adapt and grow to meet the needs of this new and exciting group of users.

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Tables and figures

Table 1*:* Cross tabulation of Question 3 and Question 8.

Job title provided in Q3 contain keywords of interest	Q8: Percentage of work dedicated to supporting entrepreneurship or startups		
	0 - 30%	> 30%	Total
No	61 (92.42%)	14 (63.64%)	75 (85.23%)
Yes	5 (7.58%)	8 (36.36%)	13 (14.77%)
Total	66 (100.00%)	22 (100.00%)	88 (100.00%)

Table 2: Cross tabulation of Question 7 and Question 8.

Q7: How did you come to support the entrepreneurship community at your institution?	Q8: Percentage of work dedicated to supporting entrepreneurship or startups		
	0 – 30%	> 30%	Total
It developed on an ad-hoc/informal basis as the need arose	32 (48.48%)	6 (27.27%)	38 (43.18%)
It was formally added to my subject/liaison areas/responsibilities due to external influences (such as e.g. a new course/program/centre for entrepreneurship on campus)	11 (16.67%)	6 (27.27%)	17 (19.32%)
It was part of the job description when I took on this role	13 (19.70%)	8 (36.36%)	21 (23.86%)
Other	10 (15.15%)	2 (9.09%)	12 (13.64%)
Total	66 (100.00%)	22 (100.00%)	88 (100.00%)
Note: We are unable to perform the Chi-square test because at least one cell is less than 5.			

Table 3: Cross tabulation of Question 10 and Question 8.

Q10: Are there other librarians on your campus who support entrepreneurship?	Q8: Percentage of work dedicated to supporting entrepreneurship or startups		
	0 – 30%	> 30%	Total
Yes	34 (51.52%)	15 (68.18%)	49 (55.68%)
No	32 (48.48%)	7 (31.82%)	39 (44.32%)
Total	66 (100.00%)	22 (100.00%)	88 (100.00%)

Table 4: Cross tabulation of Question 19 ("What curricular opportunities are available in undergraduate education at your institution? Check all that apply") and Question 3.

Number of categories chosen in Q19	Job title provided in Q3 contains keywords of interest		
	No	Yes	Total
0	1 (1.54%)	0 (0.00%)	1 (1.28%)
1 - 2	22 (33.85%)	3 (23.08%)	25 (32.05%)
3 - 4	28 (43.08%)	4 (30.77%)	32 (41.03%)
5 - 6	14 (21.54%)	6 (46.15%)	20 (25.64%)
Total	65 (100.00%)	13 (100.00%)	78 (100.00%)

In Question 19, respondents were asked to select all that apply among six categories, not including the options "None of the above" and "Don't know/Not sure". Hence, the minimum number of categories one can choose is zero whereas the maximum number of categories that can be chosen is 6. The Fisher' Exact test showed that the effect of job title containing keywords of interest (Question 3) has no effect on how the respondents answer Question 19, $p = 0.33$.

Table 5: Cross tabulation of Question 20 ("What curricular opportunities are available in graduate education at your institution? Check all that apply") and Question 3.

Number of categories chosen in Q20	Job title provided in Q3 contains keywords of interest		
	No	Yes	Total
0	11 (16.67%)	2 (15.38%)	13 (16.46%)
1 - 2	26 (39.39%)	5 (38.46%)	31 (39.24%)
3 - 4	19 (28.79%)	3 (23.08%)	22 (27.85%)
5 - 6	10 (15.15%)	3 (23.08%)	13 (16.46%)
Total	66 (100.00%)	13 (100.00%)	79 (100.00%)

In Question 20, respondents were asked to select all that apply among seven categories, not including "None of the above" and "Don't know/Not sure". Hence, the minimum number of categories one could choose was zero whereas the maximum number of categories that can be chosen is 7. The Fisher' Exact test showed that the effect of job title containing keywords of interest (Question 3) has no effect on how the respondents answer Question 20, $p = 0.95$.

Table 6: Total and average score of Question 43 ("Rank the following competencies from 1 to 5 based on how important they are to your work with entrepreneurship on campus, with 1 being most important.")

Librarian competencies	Ranking					Number of respondent	Total Score	Average Score	Overall ranking
	1	2	3	4	5				
Collection development	4	12	14	24	11	65	221	3.40	4
	(6.15%)	(18.46%)	(21.54%)	(36.92%)	(16.92%)	(100.00%)			
Engagement	16	18	19	8	3	64	156	2.44	2
	(25.00%)	(28.13%)	(29.69%)	(12.50%)	(4.69%)	(100.00%)			
Research services	27	19	13	5	0	64	124	1.94	1
	(42.19%)	(29.69%)	(20.31%)	(7.81%)	(0.00%)	(100.00%)			
Scholarly communication	5	0	1	13	46	65	290	4.46	5
	(7.69%)	(0.00%)	(1.54%)	(20.00%)	(70.77%)	(100.00%)			
Teaching and learning	14	15	17	14	5	65	176	2.71	3
	(22.22%)	(23.81%)	(25.40%)	(22.22%)	(6.35%)	(100.00%)			

Note: Overall ranking is determined by the average score. The lowest average score will be ranked 1, whereas the largest average score will be ranked 5.

Table 7: Total and average score of Question 69 (“Rank the following subject competencies from 1 to 12 based on how central they are to your work with entrepreneurship on campus, with 1 being most central”)

Subject competency	Ranking								Number of respondents	Total score	Average score	Overall ranking
	1	2	3	4	5	10	11	12				
Business information environment	8	5	4	9	11	1	1	1	62	310	5.00	5
	(12.90%)	(8.06%)	(6.45%)	(14.52%)	(17.74%)	(1.61%)	(1.61%)	(1.61%)	(100.00%)			
Business law research	0	1	2	2	1	8	12	8	62	542	8.74	9
	(0.00%)	(1.61%)	(3.23%)	(3.23%)	(1.61%)	(12.90%)	(19.35%)	(12.90%)	(100.00%)			
Company research	3	7	18	17	8	0	0	1	62	247	3.98	3
	(4.84%)	(11.29%)	(29.03%)	(27.42%)	(12.90%)	(0.00%)	(0.00%)	(1.61%)	(100.00%)			
Financial research	0	1	3	5	8	5	2	4	62	439	7.08	7
	(0.00%)	(1.61%)	(4.84%)	(8.06%)	(12.90%)	(8.06%)	(3.23%)	(6.45%)	(100.00%)			
Industry research	10	18	18	7	4	1	0	0	62	185	2.98	1
	(16.13%)	(29.03%)	(29.03%)	(11.29%)	(6.45%)	(1.61%)	(0.00%)	(0.00%)	(100.00%)			
Interdisciplinary information	6	1	1	1	4	3	4	0	63	422	6.70	6
	(9.52%)	(1.59%)	(1.59%)	(1.59%)	(6.35%)	(4.76%)	(6.35%)	(0.00%)	(100.00%)			
International business research	0	0	3	3	5	3	5	1	62	472	7.61	8
	(0.00%)	(0.00%)	(4.84%)	(4.84%)	(8.06%)	(4.84%)	(8.06%)	(1.61%)	(100.00%)			
Market research	21	20	2	7	3	1	0	2	62	186	3.00	2
	(33.87%)	(32.26%)	(3.23%)	(11.29%)	(4.84%)	(1.61%)	(0.00%)	(3.23%)	(100.00%)			
Patent research	3	0	4	1	1	15	8	11	62	551	8.89	10
	(4.84%)	(0.00%)	(6.45%)	(1.61%)	(1.61%)	(24.19%)	(12.90%)	(17.74%)	(100.00%)			
Research commercialization	1	1	1	1	3	13	21	4	62	572	9.23	11
	(1.61%)	(1.61%)	(1.61%)	(1.61%)	(4.84%)	(20.97%)	(33.87%)	(6.45%)	(100.00%)			
Research strategies	9	7	6	9	13	3	6	0	62	296	4.77	4
	(14.52%)	(11.29%)	(9.68%)	(14.52%)	(20.97%)	(4.84%)	(9.68%)	(0.00%)	(100.00%)			
Theory-based discipline research	2	1	0	0	1	9	3	30	62	615	9.92	12
	(3.23%)	(1.61%)	(0.00%)	(0.00%)	(1.61%)	(14.52%)	(4.84%)	(48.39%)	(100.00%)			

Note: We have omitted Ranks 6-9 from the ranking columns to focus on details of the respondents' top 5 (Rank 1 to 5) and bottom 3 (Rank 10 to 12) choices. Overall ranking is determined by the average score. The lowest average score will be rank 1, whereas the largest average score will be rank 12. There are no Rank 2 in this case because two skills are tied for Rank 1.

Figure 1: Heat map for research services

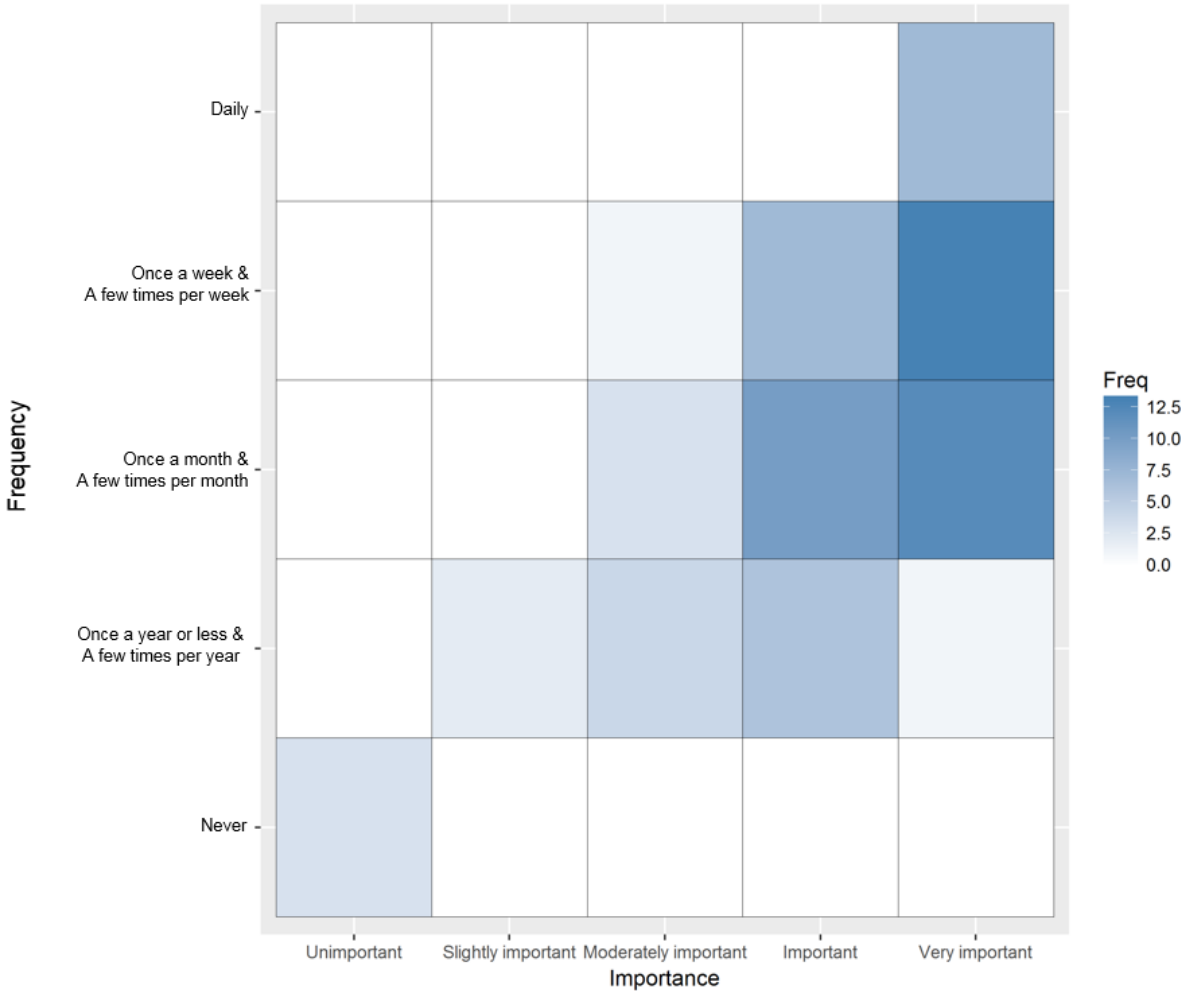

Figure 1. Heat map for Research Services (Q43)

Figure 2 – heat map for engagement

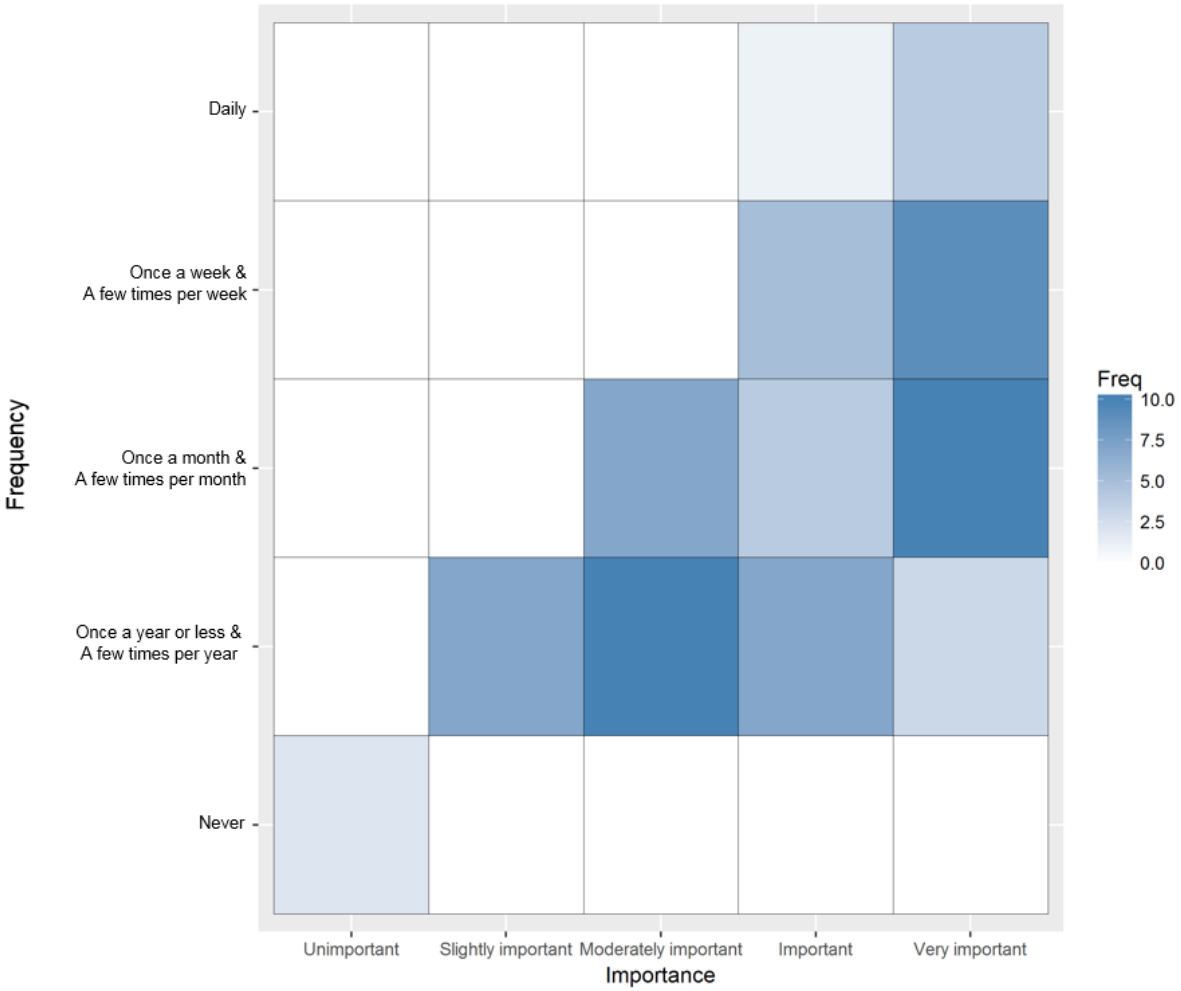

Figure 2. Heat map for Engagement (Q43)

Figure 3 – heat map for teaching and learning

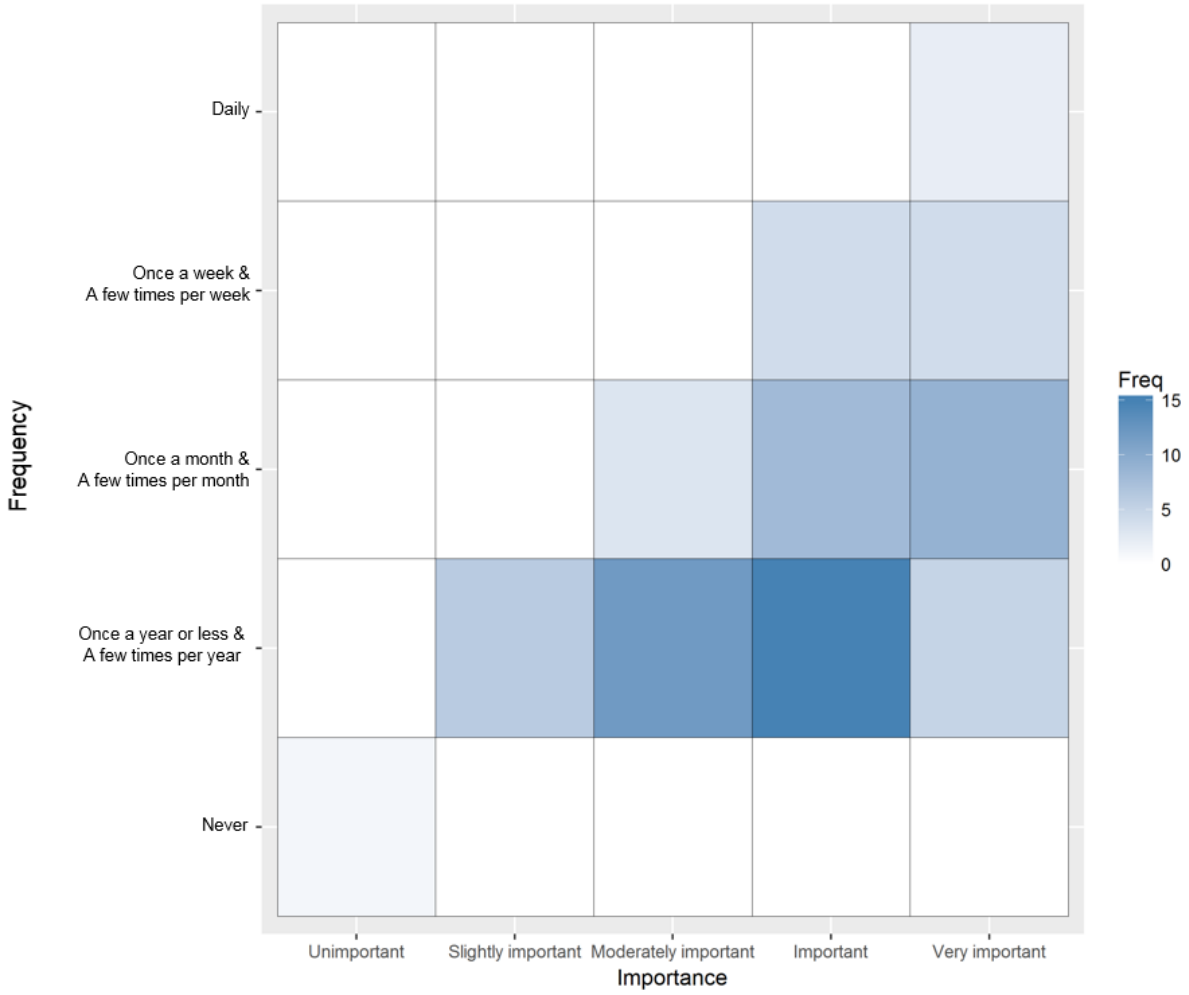

Figure 3. Heat map for Teaching and Learning (Q43)

Figure 4 – Heat map for collection development

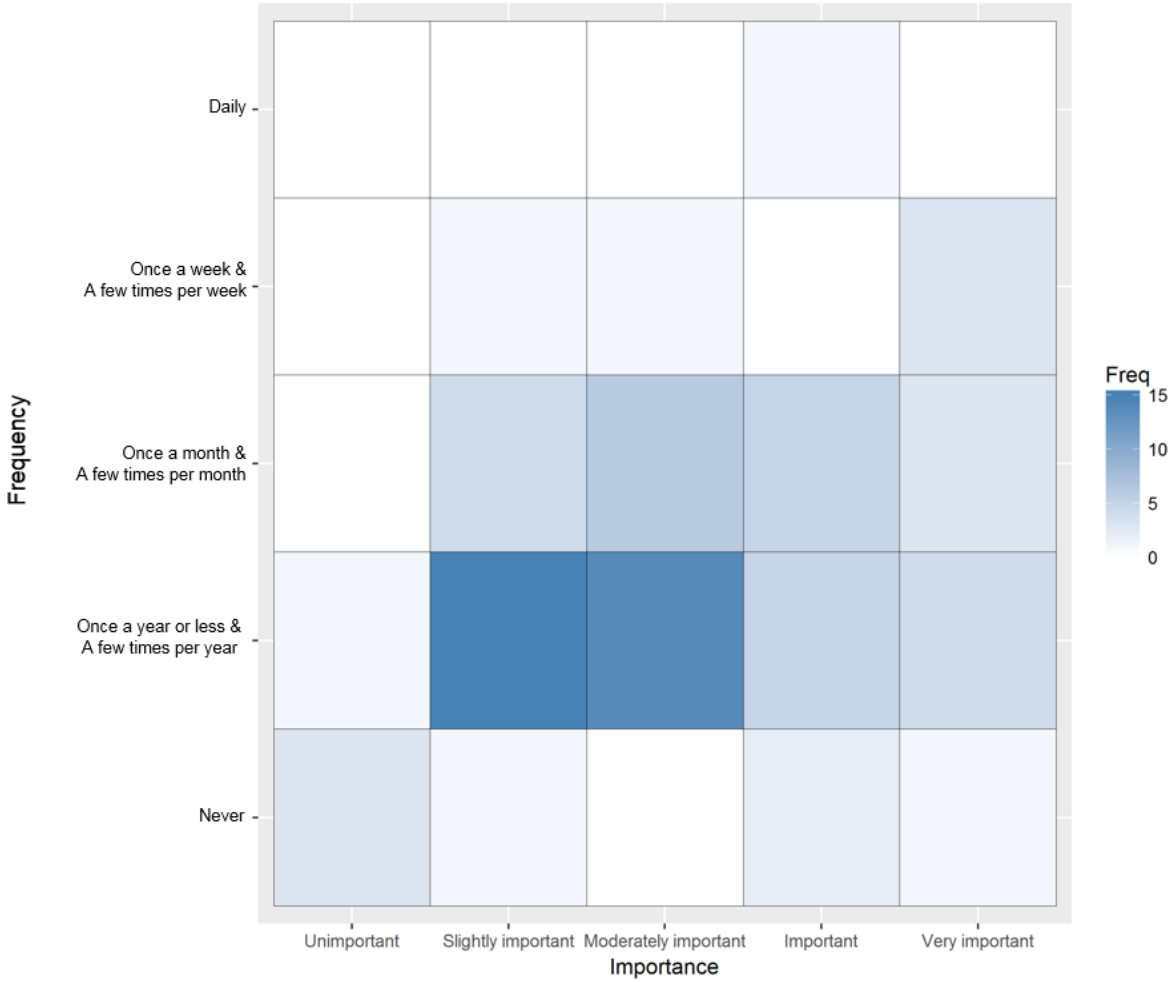

Figure 4. Heat map for Collection Development (Q43)

Figure 5 - heat map for scholarly communication

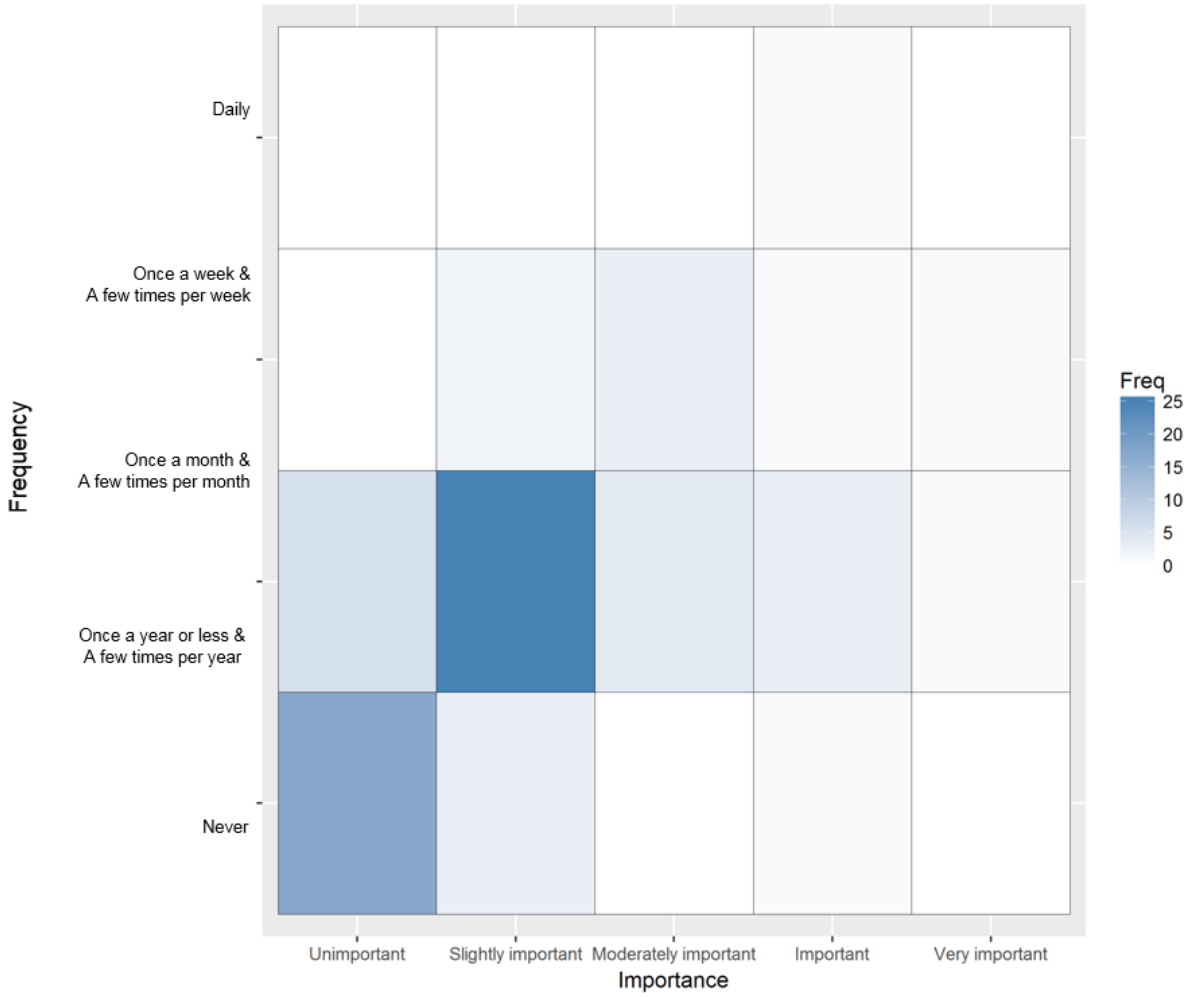

Figure 5. Heat map for Scholarly Communication (Q43)

Figure 6 – heat map for market research

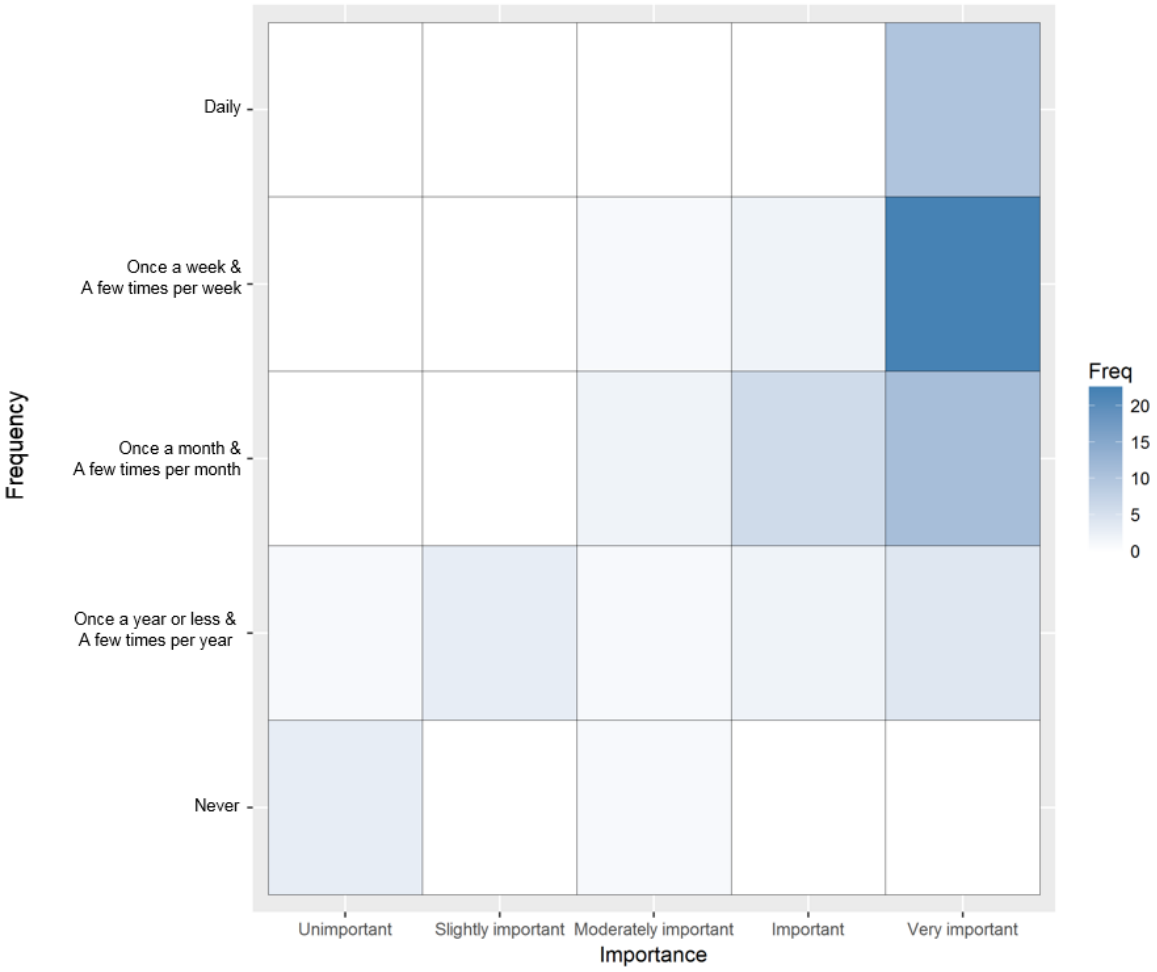

Figure 6. Heat map for Market Research (Q43)

Figure 7 – heat map for industry research

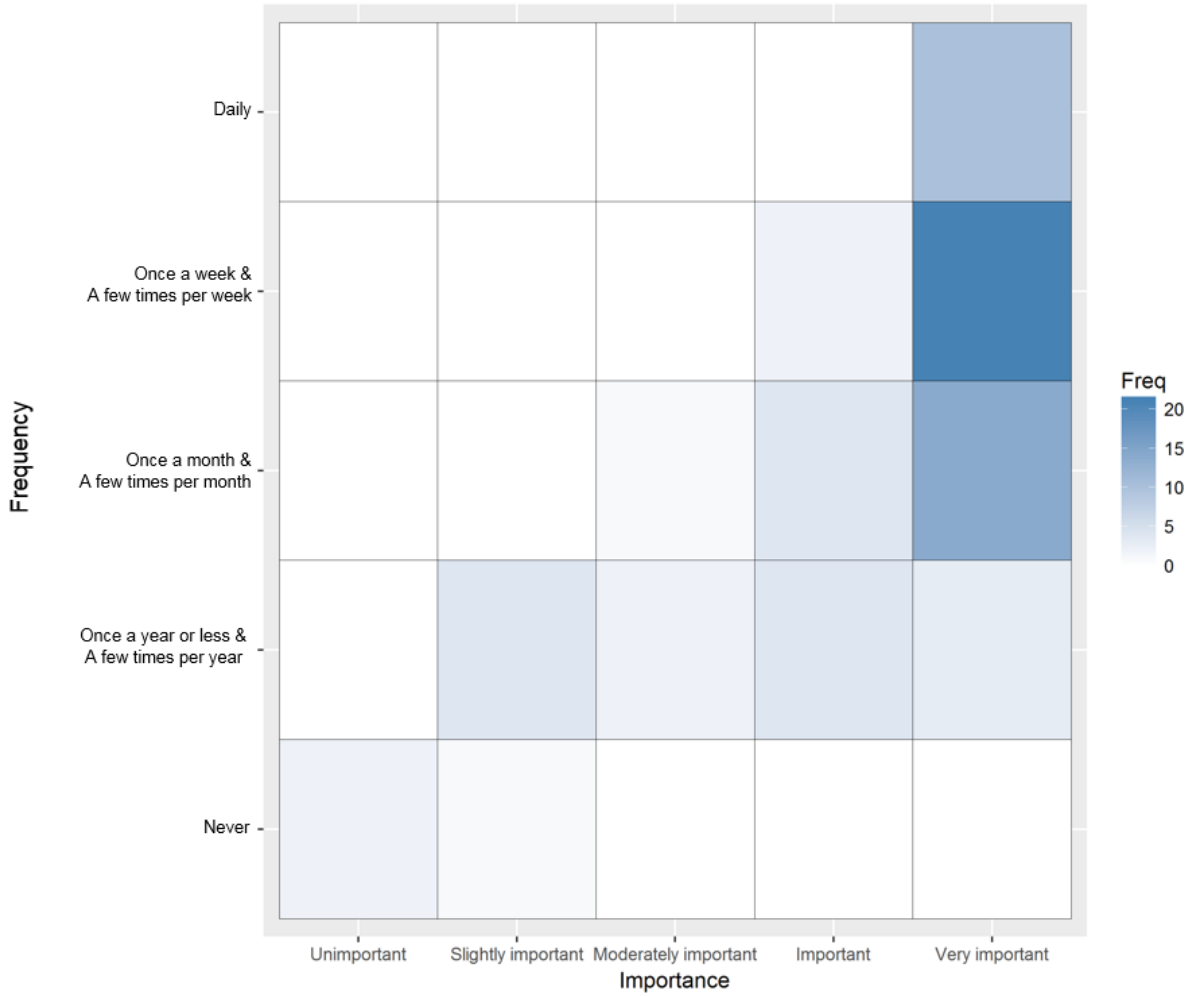

Figure 7. Heat map for Industry Research (Q43)

Figure 8 – heat map for company research

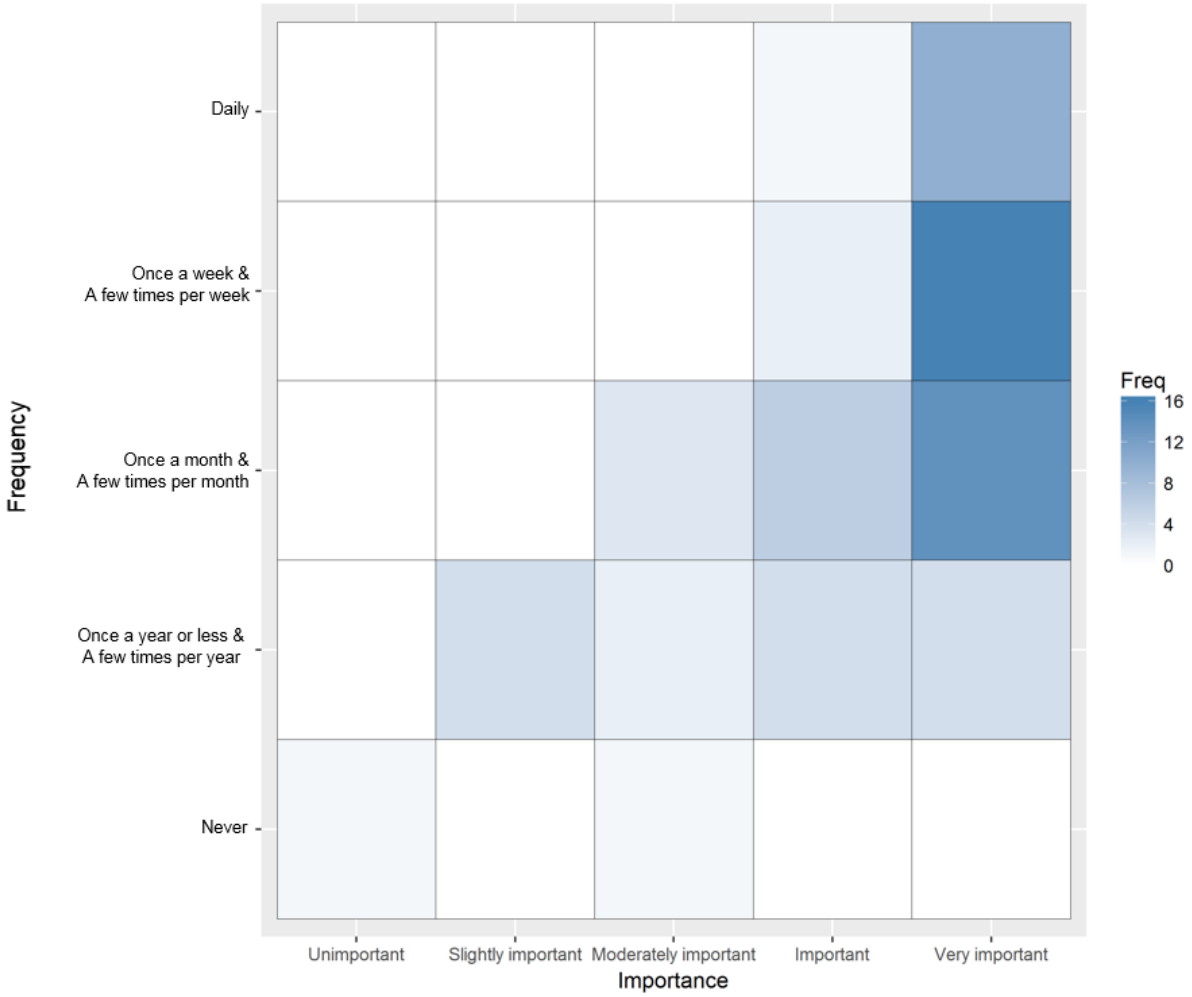

Figure 8. Heat map for Company Research (Q43)

Figure 9 – heat map for research strategies

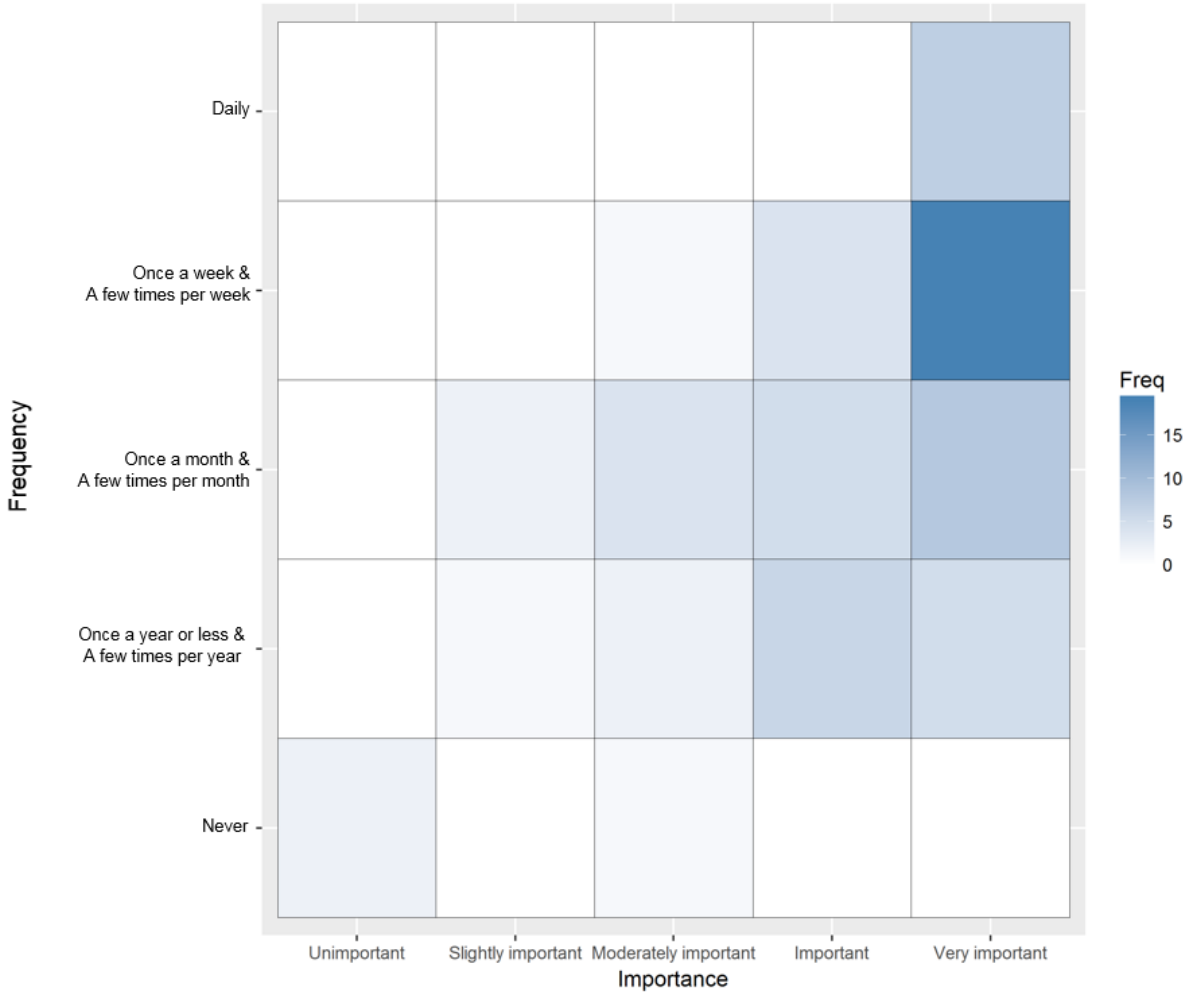

Figure 9. Heat map for Research Strategies (Q43)

Figure 10 - Heat map for business information environment

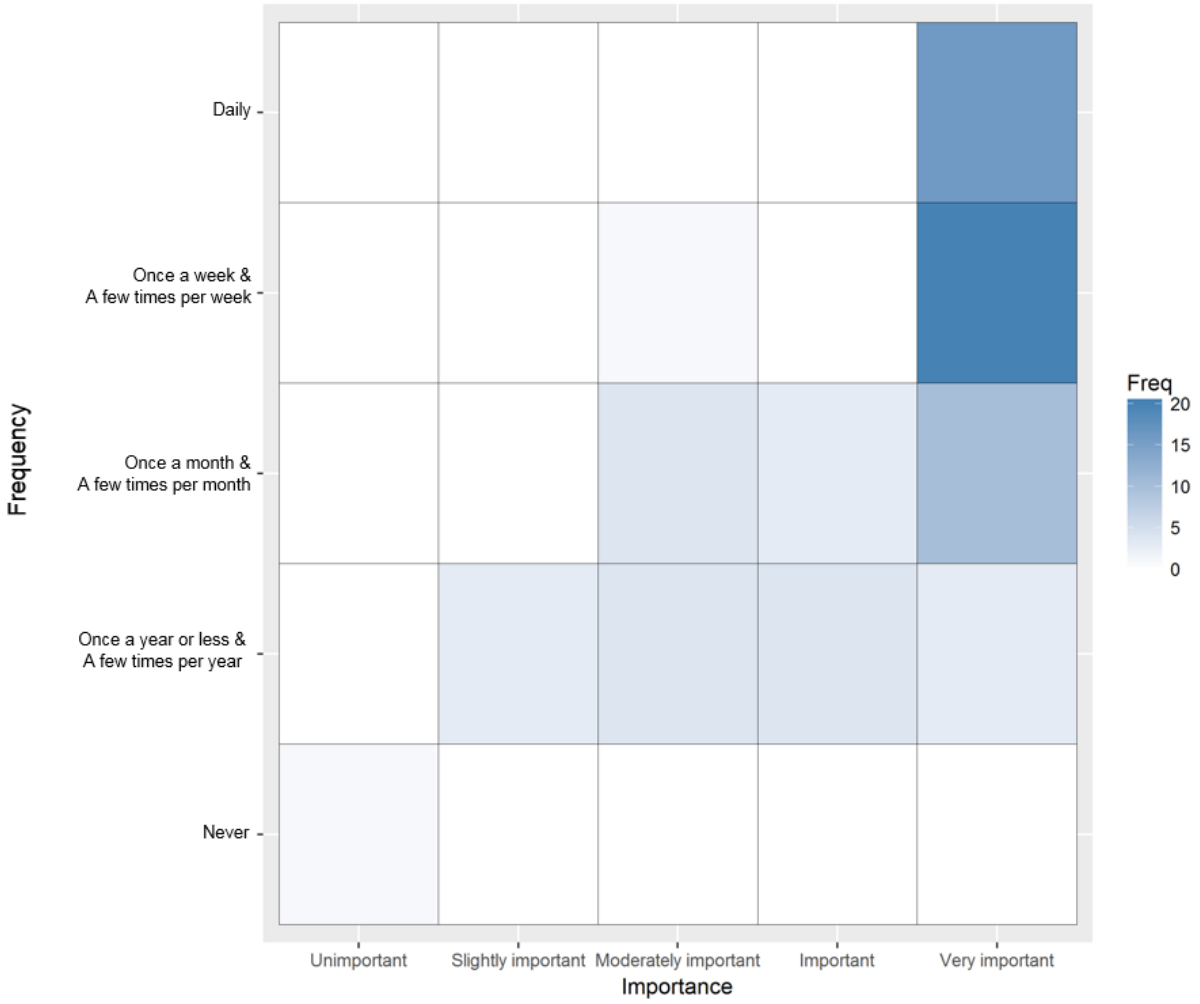

Figure 10. Heat map for Business Information Environment (Q43)