

Models of Embedded Librarianship

Final Report

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Executive Summary

This report documents an eighteen month research project, “Models of Embedded Librarianship”, which was carried out from January 2008 to June 2009, and funded by the Special Libraries Association under its Research Grant program.

The term “embedded librarianship” is widely used in the professional literature. It describes a variety of service innovations in a variety of organizational settings. It is used to describe the work of an academic librarian who participates in an academic course on an ongoing basis, teaching information literacy skills. It encompasses the work of librarians in a research institute or corporation whose offices are moved from a central library to their customer groups, so that they can work more closely with the members of those groups. It includes the role of a medical librarian who goes on “rounds” and participates in clinical care teams.

In this project, we sought to gain a better understanding of the similarities and differences among embedded library service programs, and to develop insights into practices that enable them to succeed. Our project had four goals:

- To define criteria of “embeddedness” for library and information service programs
- To define indicators of success and identify successful (model) programs
- To collect data about the practices followed by model programs in initiating, operating, and evaluating their services
- To develop recommendations for other librarians seeking to implement embedded services.

To achieve these goals, we conducted two surveys, made four site visits to embedded library service providers, and monitored the professional literature. The membership of the Special Libraries Association (SLA) was defined as the population for the study.

We found that embedded library services are widespread among the SLA membership. Forty-five percent of respondents who provide direct library and information services to information users in an organization said they deliver specialized services to one or more groups. Embedded services were found to be widespread among all organization types and industry sectors in the study. They were most prevalent in larger organizations.

Embedded librarians (those providing specialized services) were not sharply distinguished from their non-embedded peers in ways that we expected. Librarians providing specialized services are more likely than others to receive funding from their customers. However, they are not more likely to be located with customer groups, nor are they more likely to be supervised by a non-library manager.

Given the limited differences in funding, location, and supervision, we focused the subsequent stages of the study on all those who provide specialized services within their organizations. These we considered “embedded librarians.” These librarians report a

range of activities that strengthen their relationships with their customer groups and their knowledge of their customers' work. The following seven were cited by more than 50% of the embedded librarians responding:

- Collaborated on or contributed to your customer group's work
- Met more than once with a few regular customers to discuss information needs and present results to them
- Provided training on information resources or information management tools away from library facilities, such as in a customer's office, a conference room, or classroom
- Met (in person or virtually) with senior members (e.g., executives, managers, supervisors) of your customer group to discuss information-related needs and services
- Attended a meeting, class, or conference devoted to your customers' area of expertise (not oriented to librarians)
- Attended your customer group(s)' meetings to learn about their work and information needs
- Collaborated on or contributed to your customer group's electronic communications and/or collaborative workspaces, including email, wikis, blogs, and other web-based workspaces.

We also found that librarians who are co-located with their customers and receive funding from their customers tend to do more of these activities than other librarians.

Embedded librarians have background in both librarianship and in the subject matter important to their customer groups. We found that 84% hold an ALA-accredited Master's in Library or Information Science. Forty-four percent also hold a Bachelor's degree in a field relevant to their customers, and 23% hold a relevant advanced degree. (Some respondents may hold both a Bachelor's and an advanced degree relevant to their customers' work.) Embedded librarians also have extensive relevant informal education and practical experience: 50% report having more than five years' work experience in a field related to their customers' work, and 78% have attended relevant classes or conferences. Embedded librarians overwhelmingly report that their employers provide some form of support for their continuing education, and we found no significant relationships between the level of librarians' subject experience and their educational activities. Continuous learning is important to embedded librarians across the board.

Embedded librarians tend to provide complex, value-added services to their customer groups, but in many cases they also continue to provide basic library services as well. The following were performed by over 50% of respondents:

- Training on the use of information services
- Ready reference, quick fact checking, citation verification
- In-depth topical research
- Information resource development (such as evaluating resources, negotiating with vendors, etc.)

- Current awareness, news alerting
- Produce electronic or print “how to” manuals, pathfinders, etc.
- Evaluating, synthesizing summarizing the literature
- Content management for web, intranet and wiki sites
- Sharing instructional responsibility (such as participating with subject faculty in a classroom instruction)

The embedded library services model is widely distributed across different organization types and industry sectors. We found that embedded services tend to occur more frequently in larger organizations (those with over 500 employees), and that over half of embedded services programs have been in existence for 10 years or more. As noted previously, among all direct service providers, 45% reported that they provide specialized services to specific groups – our definition of “embedded librarianship.” Academic librarians are significantly more likely to say they provide embedded services, but government, corporate, and nonprofit organizations also report widespread adoption of this model. Similarly, educational institutions were the largest industry segment, but legal services, financial services, professional services, and media organizations accounted for roughly equal percentages of the embedded library service providers in the study. In six sectors, more than half of service providers reported that they are embedded. These sectors are:

- Education
- Financial services
- Information services
- Technology
- Biomedical and pharmaceutical
- Media

We did find some differences in the nature of embedded services and activities of embedded librarians across organization types. In particular, academic librarians are more likely to provide training on information resources in non-library locations, and appear to engage in fewer relationship-building activities.

Having explored the individual and organizational characteristics of embedded librarians, we defined criteria for the selection of successful programs, and studied factors that differentiated successful programs from others. Our criteria for success included an increase in the number of librarians providing services to the customer group; an increase in demand for services from the customer group; and an increase in the number of different services provided to the group. We identified eleven respondents who had experienced increases in all three, and sixteen who had not experienced increases in any.

Twenty-two factors were identified that differentiated the two groups. We categorized these factors into four themes:

- **Marketing and promotion:** successful programs are more likely to benefit from word of mouth advertising; use printed promotional materials; and give presentations at new employee orientations.
- **Service evaluation:** successful programs are more likely to measure outcomes in financial terms; to use their metrics as justification for the continuance of their embedded services; to collect anecdotes about their services; and to count research projects, documents delivered, reference questions, and attendance at training sessions.
- **Services provided:** successful programs are more likely to provide sophisticated, value-added services, specifically in-depth research, competitive intelligence, training away from library facilities, sharing of instructional responsibility with subject faculty, and data analysis. They are also more likely to provide document delivery services.
- **Management support:** successful programs were more likely to be established without needing approval from organization management; to benefit from the customer group manager's participation in integrating the librarian into the customer group; and to have the customer group provide input to the librarian's performance review. They were more likely to have a written agreement for the service delivery; to have the authorization of the library manager to initiate services; and to require the embedded librarian to participate in continuing education.

In conclusion, we find that embedded library services are widespread and effective. Successful embedded librarians are excellent relationship-builders, with strong knowledge of their customers' work, and they deliver highly sophisticated, value-added services.

We are concerned that current programs depend too much on the excellence of individual librarians. We recommend that many library managers renew their efforts to lead and support embedded librarians, taking five specific actions:

1. Hire library services staff who can build relationships
2. Enable them to learn about the parent organization and the subject domain of their customers
3. Empower them to identify and offer the services that their customers need most
4. Build manager-to-manager alliances and communicate effectively with customer managers
5. Support the embedded librarian's work by enabling them to reach back into the central library staff for support and to share knowledge with other embedded librarians in the organization; by promoting embedded services effectively; and by systematically evaluating embedded services.

1 Introduction and Overview

1.1 Background

“Embedded Librarianship” is not a new concept. Rather, it is an expanding trend and a term used to cover a range of initiatives and service concepts. The development of new, digital information resources and related economic and administrative changes have made embedded librarianship critically important to librarians and information professionals. This project addresses the profession’s need for greater knowledge of the spread of embedded services, the common factors in the embedded services model, factors associated with success, and guidance for the development and operation of embedded library services.

As early as the 1970s, medical librarians began to join interdisciplinary health care rounds, along with pharmacists, social workers, and other professionals, to augment the expertise of M.D.s and deliver improved medical care.(Cimpl, 1985) More recently, academic librarians, encouraged in part by the ubiquity of digital information resources and the expansion of distance education programs, have developed new programs to take their instructional services out of the library and into the classroom – whether physical or virtual. These programs have often gone by the name of “embedded library instruction”. (See for example Ferrer-Vinent & Carello, 2008) While less prominent in the literature, initiatives to embed librarians and library services have also been reported in research institutes and other organizations.

Commonly, embedded librarianship programs start by shifting the location of delivery, not changing the nature of the service itself. However, they have a way of evolving into new modes of highly customized and contextualized services, with new roles and responsibilities for the librarians.

In health sciences libraries, the initial idea was that the librarian would perform literature searches – a standard library service – but would be better able to identify search needs by joining the clinical care team on its rounds. But as this initial change took hold, the nature of the service changed. The librarians began to “project themselves not as information ‘servers’ who trail the team in an auxiliary capacity, but as an integral part of the group with a specialized expertise that can contribute vitally to clinical situations.” (Giuse, 1997) Ultimately, the clinical medical librarian has led to the concept of the informationist, a health care professional who combines professional knowledge in information and library science with equivalent knowledge in medical sciences. The informationist is able not only to search and retrieve relevant literature, but read it, analyze it, and present a synthesis of it to the medical doctors and clinical care teams. (See Davidoff and Florance 2000 for a description of the informationist skills and roles.)

Similarly, in higher education, librarians have gone beyond taking their standard bibliographic instruction presentations into the classroom or the class website. Dugan, of Purdue University, describes a “proactive embedded librarian approach [that] combined conventional classroom instruction with semester-long monitoring and research assistance on a point-of-need basis.” (Dugan, 2008) Purdue’s program, as Dugan points out, is derived from another program at the University of Michigan, in which librarians

serve as semester-long information consultants to student project teams in the Ross School of Business. (Berdish & Seeman, 2008)

This type of growth in depth, sophistication, and complexity of library services has also been noted elsewhere. Weddell describes an embedded library services program in an agricultural research institute, involving librarian outreach and relationship building to specific customer groups, along with some physical office moves of librarians into customer office areas.(Weddell, 2008) In a follow-up communication, she writes that as a result of developing embedded library services, “the work is at a much higher level than before, there is more in depth research required and as the trust has built up so has the requirement for more analysis of results.” (Weddell, personal communication, 2009)

From experience and from our reading of the literature, we have formulated a concept of embedded library services that involves much more than the transfer of traditional library operations into new physical and virtual locations. Rather, it involves focusing on the needs of one or more specific groups, building relationships with these groups, developing a deep understanding of their work, and providing information services that are highly customized and targeted to their greatest needs. In effect, it involves shifting the basis of library services from the traditional, transactional, question-and-answer model of reference services to one in which there is high trust, close collaboration, and shared responsibility for outcomes.

While physical co-location, direct funding of services by the customer, and sharing of management responsibility between library and customer group management may be features of embedded library services, we believe that a more complete way of differentiating embedded library services is needed. We propose the following list of attributes to distinguish embedded from traditional modes of library service. Embedded services are:

- Customer Centric not Library Centric
- Located in their Workplace not Our Workplace
- Focused on Small Groups not Entire Populations
- Composed of Specialists not Generalists
- Dependent on Domain Knowledge not only Library Skills
- Aiming for Analysis and Synthesis not simply Delivery
- In Context not Out of Context
- Built on Trusted Advice not Service Delivery

As this review has shown, the model for embedded library services was established well before the advent of today’s Internet-based digital information resources, available any time and any where to anyone with a network connection. Yet the technological revolution in digital information, and related economic and organizational changes, have raised the importance of embedded services in a dramatic way. Library users, whether M.D.s, students, or advanced research staff, no longer need to rely on libraries and librarians for basic discovery and access in the way they once did. As the Special Libraries Association noted, “Business leaders think Google is all they need.” (*Positioning SLA for the future: Alignment initiative results and recommendations*2009)

When the Educause Center for Applied Research studied the information technology skills of undergraduates in 2008, they found that “79.5% give glowing reports of their ability to search the Internet effectively and efficiently.” (Salaway, Caruso, & Nelson, 2008) Saunders has summed up the situation nicely, “The Internet and Google have changed the information landscape. Libraries now compete for a share of the information market.” (Saunders, 2007) In this competitive environment, it is not surprising that many libraries report flat or declining demand for traditional reference services.

The challenge and the opportunity for librarians and information professionals is to apply their skills in ways that increase the value of their services. As the SLA Alignment Project has noted, there must be a new emphasis on:

- “[T]he quality of information, the efficiency of dissemination, and the level of analysis which I[nformation] P[rofessional]s uniquely provide”
- “[R]elevance, access and timeliness vs. the packaging and format of distribution”
- “[R]efram[ing] the skill sets of IPs in terms of better end-products and bottom-line results” (Positioning SLA for the future: Alignment initiative results and recommendations 2009)

We believe that the embedded library services model offers a uniquely powerful way to achieve these strategic goals for the profession. By enabling librarians to build relationships, establish trust, and understand the work of their users – whether teaching faculty, students, researchers, clinicians, business leaders, or others – it provides the environment in which the value, alignment, and visibility of information services can all be heightened to a new level.

In this project, we set out to develop awareness and insights into the growing trend of embedded library services. We sought to explore the common features of these services across many types of libraries and information centers, in many types of organizations, as represented by the membership of the Special Libraries Association. We collected information about their initiation, services delivered, marketing and promotion, management, and evaluation. Most importantly, we hoped to identify factors that were associated with success, and to develop recommendations that can help other librarians to develop successful embedded services programs.

We established four project goals:

- To define criteria of “embeddedness” for library and information service programs
- To define indicators of success and identify successful (model) programs
- To collect data about the practices followed by model programs in initiating, operating, and evaluating their services
- To develop recommendations for other librarians seeking to implement embedded services.

1.2 Report Overview

This final report consists of five sections, plus four appendices.

- Section 1 provides the background and justification for the study and an overview of the methodology.
- Section 2 discusses our survey findings regarding the distinctions between embedded and non-embedded librarians, and the attributes shared by individual librarians and information professionals functioning in embedded service roles.
- Section 3 reviews findings having to do with the organizational and administrative characteristics of embedded library services programs, as reported in survey responses and site visits.
- Section 4 reports our identification of successful programs, and analysis of the factors that appear to differentiate successful programs from other programs.
- Section 5 proposes actions that librarians and library managers can take to enhance their chances for success in initiating, operating, and sustaining embedded library services programs. These recommendations are derived from the analysis of success factors in Section 4, and are synthesized into a “Virtuous Cycle for Embedded Library Services.”

The four appendices contain supplementary and detailed information. Appendix A provides a summary of responses to the two surveys we conducted. Appendix B presents summaries of the four site visits we conducted to gain in-depth knowledge about successful programs. Appendix C gives details of the statistical analyses methods and findings that are referred to in the body of the report. Finally, Appendix D provides a summary of the literature content analysis that was carried out during the project.

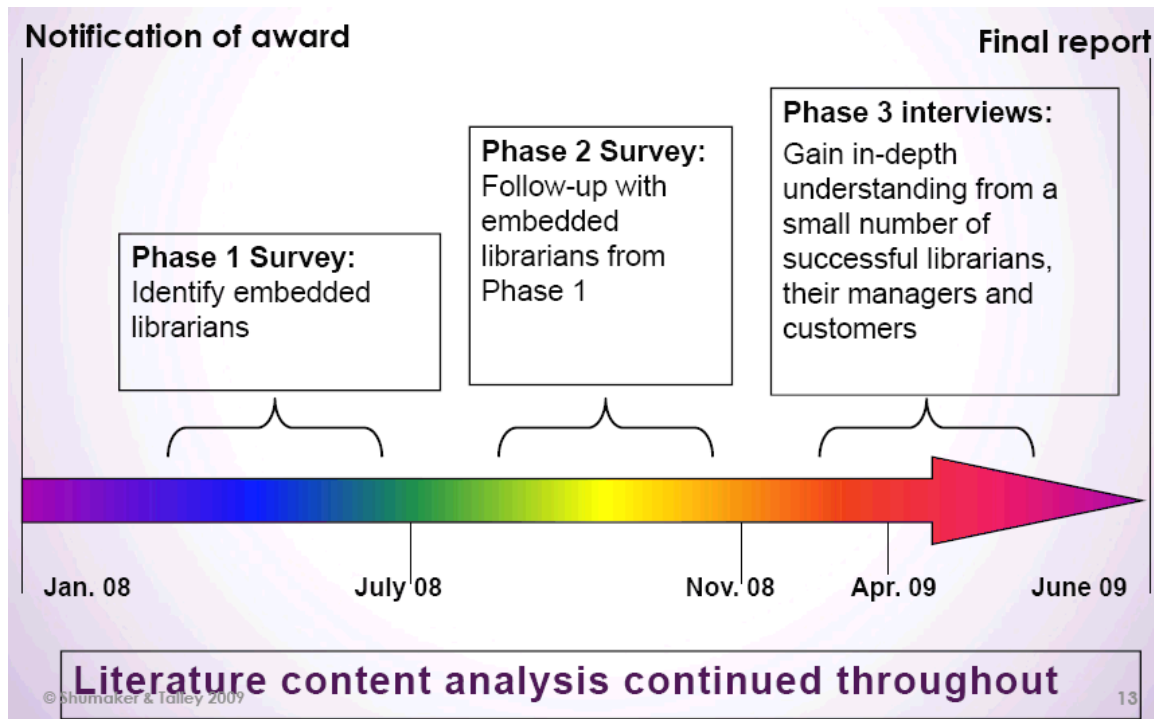
The report concludes with a bibliography of literature pertaining to embedded librarianship. Sources listed include case studies, reviews and analytical papers, and concept papers that provide insights into the general context of embedded librarianship within the profession of librarianship and within broader management and societal trends.

1.3 Methodology

The study encompassed three major data collection phases. In the first phase, a short survey was administered for the purpose of identifying individuals directly involved in the delivery of embedded library and information services. In the second phase, a longer survey was administered to those who qualified as embedded librarians from the first survey. In the second survey, detailed information was collected about the longevity and growth of their programs. We also collected detailed information about the initiation, operation and management, and evaluation of the embedded services. In the third phase, we identified four successful examples and arranged to conduct in-depth, on-site interviews with the embedded librarians, and in some cases their managers, representative customers, managers of customer groups, and library colleagues. In addition, a fourth activity, monitoring the relevant professional literature, was conducted as an ongoing, background activity.

A timeline showing the progression of the study is presented as Figure 1.1

Fig. 1.1: Project Timeline



1.3.1 Literature review and content analysis

The literature review began with a bibliography of 77 articles and other documents compiled by Shumaker and Tyler in 2007. A spreadsheet was prepared in which each row represents a document, and each column represents an attribute of embedded library services. Notations were made in the appropriate cell of the spreadsheet to indicate the treatment of the attribute by the article.

The initial bibliography was updated by searches in major Library and Information Science databases, including Emerald, Library and Information Science Abstracts (Cambridge), Library Literature and Information Science (WilsonWeb), and Library, Information Science, and Technology Abstracts (Ebsco). Searches were updated by establishing alerts in each database. Only documents judged relevant to embedded librarianship were included in the spreadsheet. The final spreadsheet contains 156 documents, and is presented as Appendix I.

1.3.2 Survey Phase 1

The goal of the Phase 1 Survey was to identify embedded librarians. We began by identifying librarians and information professionals whose primary job function is the direct delivery of information services within an organization. By “Direct Delivery” we mean reference librarians, instruction librarians, public services librarians, information

analysts and others whose primary job involves interacting with information seekers in order to provide information to them.

We began by drawing a random sample of 3,000 names from the membership list of over 10,000 individual members of the Special Libraries Association. The Phase 1 Survey was developed in the SurveyMonkey web-based survey system, pre-tested, and released via email notification to the sample population on July 9, 2008. We offered a drawing for two Amazon gift certificates as an incentive for participation. Each individual in the sample received a unique URL, enabling tracking of responses. Two follow-up notices were sent to non-respondents, and the survey was closed on August 1, 2008. A total of 1001 completed responses were received, for a response rate of 33%. The number of responses is sufficient to ensure that, at the 95% level of confidence, the population estimates derived from this study will fall within +/- 3.2% of the true SLA population parameters.

The survey contained nineteen questions, including three eligibility questions. The first was whether the respondent was currently employed. Forty participants responded that they were not currently employed and were dropped from the survey.

All the remaining 961 respondents were asked to identify their organization and industry affiliations. We were unable to compare the respondents' organization or industry type with corresponding data in the original random sample to verify that the response sample is representative of the sample as a whole. SLA does not collect this information from its members. Of the 961 employed respondents:

- 43% represented For-profit organizations,
- 19% represented Academic institutions;
- 15% represented Government Agencies;
- 14% represented Not-for-profit organizations; and,
- 7% represented "Other" organization types.

The remaining two organizational types were Public, 2%, and School, 0.4%.

The second qualifying question related to the respondent's work responsibilities. We sought to include in the study only those with direct responsibility for the delivery of services, and to exclude managers and others without such responsibilities as their primary duty. All but nineteen (942) of the 961 employed respondents provided their primary work responsibilities. Their answers were:

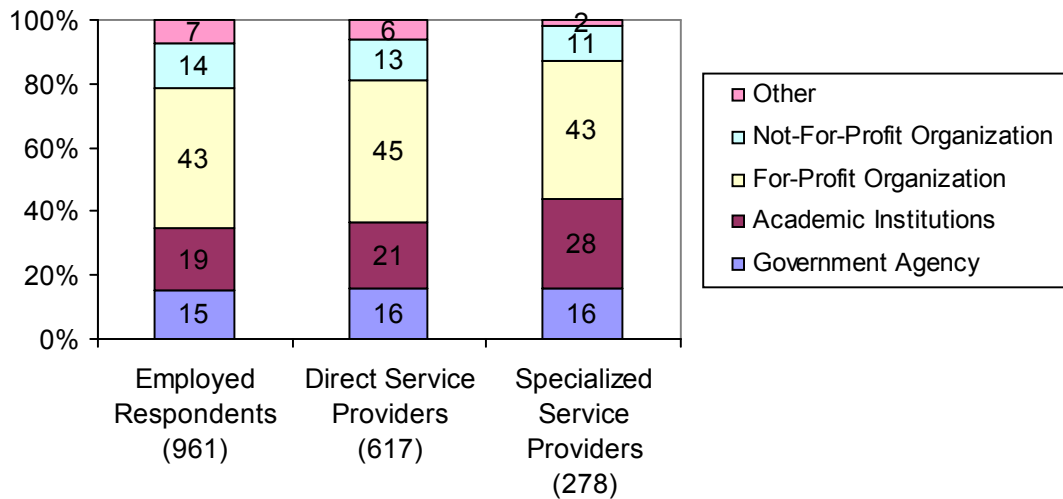
| | |
|---------------|-----|
| Manager | 279 |
| Librarian | 500 |
| Webmaster | 31 |
| Support Staff | 34 |
| Faculty | 9 |
| Vendor | 21 |
| Self Employed | 16 |
| Other | 52 |
| Total | 942 |

Of these categories, Librarian, Webmaster, Support Staff, and Other were identified as possibly engaged in direct delivery of information services, and advanced to the third qualifying question. There were 617 respondents who met these criteria.

The third qualifying question asked whether the respondent provides specialized services to one or more customer groups within the organization. Of the 617, 278 (45%) indicated that they provide specialized services to a specific customer group within their organization. For purposes of our study, this group was defined as Embedded Librarians and deemed eligible to participate in the Phase 2 Survey. However, only 234 of the 278 indicated a willingness to participate in a follow-up survey. These 234 became the pool for the Phase 2 Survey.

It should be noted that the percentage of respondents providing specialized services held steady (within 1 – 3 percentage points) for three of the four most common organization types (Government, Academic, For-profit, and Not-for-profit) as we filtered out those who were not embedded librarians. However, the Academic group proved the exception: it constituted 28% of the 278 providers of specialized services. Graph 1.2 depicts the distribution of respondents by organization type through the three qualifying questions.

Graph 1.2: Distribution of Respondents by Organization Type



A summary of the survey and responses is provided in Appendix A. Survey Results, Phase 1 Survey.

1.3.3 Survey Phase 2

As noted above, analysis of Phase 1 Survey responses identified 278 direct providers of specialized library and information services deemed eligible for the Phase 2 Survey. Of these, 234 indicated willingness to participate in a follow-up survey. These became the pool for Phase 2.

The Phase 2 Survey instrument was developed and pre-tested using SurveyMonkey. The survey was released on November 10, 2008. As in Phase 1, the incentive of a

drawing for two Amazon gift certificates was offered for participation. Individual response was tracked using unique URLs, and two rounds of follow-up emails were sent to non-respondents. The survey was closed on November 30, 2008 with a total of 130 responses, for an overall response rate of 56%.

A summary of the Phase 2 Survey questions and responses is included in Appendix A. Survey Results, Phase 2 Survey.

1.3.4 Interviews

The final phase of the project was to conduct site visits and in-depth interviews with a small number of exemplary embedded library service providers. Potential interviewees were identified by filtering Phase 2 Survey responses for criteria including longevity (both individual employee longevity in the current position and longevity of the embedded services program) and growth (including demand for services, number of services offered, and staff size increases). The resulting list was prioritized based on text comments provided by the respondent: those who provided interesting and extensive comments about their programs were put at the top of the list. Respondents were then contacted by telephone and asked if they would be willing to host a one to two day visit, be interviewed, and arrange interviews with library management, customer management, and customer/colleagues. Two respondents who were contacted declined or failed to respond, but six others expressed interest. Of those, four visits were conducted: two with For-profit organizations and two with higher education institutions.

Site visits were conducted from March to early May, 2009. In addition to the librarians themselves, we spoke with library managers or directors in all four cases; with customers or non-library colleagues in three cases, and with managers of teams and organizations where the librarians were embedded in three cases. The interview script for interviews with the embedded librarians is included in Appendix B. This script was modified when interviewing library directors, customers/colleagues, and customer managers. Summaries of the four site visits are also included in Appendix B.

2 Characteristics of Embeddedness

What does it mean to be an embedded librarian or information professional in an SLA organization today? Are there any common characteristics that define an embedded professional? Our first research goal was to answer these questions and establish a set of defining characteristics to distinguish embedded from other direct service providers. Our literature review provided initial insights into the factors that distinguish embedded librarians from other service providers. These include:

- Location with a customer group (see, for example [Allen, 2003], [Brown & Leith, 2007], and [Boyd, 2004]);
- Partial or full funding by a customer group (see, for example, [Seago, 2004] and [Moore, 2006]); and,
- Supervision by a non-library manager (see, for example, [Davidoff and Florance, 2000] and [Hearn, 2005]).

We analyzed these factors through an analysis of two groups identified in the Phase 1 Survey. A group of 617 direct service providers (62% of the survey respondents) was identified in Survey 1. This group was further subdivided into two subgroups based on “yes/no” responses regarding the provision of specialized services to any single customer group in their organization. (Appendix A: Survey Results, Phase 1 Survey, Q14). Those answering “yes” to this question (278/617= 45%) were identified as the research project’s embedded librarians, and those answering “no” were considered not to be embedded (339/617=55%). We then looked for significant differences between the embedded librarians and non-embedded service providers by comparing each group’s responses to questions regarding work location, supervisors, and funding sources. Survey 1, Questions 9 – 13 inquired about each of these factors.

The first level of analysis performed on Phase 1 Survey results included traditional statistical methods of Correlation Analysis and Chi-square Analyses. In addition, a variety of data-mining techniques were used, including Factor Analysis, Correspondence Analysis, and Logistic Regression. A significance level of $\alpha = 0.05$ was employed in all statistical analyses. (See Appendix C, Data Tables and Methodology, 2.1 Background) This means that the results of these analyses had only a 1 in 20 probability of occurring randomly.

One particular statistical method yielded important results. A contingency table was created for Question 14 (In your position, do you provide any specialized services to any single customer group within your organizations?) broken down by the survey questions funding, location and supervision (Questions 9-13). Chi-squared tests of association were then performed on the tables using only the “yes/no” responses to Question 14 (the embedded and non-embedded populations). (See Appendix C. Data Tables and Methodology, 2.1 Background). The discussion that follows is based primarily on the findings from this analysis.

2.1 The Role of Funding and Work Location

We found significant associations between some sources of salary funding and embedded service providers. We also found a significant relationship between primary work location and funding sources, in general. No relationship was found between who the supervisor is and whether a respondent is an embedded service provider.

2.1.1 Funding

In the Phase 1 Survey, we asked three questions related to salary funding to understand whether any relationship exists between funding sources and the provision of specialized services:

- Question 11: Does your organization have a specific budget designated for library and information services expenditures?
- Question 12: Is your salary funded COMPLETELY by a library or information services budget?
- Question 13: Is any part of your salary directly funded by one or more customer groups?

Funding of service providers' salaries from a library budget is most common for both groups:

- Most respondents in both groups of embedded (53%) and non-embedded (49%) service providers were more likely to indicate a library budget as the sole-source of salary funding, when there is a specific library budget. It is surprising that a larger percentage of embedded than non-embedded service providers are more likely to say they are fully-funded by a library budget.
- Equal proportions (24%) in each group of embedded and non-embedded respondents indicated that their salaries are funded by customer groups (in part or in full), even when there is a library budget.
- A larger percentage (19%, almost a fifth) of non-embedded respondents than embedded respondents (9%) *did not* know the source of their salary funding. The high percentage of non-embedded "don't know" responses may explain the smaller percentage of non-embedded service providers (49%) indicating that their salaries are completely library-funded.

Similarities between the two groups diminish when we look at respondents who said their salaries are funded either by a combination of library and customer funding or by customer funding alone. The Chi-squared test of association found that funding by one or more customer groups has a significant association with providing specialized services ($p = 0.0004$). (See Appendix C, Data Tables and Methodology, 2.2.1 Funding for data on all results discussed in this section).

- We found a statistically significant positive relationship between customer funding and "embeddedness."
- Embedded respondents indicated that they are more likely to receive all or partial salary funding from a customer group than non-embedded (23% vs.15%).

Table 2.1 presents details on the customer funding analysis by embedded and non-embedded respondents.

Table 2.1: Customer funding of salary by embedded and non-embedded respondents

| | Q13 Is any part of your salary funded by one or more customer groups? | | | | | |
|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|------------------------|-----------------------|------------|-------------------------------------------------------------------------------------|------|
| Q14 In your position, do you provide specialized services to any single customer group within your organization? | Yes, all of my salary | Yes, part of my salary | No, none of my salary | Don't Know | Did not answer (Answered "yes" to Q12, fully-funded by library budget; skipped Q13) | |
| Yes (N=278) | 18.4% | 5.0% | 12.2% | 11.2% | 53.2% | 100% |
| No (N=320) | 8.8% | 5.9% | 17.8% | 18.1% | 49.4% | 100% |
| Total (N=598) | 13.2% | 5.5% | 15.2% | 14.9% | 51.2% | 100% |

Correlation analysis reinforced this relationship, finding a significant positive relationship between customer funding and embedded respondents and a negative relationship between customer funding and non-embedded respondents.

- Respondents who answered Question 13, "Yes, part of my salary is funded by a customer group" were very likely to answer Question 14, "Yes, I provide specialized services" ($r = 0.26103$, $p < 0.0001$).
- Conversely, non-embedded respondents *tended not* to indicate that they receive funding from a customer group ($r = -0.21196$, $p = 0.0002$).

2.1.2 Location

We also examined whether there were differences between embedded and non-embedded respondents (Question 9: Where is your primary work area located?). The literature on embedded roles suggests that embedded service providers are more likely to be located with a customer group. Neither Correlation Analysis nor the Chi-squared tests of association found any significant statistical relationships between embedded respondents and work location with a customer group. The contingency table below shows that a clear majority in each group (59% embedded, 65% non-embedded) is located with other library staff and not customer groups.

Table 2.2: Primary work location by embedded and non-embedded respondents

| | Q9 – Where is your primary work area located? | | | | | |
|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|------------------------------------------|---------|-------------------------------------------|-------|-------|
| Q14 In your position, do you provide specialized services to any single customer group within your organization? | Located with other library/information staff | Located with one or more customer groups | Neither | Located at home or another tele-work site | Other | Total |
| Yes (N=278) | 59% | 26% | 7% | 3% | 5% | 100% |
| No (N=320) | 65% | 19% | 9% | 2% | 5% | 100% |
| Total (N=598) | 62% | 22% | 8% | 2% | 5% | 100% |

Primary work location does appear to affect funding sources for both the embedded and non-embedded respondents, even though it was not found to be a distinguishing characteristic of embedded service providers. Correlation Analysis performed on all of the factors (location, supervision and funding) found a number of statistically significant relationships between location and funding that are worth noting. These are:

- All direct service providers located with other library/information staff are more likely to have their salaries completely funded by a library budget ($r = 0.33048$, $p < 0.0001$), and not likely to have mixed funding sources ($r = -0.39341$, <0.0001).
- Embedded respondents who are located with library/information staff are much more likely to have their salaries funded completely by a library budget than non-embedded respondents with a similar work location ($p = 0.0001$).

Table 2.3 shows the percentage of embedded and non-embedded respondents who reported that they are located with other library/information staff and that their salaries are completely funded by a library budget.

Table 2.3: Primary work location with other library/information staff and salary funded by a library budget by embedded and non-embedded respondents

| | | | |
|--------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----|------------|
| | Q9: Located with library/information staff | | |
| | Q12: Is your salary funded completely by a library or information services budget? | | |
| | Yes | No | Don't know |
| Q14: Provide specialized services to one or more customer groups (N=153) | 79%* | 11% | 10% |
| Q14: Provide services to everyone within the organization (N=204) | 61%* | 17% | 22% |

*Differences between embedded and non-embedded respondents answering “yes” to the two questions are statistically significant at the .05 level.

Note that the percentage of embedded respondents who are located with library staff and completely funded by a library budget is significantly higher than that for non-embedded respondents. This finding is statistically significant at the .05 level, as well. We do not know why location seems to have a stronger correlation with customer funding for embedded service providers.

2.1.3 Summary

Using the reported characteristics of location, supervision and funding, we found fewer differences between embedded and non-embedded respondents than expected. Our analysis establishes one attribute that can be said to be associated with the role of the embedded service provider: customer funding of salaries. We also found work location to be related to customer funding. The lack of significant relationships between the other characteristics and our embedded respondents, using multiple statistical analysis techniques, suggests that other factors are of greater importance in defining embedded service providers.

The strong relationship between customer funding and embedded service providers may be critical information for library directors looking for alternative funding sources. In our analysis, establishing embedded roles and programs is a crucial element of securing customer funding for positions. Locating them away from the library and with the customer groups may prove to be equally important.

2.2 Nature of the Embedded Role

This section shifts focus to the role embedded service providers play in their customer groups' work and how that role is shaped. The literature consistently describes a transformation in the service provider's role from the traditional customer/service provider relationship to that of customer group or team member. (See Appendix D: Literature Content Analysis.) Our data supports this proposition and indicates that a dynamic set of interactions between embedded professional and customer group members facilitates and characterizes the embedded role. These interactions include:

- Reciprocal communications;
- Domain knowledge learned on the job; and,
- Targeted, value-added products and services

We used a series of questions in the Phase 1 and 2 Surveys to study embedded service providers' interactions with customer groups, their domain knowledge, and the types of services provided. In Phase 1, we focused on activities and interactions with customer groups. (See Appendix A, Survey Results; Phase 1 Survey, Question 17). Phase 2 questions centered on levels of education, experience and training, and specific types of services. (See Appendix A, Survey Results; Phase 2 Survey; Questions 13 – 17 and Questions 18-20). Our goal was to explore the type and extent of the interactions and relationships with customer groups and whether they are significant in shaping the embedded role. The discussion in the following sections is based on data analysis performed on these Phase 1 and Phase 2 Survey questions.

2.2.1 Building Relationships

In Phase 1 Survey, Question 17, we asked embedded respondents only to indicate whether they had engaged in each of 10 activities with their customer group(s) in the last six months. The activities fall into four general categories:

- Meeting with the customer group to gather and share information;
- Supporting the group(s) work through various activities;
- Engaging in social interactions with the customer group; and
- Meeting with customer group leaders to review performance.

Analysis of the responses to Question 17 indicates that embedded respondents are highly connected with their customer groups, engaging in multiple, complex interactions. They interact with groups to understand their work and related information needs, contribute to their work product, learn their subject domain, and sometimes meet informally as colleagues.

2.2.1.1 Interactions with Customer Groups

.A frequency table was created to identify the combinations of Question 17 activities that respondents selected most often. We found five combinations of activities that were selected at least six or more times.

- In the most frequently chosen combination, all of the ten activities were selected by 19 respondents;
- In the second most frequently chosen combination, nine of the ten activities were selected by 13 respondents;
- In the third, fourth and fifth most frequently chosen combinations, eight of the ten activities were selected by seven (3rd and 4th place) and six (5th place) respondents.

Table 2.4 shows each of the ten activities and the combinations selected by embedded respondents.

Table 2.4: Combination of activities performed with customer groups by frequency chosen

| Met with a customer manager to review my performance | Provided training on information resources or information management tools away from library facilities, such as in a customer's office, a conference room, or classroom. | Attended a meeting, class, or conference devoted to your customers' area of expertise (not oriented to librarians). | Met (in person or virtually with senior members (e.g., executives, managers, supervisors) of your customer group to discuss information-related needs and services. | Attended your customer group(s)' meetings to learn about their work and information needs. | Met more than once with a few regular customers to discuss information needs and present results to them. | Collaborated on or contributed to your customer group's work. | Collaborated on or contributed to your customer group's electronic communications and/or collaborative workspaces, including email, wikis, blogs, and other web-based workspaces. | Had lunch with members of your customer group. | Attended social events held by your customer group. | Frequency |
|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------|-----------|
| ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 19 |
| | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 13 |
| | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | 7 |
| | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | 7 |
| | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | 6 |

What is notable about this is the high number of interactions that embedded respondents are engaging in with customer groups on a regular basis.

Table 2.5 presents individual activities selected by 50% or more of the embedded respondents. Six of the seven appear in the above frequency table.

Table 2.5: Top seven activities reported by embedded respondents

| Activities | Response Percent | Response Count |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------|
| Collaborated on or contributed to your customer group's work | 74.5% | 205 |
| Met more than once with a few regular customers to discuss information needs and present results to them | 66.2% | 182 |
| Provided training on information resources or information management tools away from library facilities, such as in a customer's office, a conference room, or classroom | 65.8% | 181 |
| Met (in person or virtually) with senior members (e.g., executives, managers, supervisors) of your customer group to discuss information-related needs and services | 63.6% | 175 |
| Attended a meeting, class, or conference devoted to your customers' area of expertise (not oriented to librarians) | 58.9% | 162 |
| Attended your customer group(s)' meetings to learn about their work and information needs | 58.9% | 162 |
| Collaborated on or contributed to your customer group's electronic communications and/or collaborative workspaces, including email, wikis, blogs, and other web-based workspaces. | 58.5% | 161 |

Answered Question 275

Note: the categories do not add up to 100% or 275 because respondents could select more than one category and because three categories with a response rate of less than 50% and “other” responses have been omitted.

Four of the seven activities focus on strengthening knowledge of the customer groups' work and related information needs and are as likely to be initiated by the embedded service provider as by the customer.

The three remaining activities are customer-centric, involving the delivery of value-added services, targeted to their work needs (e.g., training at the customers' location and collaborating on work and blogs, wikis, etc.). A majority of embedded respondents (50% or more) are engaging in multiple interactions that build relationships. The number,

frequency and level of interactions suggest a strong focus on building and strengthening relationships with the customer groups. We also see a level of participation in the customer organizations (e.g., participating alongside customers in work-related meetings and learning opportunities) that is usually outside the traditional customer/service provider relationship.

2.2.1.2 The Role of Location and Funding

Primary work location and salary funding were found to foster relationships by influencing the number and types of interactions embedded service providers have with their customer groups.

- Primary work location was found to have a statistically significant association with an increase in the number of activities performed. Correspondence Analysis clearly showed that those located with one or more customer group(s) tended to check more activities in Question 17 ($p < .001$). (See Appendix C. Data Tables and Methodology, 2.3.2 Location and Funding)
- Salary funding by a customer group was found to have a statistically significant relationship with the types of interactions embedded service providers have with their customer groups. Correspondence analysis found that those who indicated their salaries are completely funded by a customer group are more likely to attend the customer groups' social events and to meet with a customer manager for a performance review. (See Appendix C. Data Tables and Methodology, 2.3.2 Location and Funding)

These two factors suggest, not surprisingly, that primary work location with and full salary funding from a customer group are associated with closer interactions and building stronger relationships with the customer group.

2.2.2 Domain Knowledge

Embedded librarians are known for their depth of knowledge in their customer group's subject domains. We wanted to understand how they acquired their knowledge and whether a degree in a related subject was a requirement for these positions. We were also interested in the extent to which the acquisition of domain knowledge might be related to relationship building with the customer group. In The Phase 2 Survey, we asked a series of five questions that focused on:

- Degrees in library and information science and in customer group(s) subject area;
- Methods for acquiring domain knowledge in the customer group; and
- Support of and participation in continuing education.

(See Appendix A. Survey Results; Phase 2 Survey, Questions 13, 14, 15, 16 and 17)

2.2.2.1 The Role of Education

We expected to find a high rate of undergraduate and graduate degrees in subjects related to the customer's domain and a significant relationship between related degrees and success factors. What we found was somewhat different. We also wanted to

understand the extent to which the acquisition of domain knowledge might be related to building a relationship with the customer group.

While a substantial percentage (44%) of respondents have an undergraduate degree in a related field, far fewer (23%) have a post-graduate degree. Fewer still (13%) indicated that they have a degree in progress in a related field. The most common educational background for a very large majority of embedded respondents (84%) is a Master's Degree in library and information science, which suggests the continuing importance of the information professional's skills in embedded roles.

Correlation Analysis performed on the questions related to educational background and several success factors (increases in staff size, demand for service and number of services provided, as well as the respondents' evaluation of the embedded program) did not find any significant relationships between this study's success markers and educational background.

Table 2.6 shows the percentage of responses for each educational level.

Table 2.6: Educational Level of Embedded Respondents

| Education | Percent of Embedded Respondents |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Master's degree in Library Science or Information Science (ALA accredited) (N=121) | 84% |
| Bachelor's degree in a field relevant to your individual customer group's area(s) of specialization (N=121) | 44% |
| Post-bachelor's degree in a field relevant to your individual customer group's area(s) of specialization (including Master's, Ph.D., J.D., M.D., etc.) (N=121) | 23% |
| Other degree in Library Science or Information Science (N=121) | 9% |

Note: the categories do not add up to 100% because respondents could select more than one category and because "other" category was omitted.

2.2.2.2 The Role of Experience and Training

In the Phase 2 Survey, we asked respondents about training and work experience related to their customer group's area of specialization. Survey results showed a 50/50 split between those with five or more years of work experience in a related field or

subject and those with less than five years of experience. Many are acquiring domain knowledge through their work experience, but just as many are not. The most common path to domain knowledge is not necessarily through experience, but through participation in classes and conferences in the customer’s subject area.

Table 2.7 shows the percentage of responses for four categories of acquired domain knowledge.

Table 2.7: Experience and Training of Embedded Respondents

| Experience and Training | Percent of Embedded Respondents |
|------------------------------------------------------------------------------------|---------------------------------|
| 5 or more years of work experience in a related field or subject matter (N=121) | 50% |
| Classes or conferences in a related field or subject matter (N=121) | 78% |
| Certification in a related field or subject matter (N=121) | 17% |
| Degree in progress in a related field or subject matter (N=121) | 13% |

Note: the categories do not add up to 100% because respondents could select more than one category and because “other” category was omitted.

Many embedded respondents appear to be acquiring domain knowledge primarily on the job. In Table 2.5: *Top seven activities reported by embedded respondents*, 60% of respondents reported attending a class or conference related to their customers’ area of expertise in the last 6 months. Our analysis shows embedded service providers to be active, continuous learners who find and take advantage of opportunities (particularly those available to their customer groups) to learn their customer groups’ work and advance their domain knowledge.

2.2.2.3 Domain Knowledge Requirements

These findings suggested another question: Are subject degrees and/or subject specializations required of new-entry, embedded librarians now to compensate for any lack of substantive work experience in their customer groups’ subject domains? A comparison of respondents with 5 or more years of experience with those with less than 5 years found that those with the greater experience (5 or more years) are the ones more likely to possess undergraduate and post-graduate degrees in a related subject area and not the other way around.

Table 2.8: Type of Degree by embedded respondents with 5 or more years of domain-related experience and by embedded respondents with less than 5 years of domain-related experience

| Degree | 5+ Years of Experience | Less than 5 Years of Experience |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------------------------|
| Master's degree in Library Science or Information Science (ALA accredited) | 52 (86.2%) | 50 (82%) |
| Other degree in Library Science or Information Science | 5 (8.3%) | 6 (9.8%) |
| Bachelor's degree in a field relevant to your individual customer group's area(s) of specialization | 34 (56.7%) | 19 (31.1%) |
| Post-bachelor's degree in a field relevant to your individual customer group's area(s) of specialization (including Master's, Ph.D., J.D., M.D., etc.) | 19 (31.7%) | 9 (14.8%) |
| Other | 16 (27%) | 9 (15%) |
| Totals | 60 | 61 |

Note: differences are not statistically significant.

These findings suggest that organizations, in general, are not emphasizing subject degrees and/or subject specializations for new-entry embedded librarians in place of experience. This may indicate that an information professional's education and skills outweigh the need for domain knowledge, which many embedded service providers are allowed to acquire on the job.

2.2.2.4 Continuing Education Support and Longevity

Even though a large majority, 85%, of all respondents said that their organizations support continuing education, only 45% of respondents reported that continuing education is required to either gain or update domain knowledge. This suggests that embedded service providers are a very pro-active group of professionals, with a high degree of curiosity that drives them to learn their customers' subject domain.

Both the more and less experienced groups of embedded service providers reported receiving organizational support for continuing education in almost equal proportions:

- 86.7% of those with 5 or more years of domain-related experience, and
- 83.6% of those with less than 5 years of domain-related experience.

A slightly larger percentage of respondents with 5 or more years of domain-related experience reported receiving more continuing education support in three areas. This is consistent with the findings reported below on continuing education and longevity.

Table 2.9 shows the response rates and percentages of type of continuing education support by embedded respondents with 5 or more years of experience in the domain and by embedded respondents with less than 5 years of domain-related experience.

Table 2.9: Type of continuing education support received by embedded respondents with 5 or more years of experience in the domain and by embedded respondents with less than 5 years of domain-related experience.

| Types of CE Support | 5 + years of experience | Less than 5 years of Experience |
|---------------------------------------------------------------------------|-------------------------|---------------------------------|
| Reimburses some or all of tuition costs | 41 (78.8%) | 42 (82.4%) |
| Reimburses costs to attend conferences in a related field or subject area | 49 (94.2%) | 43 (84.3%) |
| Provides or sponsors courses in-house in a related field or subject area | 26 (50.0%) | 23 (45.1%) |
| Provides release time from work to attend courses or conferences | 47 (90.4%) | 45 (88.2%) |
| Other (please specify) | 1 (1.9%) | 8 (15.7%) |
| Totals | 52 | 51 |

When experience in a related field or subject matter is removed, it can be seen that both groups rely on classes and conferences, while those with less experience rely almost exclusively on them to gain domain knowledge.

Table 2.10 shows the number and percentage of each type of training and experience reported by embedded respondents with 5 or more years experience in a related field or subject and by embedded respondents with less than 5 years of experience.

Table 2.10: Training and Experience by embedded respondents with 5 or more years of domain-related experience and by embedded respondents with less than 5 years of domain-related experience

| Training and Experience | 5+ Years of Experience | Less than 5 years of Experience |
|-------------------------|------------------------|---------------------------------|
|-------------------------|------------------------|---------------------------------|

| | | |
|-------------------------------------------------------------------------|------------|------------|
| 5 or more years of work experience in a related field or subject matter | 60 (100%) | 0 |
| Classes or conferences in a related field or subject matter | 49 (81.7%) | 45 (73.8%) |
| Certification in a related field or subject matter | 15 (25%) | 6 (9.8%) |
| Degree in progress in a related field or subject matter | 11 (13.3%) | 5 (8.2%) |
| Other (please specify) | 4 | 7 |
| Totals | 60 | 61 |

Correlation Analysis performed on the questions regarding education, training and continuing education, indicated a number of significant relationships between longevity (either of the embedded position or the program) and support of continuing education. (See Appendix C: Data Tables and Methodology, 2.7).

- The longer a respondent reported they had been embedded, the more likely they are:
 - Provided release time to attend courses or conferences ($r = 0.20515$, $p = 0.0221$, average = 0.89);
 - Reimbursed for costs for continuing education ($r = 0.32494$, $p = 0.0002$, average = 0.89);
- The longer a respondent reported that specialized services have been provided to customer groups by their organization, the more likely that:
 - They have attended classes or conferences in a related field or subject matter ($r = 0.37498$, $p = <0.0001$, average = 0.78);
 - Their organization supports continuing education or training for specialized service providers ($r = 0.20962$, $p = 0.0447$, average = 0.93);
 - Their organization reimburses some or all of tuition costs. ($r = 0.20309$, $p = 0.0415$).

No causality can be inferred from these relationships. We do not know whether continuing education opportunities encourage embedded librarians to remain longer in their positions; or, whether a certain length of time in an embedded position is required before an organization will offer more continuing education opportunities to its library staff; or, whether something else altogether is occurring.

2.2.2.5 Summary

The prevalence of domain knowledge among our survey respondents, whether acquired through formal education, experience, or other means, demonstrates the importance of understanding the customer's work. Further, the presence of some statistically significant relationships between education and longevity reinforces the inference that domain knowledge is of great importance. Finally, the absence of large gaps between in

educational level between embedded librarians with greater than 5 years' experience and those with less than 5 years' experience suggests that education and experience are not substituted for one another. Embedded librarians with less experience are not required to have more education; those with more experience do not have less education. Both groups appear to be learning on the job.

2.2.3 Services

The literature on embedded services documents an evolution in the level of services provided by professionals in these roles. To examine this in our embedded population, we asked respondents in the Phase 2 Survey to indicate which of 19 types of services they provide to their customer groups. (See Appendix A, Survey Results; Phase 2 Survey, Questions 18, 19, and 20.) Services ranged from basic to complex and were organized into three question categories:

- Reference and research services,
- Technology-related services, and
- Training and education services.

Individual service types were grouped under appropriate questions as answer choices. A review of the responses to the three service-related questions shows that close to half (9) of the 19 services are performed by a majority of respondents (50% or more). Of these nine services:

- Five are in the category of Reference and Research;
- Three are Training and Educational services; and
- One is a Technology-Related service.

Table 2.11 presents the nine services in order of largest to smallest percentage of responses.

Table 2.11: Services performed by 50% or more of respondents

| Services | Percent of Embedded Respondents |
|----------------------------------------------------------------------------------------------------------------|---------------------------------|
| Training on the use of information services (Q20a) (N=113) | 91% |
| Ready reference, quick fact checking, citation verification (Q18b) (N=113) | 91% |
| In-depth topical research (Q18e) (N=113) | 88% |
| Information resource development (such as evaluating resources, negotiating with vendors, etc.) (Q18a) (N=113) | 84% |
| Current Awareness, news alerting (Q18f) (N=113) | 80% |

| | |
|----------------------------------------------------------------------------------------------------------------------------|-----|
| Produce electronic or print “how to” manuals, pathfinders, etc. (Q20e) (N=113) | 75% |
| Evaluating, synthesizing summarizing the literature (18d) (N=113) | 60% |
| Content management for web, intranet and wiki sites (19a) (N=113) | 58% |
| Sharing instructional responsibility (such as participating with subject faculty in a classroom instruction) (20b) (N=113) | 54% |

Examining the nine responses grouped under their question categories, a picture emerges of the services that characterize embedded librarians.

- Services cluster around reference and research. Of these five services, three are complex, value-added services (in-depth topical research, evaluating and synthesizing the literature, and current awareness) and involve some level of analysis.
- One of the three Training and Educational services (sharing instructional responsibility with a faculty member) is both collaborative and complex, requiring sophisticated skills to render effectively.
- Technology-related services are on the low-end of the percentage scale. Content management is the only service in this category to receive 50% or better of the responses.
 - Document repository management ranks as the second most-performed service in the Technology-Related Services category, with a 46% of the responses (see Appendix A. Survey Results; Phase 2 Survey, Question 20 for all responses in this category).
 - Both content management and document repository management are elements of knowledge management services. Performing these services successfully frequently requires a close familiarity with the related subject domain, making them likely candidates for embedded services.
 - The remaining technology services ranked in the bottom third of the percentage rankings.

Embedded respondents indicated that they continue to perform work that does not require domain expertise alongside high-value services.

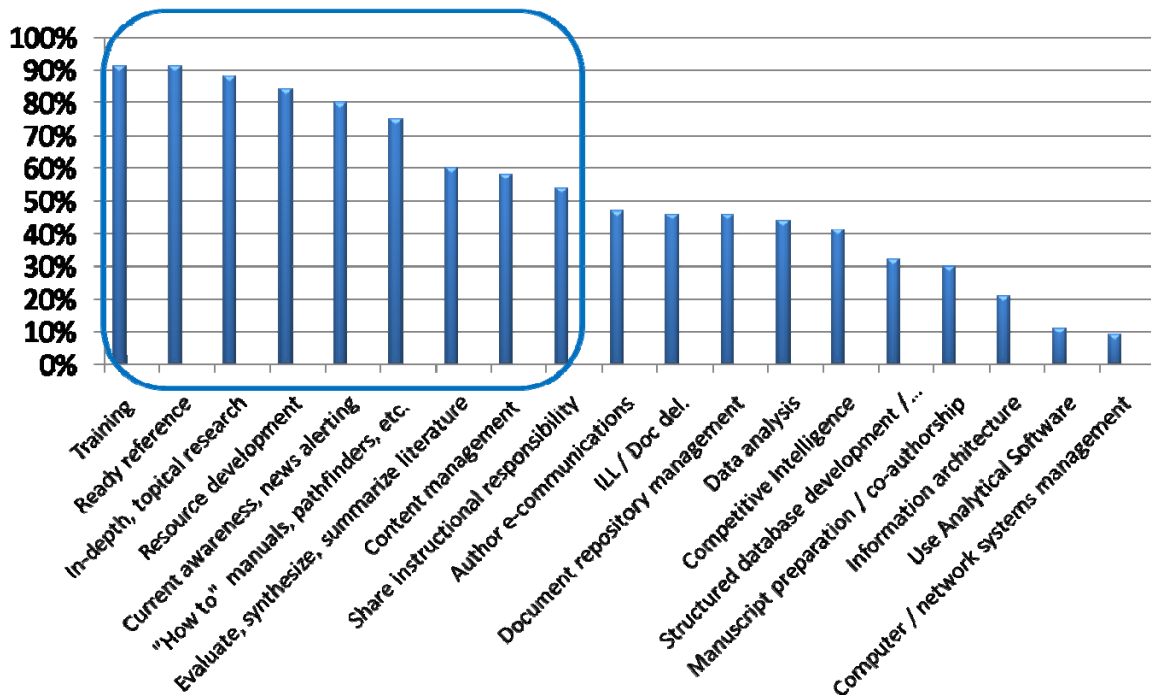
- “Ready Reference” tied with “Training” for the number one spot on the “nine most frequently selected services’ list;
- Inter-Library Loan/Document Retrieval received a 46% response count.

This may be indicative of the cumulative nature of embedded professionals’ work, which we observed during the site visits. Services and tasks are layered on top of one another

and are not often relinquished. This may be in part due to the lack of reach-back, also observed during the site visits.

Chart 2.12 shows the percentage of responses for all 19 services ordered from largest percentage of responses to smallest.

Chart 2.12: Services Performed by Embedded Respondents by decreasing percentages



2.3 Summary

Analysis of the Phase 1 and Phase 2 Survey results provides a set of characteristics that help describe the roles of embedded service providers in SLA organizations.

- They are not as sharply distinguished from non-embedded librarians by virtue of their location, funding, or supervision as we had anticipated. Customer funding does indeed help to distinguish them as a category, but it is still not the most common funding source for embedded librarians.
- They engage in important relationship-building activities with their customers; in many cases, their relationships are fostered by co-location and by direct funding from their customers.
- They possess extensive knowledge of their customers' work, sometimes gained through formal education, but often through work experience and learning opportunities shared with their customer groups.
- They perform complex, sophisticated services, involving collaboration and analysis, but may also retain responsibility for other basic services.

We believe that the distinguishing factors for embedded librarians are ultimately their relationships with their customer groups. Future research will be needed to verify this.

3 Organizational Characteristics

This chapter presents analysis of the organizational environments in which embedded service providers function. We started the research project with a number of fundamental questions, such as:

- How long have embedded programs been in existence and in which organizations?
- How widespread is the practice across different organization and industry types?
- What differences exist in services and other characteristics based on organizational type?
- Are there any barriers to the adoption of the embedded model in certain types of organizations or industries?

In the Phase 1 Survey, we asked all respondents to identify the organization and industry type in which they work, as well as the size of their organization. (See Appendix A, Survey Results; Phase I Survey, Questions 2, 3 and 4). In The Phase 2 Survey, we asked respondents to indicate the number of years they have been embedded in their positions, and the number of years embedded services have been provided in their organizations to both their individual customer groups and to all customer groups within the organization. (See Appendix A, Survey Results, Phase II Survey, Questions 8, 12, and 40)

We employed Correlation Analysis to identify associations among these characteristics to track the spread and adoption of the embedded library services model. Finally, we analyzed the data for differences among organization types regarding the adoption of embedded services. (See Appendix C. Data Tables and Methodology for details.)

3.1 *Organization and Industry*

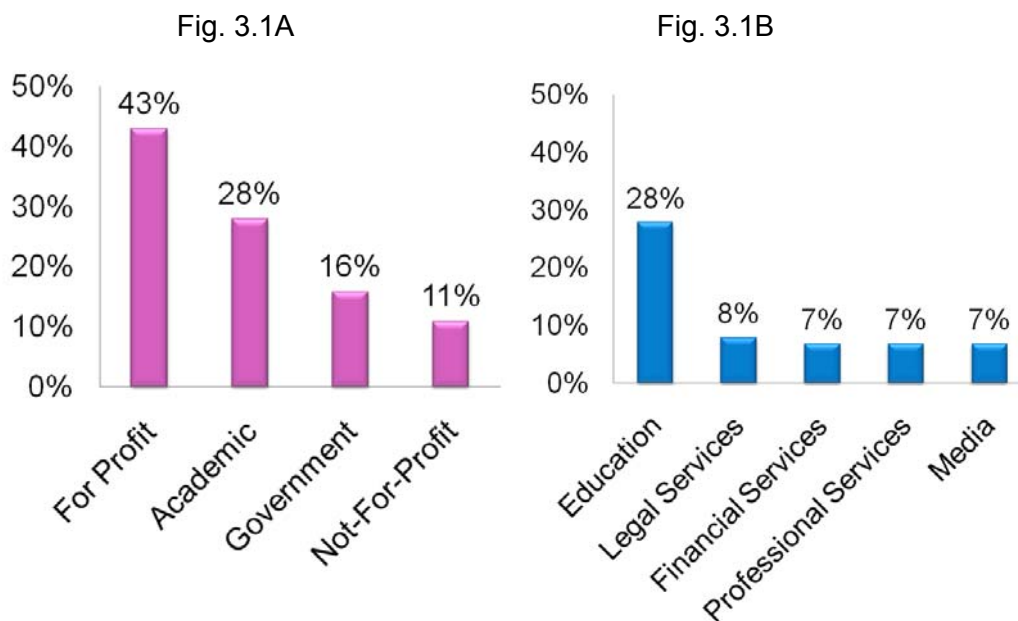
The data regarding both organization and industry type suggests that the embedded model is widespread. All 961 respondents were asked to identify the organization type in which they work: Academic, For-profit, Not-for-profit, Government, Public and School (Appendix A: Survey Results, Phase 1 Survey, Question 2). Specialized service providers were found in each of the four most common organization types in SLA (Academic, For-profit, Not-for-profit, and Government), in varying proportions. These proportions differed only slightly from the original population of 961 SLA members.

- The For-profit sector makes up the largest group in both embedded and non-embedded populations, which is not unexpected in a sample of the SLA membership.
- Respondents from Academic institutions are more likely to say they provide specialized services than respondents from any of the other organization types.
 - The proportion of embedded to non-embedded service providers is significantly higher among academic librarians (61% embedded to 35% non-embedded).
 - A Chi-square test for association between variables found a significant relationship between providing specialized services (Phase 1 Survey,

Question 14) and type of organization ($p < 0.0001$). Correspondence Analysis confirmed an association between Academic Institutions and Phase 1 Survey, Question 14 “yes” responses (the determining question/response for embedded service provider). (See Appendix C. Data Tables and Methodology, 3.2 Embedded Librarians Survey 1 Results.)

Figure 3.1A presents the percentage of embedded service providers out of all direct service providers in Phase 1 Survey by organization type.

Figure 3.1A: Distribution of specialized service providers by organization
Figure 3.1 B: Distribution of specialized service providers by the 5 industries with the highest percentages



In the Phase 1 Survey, all respondents identified their employer’s industry from 17 industry types (based on similar lists in prior SLA surveys; see Appendix A: Survey Results, Phase 1 Survey, Question 3). We found embedded service providers present in all of the 17 industry types. Correlation Analysis did not find any statistically significant relationships between any one industry type and embedded service providers. (See Appendix C: Data Tables and Methodology, 3.2 Embedded Librarians Survey 1 Results, 8/22/08) This suggests that embedded service providers are not more likely to be found in one industry over another.

Figure 3.1B, above, shows the industry types with the five largest percentages of embedded service providers. This “top 5” list represents a range of industry types, from Education, to Legal to Media. With the exception of Education, the percentage of embedded service providers in each type is almost equal.

We also analyzed the percentage of embedded to non-embedded service providers by industry type. In fully a third (6), embedded outnumber the non-embedded service providers. Only two out these six industries appear on the “top 5’ list, further supporting the finding that the embedded library services model is widespread.

Figure 3.2 shows the percentages and response counts of the six industries that have a larger percentage of embedded to non-embedded service providers.

Fig. 3.2 Embedded Response Counts and Percentages by Industry Type

| Industry Category | Embedded Response Count (Percentage) |
|---------------------------------------------------|--------------------------------------|
| Education | 77 (59%) |
| Financial Services | 20 (56%) |
| Information Services, Data Processing | 7 (54%) |
| Information Technology (Computers and technology) | 7 (54%) |
| Biomedical and Pharmaceutical | 11 (52%) |
| Media | 19 51% |

Taken together, these findings suggest that there are no barriers to the adoption of the embedded library services model associated with organization or industry type.

3.2 Organization Size

The size of the organization was found to have a positive correlation with the presence of embedded library service programs. Larger organizations are more likely to employ the embedded services model. A Chi-square analysis was performed on a contingency table with Phase 1 Survey, Question 14 (the “yes” and “no” answers to Question 14, delivery of specialized services) broken out by organization population size . From this analysis, we found that the variables of size and embedded and non-embedded services have an association ($p = 0.001$). (See Appendix C, Data Tables and Methodology, 3.3 Embedded Librarians Survey 1 Results, 8/22/08).

A Hypothesis test was then performed on the proportions of specialized and non-specialized service providers in organizations of more than 500 and less than 500 employees. We found a statistically significant difference between the two groups by organization size ($p=0.0018$). Specialized services tend to be provided in organizations that employ 500 or more people. Non-specialized services tend to be provided in organizations that employ less than 500 people.

Table 3.3 shows the contingency table on which the analysis was performed with the response counts.

Table 3.3 Contingency table with size of organization by specialized and non-specialized service providers.

| How many people would you estimate are employed by your organization in all locations? | Yes, I provide specialized services to one or more Customer groups. | No, I provide services to everyone within my organization | Not sure | Total |
|----------------------------------------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------------------|----------|-------|
| 1 | 0 | 0 | 0 | 0 |
| 2 to 9 | 1 | 10 | 0 | 11 |
| 10 to 24 | 6 | 13 | 1 | 20 |
| 25 to 99 | 18 | 29 | 2 | 49 |
| 100 to 499 | 50 | 71 | 3 | 124 |
| 500 to 999 | 32 | 28 | 2 | 62 |
| 1000 to 2499 | 34 | 38 | 0 | 72 |
| 2500 to 9999 | 60 | 60 | 1 | 121 |
| 10,000+ | 71 | 57 | 6 | 134 |
| Not sure | 6 | 14 | 4 | 24 |
| Total | 278 | 320 | 19 | 617 |

We did not find any significant associations between the organization type in which specialized services occur and the size of the organization. At this time, we do not have the data to explain the relationship between embedded information services and larger organizations. One hypothesis is that the greater likelihood of large library staff sizes and of specialized customer groups in larger organizations presents more opportunities to implement specialized services.

We believe that further research is needed on the delivery of information services in smaller organizations, especially the practices of “solo librarians.” One hypothesis is that solo librarians and others in small organizations may engage in many of the same activities and have many of the same attributes as embedded librarians, but without specializing – simply because the small size of the parent organization does not lend itself to specialization.

3.3 Longevity and Growth of Embedded Programs

In the Phase II Survey, we asked embedded service providers a number of questions concerning the length of time in their embedded positions and the length of time specialized services have been offered to their customer groups in specific and within their organizations in general. (See Appendix A, Survey Results, Phase II Survey, Questions 3, 8, and 40). We found that a large majority of specialized service providers are in well-established, stable programs. Survey results show the following:

- 75% (72/96=75%) of respondents are in programs in existence for seven or more years.
- 63% (60/96=63%) of respondents are in programs in existence for 10 or more years.

- 40% (29/72=40%) are in programs in existence for seven or more years and have also been in their embedded positions for seven or more years.

Correlation Analysis performed on Phase 2 Survey, Question 3, related to length of time in the position, and Question 40, related to longevity of the embedded program, found an association between the variables ($r=0.238$, $p=0.0161$). (See Appendix C, Data Tables and Methodology, 3.4 Phase II Analysis and Conclusions) In other words, embedded service providers in long-term positions tended to indicate that specialized services had also been in existence in the organization for a higher number of years than those who were not in long-term, embedded positions. This finding suggests stability in both staff and programs.

We did not collect comparable data on non-embedded service providers and cannot comment on how this phenomenon in the embedded community relates to direct service providers in the SLA community at large.

Table 3.4 shows the length of time embedded service providers indicated they have been in their positions by the length of time embedded programs have been in existence in the organization.

Table 3.4 Contingency table with length of time in embedded position by longevity of embedded program in the organization.

| | Q40 To your knowledge, how many years total have customized and specialized information services to individual customer groups been offered in your organization? | | | | | | |
|---------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|------------------|-------------|
| Q3 How long have you been employed in your current position? | Less than 1 year | 1-2 years | 3-4 years | 5-6 years | 7-9 years | 10 or more years | Grand Total |
| Less than a year | 2 | 1 | | | | 4 | 7 |
| 1-2 years | | 5 | | | 2 | 13 | 20 |
| 3-4 years | 1 | 3 | 3 | | 4 | 10 | 21 |
| 5-6 years | | | 1 | 2 | | 10 | 13 |
| 7-9 years | | | 1 | | 4 | 7 | 12 |
| 10 or more years | | | 2 | 3 | 2 | 16 | 23 |
| Grand Total | 3 | 9 | 7 | 5 | 12 | 60 | 96 |

Based on the cross tabulations performed on the questions regarding longevity and growth combined with a visual assessment of the data in Chart 3.5, we can make some limited statements about growth.

- The majority of embedded programs were implemented 10 or more years' ago;
- There has been some, modest growth in programs during the last 9 years; and, we may be seeing an upswing in program growth in the last 3 – 4 years.

Chart 3.5 shows the percentage of embedded library service programs by the number of years in existence as reported by specialized service providers.

Chart 3.5 Percentage of embedded programs by number of years in existence



Two questions in the Phase 2 Survey allowed us to analyze data regarding staff changes over time and provided limited data regarding staff growth as another indicator of embedded program growth.

- Survey 2, Question 8 asked about changes, from the time the respondent started in the position until today, in the number of specialized service providers that also provide services to the same customer groups as the respondent.
- Survey 2, Question 41 asked about changes in the total number of specialized service providers in the organization since January 2007.

Note that we are measuring and comparing two time periods. Question 8 measures staff changes over an indefinite, longer term. Question 41 measures changes over the 22-month period preceding Survey 2

Correlation analysis performed on these two questions found a statistically significant relationship between the variables ($r=0.387$, $p<0.0001$ and Question 8 average = 1.08, Question 41 average = 0.963, where 2 = increased, 1 = stayed about the same, and 0 = decreased for both questions).

- The averages for these two questions indicate that most respondents reported that embedded staff size had stayed about the same. (See Appendix C, Data Tables and Methodology, 3.5 Phase II Analysis and Conclusions)
- Survey 2 was conducted in November 2008, as the U.S. and global economies first began to experience serious problems. We do not know what effects, if any, this might have had on the findings.

This aside, the data suggests that overall growth in the numbers of embedded service providers has been flat.

Table 3.6 shows changes in the number of specialized service providers who also provide services to the respondents' customer groups (in addition to the respondent) and changes in the total numbers of specialized service providers since January 2007 until November 2008.

Table 3.6 Contingency table with changes in number of specialized information providers who also provide services to respondents' customer group by changes in number of specialized service providers in the organization.

| | Q41 To the best of your knowledge, has the number of library or information professionals who provide specialized services in your organization increased, decreased or stayed about the same since January 2007? | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------|-------------|
| Q8 From the time you first began providing specialized information services to an individual customer group(s) until today, has the number of librarians or information professional who provide the same services to YOUR CUSTOMER GROUP(s) increased, decreased, or stayed about the same? | Decreased | Stayed about the same | Increased | Grand Total |
| Decreased | 3 | 6 | 1 | 10 |
| Stayed the same | 16 | 47 | 4 | 67 |
| Increased | 2 | 5 | 12 | 19 |
| Grand Total | 21 | 58 | 17 | 96 |

To sum up our analysis of longevity and growth, the overall impression is one of stable, long-lived programs.

- Embedded services have existed in many organizations for a long time; but,

- New programs have continued to be established at a modest rate over the past decade or so.

There are factors related to growth that we did not study, such as attrition among embedded programs and the absolute number of staff increases and decreases. Still, based on the evidence we did collect, the impression is one of limited growth over time.

3.4 Organizational Differences

To understand whether embedded services differ by organization type, we looked for organizational differences in the way in which embedded service providers interact with customer groups (Phase 1 Survey, Question 17). We performed two types of analysis for each possible pairing of organization type and activities reported in Question 17. These analyses used were:

- A series of hypothesis tests; and
- A series of relative risk tests.

Only those results that were significant at the $\alpha = 0.10$ level or less were considered. (See Appendix C, Data Tables and Methodology, 3.6: Relationship between Q2 and Q17, S1, for a full description of the methodology)

Both the hypothesis and risk analysis found a number of significant differences in the organizations' approach to interactions with customer groups. For this study, we have included only the differences that are common to both types of analyses. Table 3.7 presents the data regarding these organizational differences. The differences between organizations were significant at the $\alpha = 0.05$ level for both the pooled hypothesis test and the relative risk test, unless stated otherwise.

Table 3.7 presents the results of both the hypothesis and risk analysis by activity with interpretations of the results by organization type.

Table 3.7 Significant differences among organizational types by Question 17 regarding interactions with customer groups

| Question | | Significant differences | Relative Risk | 95% RR Confidence interval | P Value calculated from Pooled Hypothesis Test |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Q17a | Met with a customer manager to review my performance | <ul style="list-style-type: none"> Academic less likely than For-profit Academic less likely than Not-for-profit | <ul style="list-style-type: none"> 0.35454 0.329545 | <ul style="list-style-type: none"> 0.164 < RR < 0.766 0.131 < RR < 0.827 | <ul style="list-style-type: none"> p = 0.0020 p = 0.0074 |
| Q17b | Provided training on information resources or information management tools away from library facilities, such as in a customer's office, a conference room, or classroom. | <ul style="list-style-type: none"> Academic more likely than Government Academic more likely than For-profit Academic more likely than Not-for-profit | <ul style="list-style-type: none"> 1.341991 1.273078 1.55671 | <ul style="list-style-type: none"> 1.032 < RR < 1.745 1.067 < RR < 1.519 1.077 < RR < 2.25 | <ul style="list-style-type: none"> p = 0.0069 p = 0.0051 p = 0.0015 |
| Q17d | Met (in person or virtually) with senior members (e.g., executives, managers, supervisors) of your customer group to discuss information-related needs and services. | <ul style="list-style-type: none"> Government less likely than For-profit Government less likely than Not-for-profit Academic less likely than For-profit Academic vs. Not-for-profit | <ul style="list-style-type: none"> 0.77037 $\alpha = 0.10$ 0.672464 0.806638 $\alpha = 0.10$ 0.704122 | <ul style="list-style-type: none"> 0.60 < RR < 0.99 0.483 < RR < 0.936 (90% CI: 0.664 < RR < 0.98) 0.536 < RR < 0.924 | <ul style="list-style-type: none"> p = 0.0289 p = 0.0117 p = 0.0287 p = 0.0131 |

| Question | | Significant differences | Relative Risk | 95% RR Confidence interval | P Value calculated from Pooled Hypothesis Test |
|----------|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Q17e | Attended your customer group(s)' meetings to learn about their work and information needs | <ul style="list-style-type: none"> Academic less likely than Government Academic less likely than For-profit | <ul style="list-style-type: none"> 0.709647 0.653954 | <ul style="list-style-type: none"> 0.506 < RR < 0.996 0.494 < RR < 0.866 | <ul style="list-style-type: none"> p = 0.0271 p = 0.0006 |
| Q17f | Met more than once with a few regular customers to discuss information needs and present results to them | <ul style="list-style-type: none"> Government more likely than Not-for-profit | <ul style="list-style-type: none"> 1.409722 $\alpha = 0.10$ | <ul style="list-style-type: none"> (90% CI: 1.039 < RR < 1.912) | <ul style="list-style-type: none"> p = 0.0201 |
| Q17g | Collaborated on or contributed to your customer group's work | <ul style="list-style-type: none"> Academic less likely than Government Academic less likely than For-profit Academic less likely than Not-for-profit | <ul style="list-style-type: none"> 0.681818 0.657919 0.659091 | <ul style="list-style-type: none"> 0.531 < RR < 0.876 0.528 < RR < 0.82 0.507 < RR < 0.857 | <ul style="list-style-type: none"> p = 0.0024 p = 0.0000 p = 0.0034 |
| Q17i | Had lunch with members of your customer group | <ul style="list-style-type: none"> Government less likely than For-profit | <ul style="list-style-type: none"> 0.693333 $\alpha = 0.10$ | <ul style="list-style-type: none"> (90% CI: 0.483 < RR < 0.996) | <ul style="list-style-type: none"> p = 0.0362 |

Academic institutions differ the most from all other organization types in the activities they are *less likely* to perform. Academic and For-profit organizations appear to have the most differences between them and might be said to be at opposite extremes in an embedded model spectrum.

- Academic respondents' interactions with customer groups are more likely to involve training activities rather than other types of service or relationship building activities:
 - Academic respondents are more likely to provide training on information resources away from library facilities than are For-profit, Not-for-profit or Government respondents.
 - Academic respondents are less likely to collaborate on or contribute to their customer groups' work than respondents from the other three organizations.

- Academic respondents are less likely than respondents in the other three organizations (particularly For-profit) to engage in non-service related, relationship-building activities. For example, as a group, they are less likely to:
 - Meet with senior members of their customer group to discuss information-related needs and services than either For-profit or Not-for-profit respondents;
 - Attend customer group(s)' meetings to learn about their work and information needs than either For-profit or Government respondents;
 - Meet with a customer manager for a performance review than either For-profit or Not-for-profit respondents.

Government respondents also appear to be less likely than respondents in For-profit and Not-for-profit sectors to engage in some relationship-building activities. For example, they are less likely to:

- Meet with senior members of their customer group to discuss information-related needs and services than either For-profit or Not-for-profit respondents;
- Have lunch with a customer group member than For-profit respondents.

Overall, the hypothesis and relative risk tests suggest that Academic respondents, and Government, to a lesser extent, are engaging in fewer relationship-building interactions with customer groups than the For-profit sector. The significance of these organizational differences may be a fruitful area for future research.

3.5 Summary

Based on this analysis, the embedded library services model is present in all of the major organization and industry types in the SLA community. It appears flexible enough to have been adapted by a diverse number of industries, ranging from biomedical, to legal to educational. Correlation Analysis shows the embedded model to be well established in SLA organizations: the majority of programs date back ten or more years and have long-term staff. The embedded model has stood the test of time, including the retention of a fair number of long-term positions, adding to its overall stability. Finally, although the embedded model has achieved excellent market penetration, there appears to be room for growth in the mid- to smaller size organizations and perhaps outside of academic organizations. Based on our analysis, the embedded service model has a strong foundation and potential staying power.

4 Models of Success

Having identified criteria for defining embedded library services programs, and characteristics of embedded programs, our next research goal was to identify and study successful programs that might provide models for others seeking to establish similar programs. In particular, we wished to identify management strategies for initiating, operating and sustaining, and evaluating embedded services that might be related to success.

4.1 *Indicators of Success*

Unfortunately, success is generally difficult to measure for library and information services programs. They rarely if ever have their own financial statements, and their contributions to organizational financial results are generally indirect and diffuse. In the absence of direct financial measures, we relied on other attributes like growth and longevity as indicators of success. Four questions in the Phase 2 Survey were related to successful outcomes:

- Question 8: From the time you first began providing specialized information services to an individual customer group until today, has the number of librarians or information professionals who provide the same services to your customer group increased, decreased, or stayed about the same?
- Question 21: From the time you began providing specialized information services to this particular customer group until today, has this group's demand for services increased, decreased, or stayed about the same?
- Question 22: From the time you began providing services to the customer group you have worked with the longest until today, has the number of services you provide increased, decreased, or stayed about the same?
- Question 41: To the best of your knowledge, has the number of library or information professionals who provide specialized services in your organization increased, decreased, or stayed about the same since January 2007?

A fifth question called for the respondent's subjective assessment of success:

- Question 37: Overall, how successful do you think the delivery of specialized information services to your customer group(s) is at this time?

A summary of responses to these questions is included in Appendix B. Pie charts showing the distribution of responses are given below.

Fig. 4.1 Staffing over Time

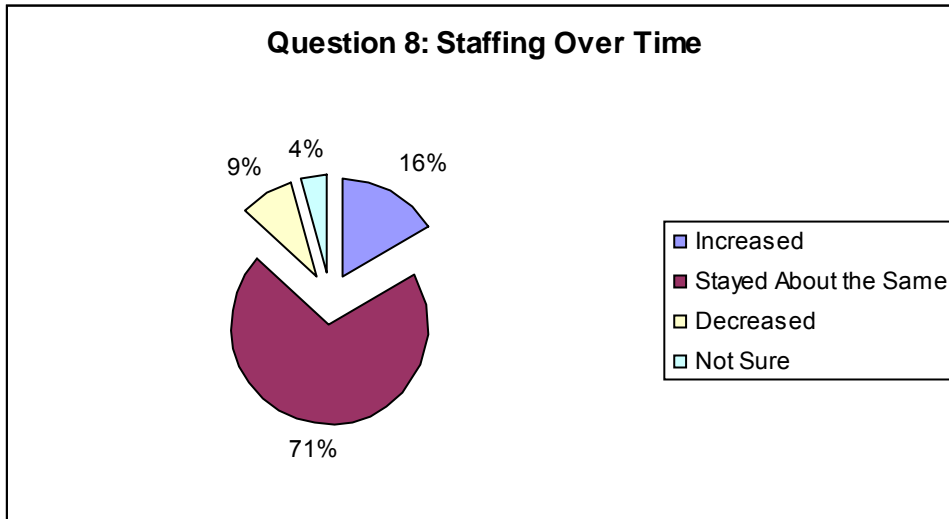


Fig. 4.2 Customer Demand over Time

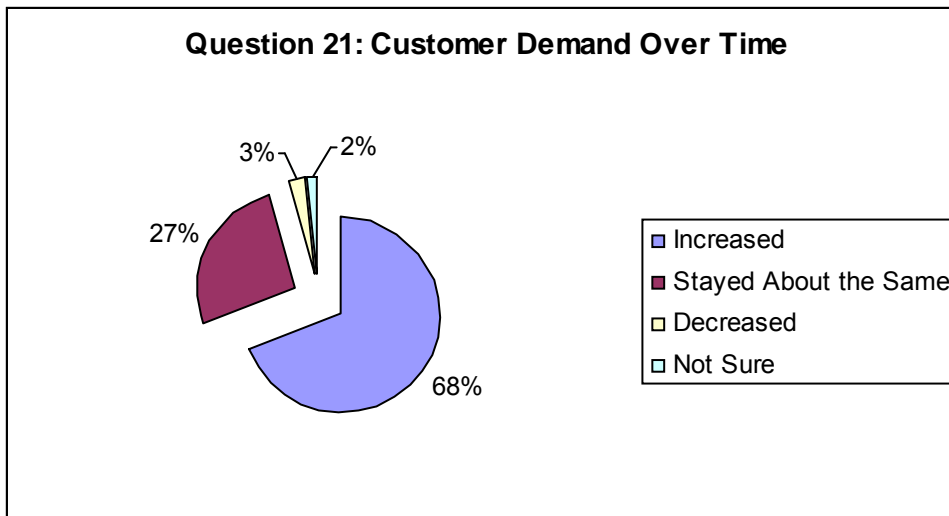


Fig. 4.3 Number of Services Provided

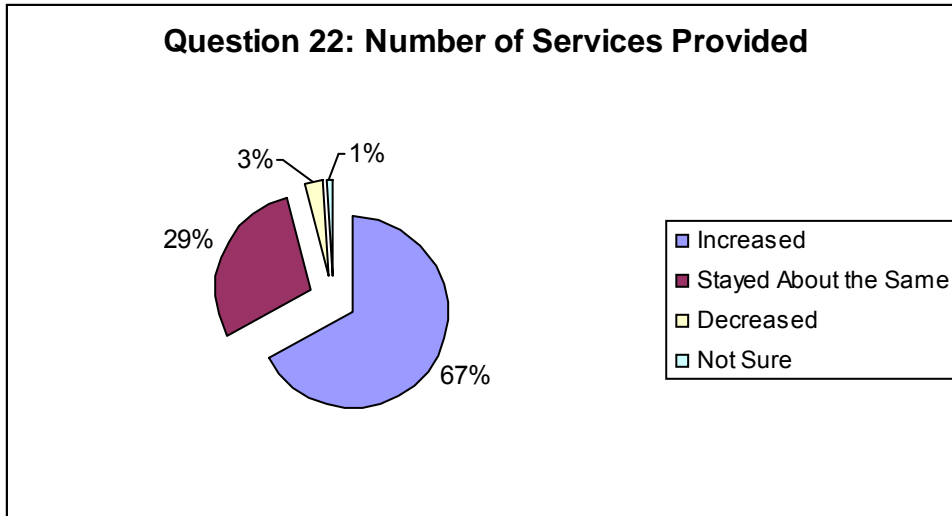


Fig. 4.4 Self-Evaluations

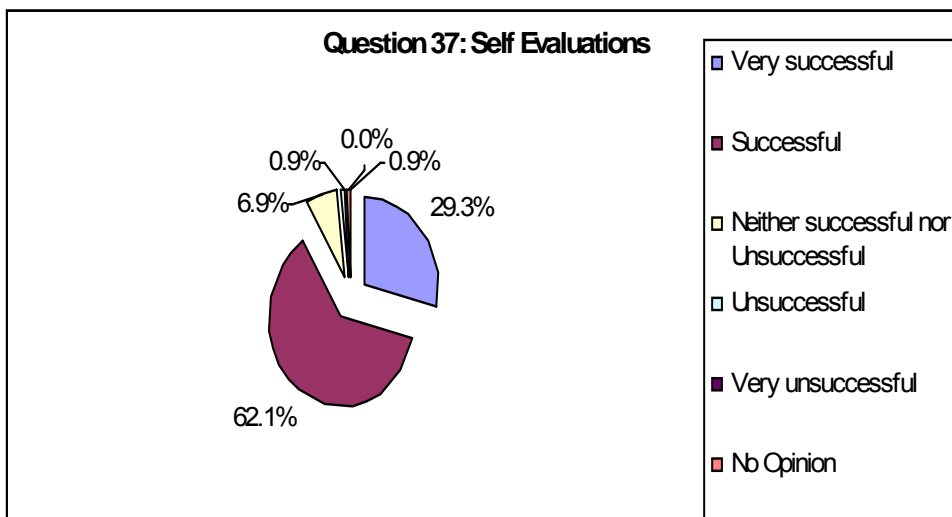
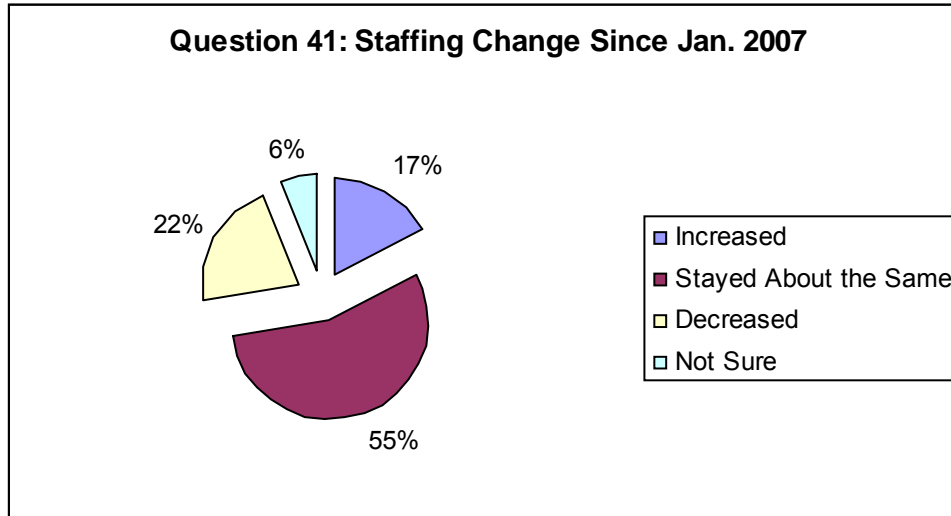


Fig. 4.5 Staffing Changes since January 2007



Ultimately, we decided to focus on Questions 8, 21, and 22 as key success indicators. Question 37 was set aside for two reasons: it called for a subjective judgment instead of an assessment of objective facts; and the overwhelming majority of respondents, 91%, responded that they were either Very Successful or Successful, so that it did not provide a good way of separating respondents into two groups. Question 41 was set aside because it focused on short term performance (January 2007 to late 2008), and because we felt the unanticipated economic recession of 2008 might have skewed the results negatively.

We found that a small number of survey respondents reported increases in each of the three questions, 8, 21, and 22. There were eleven respondents in this group. Similarly, we found that a small number, 16, reported no increases in any of the same three questions. These two groups we labeled as Group 1 – those reporting increases in all questions – and Group 2 – those reporting no increase in any of the three questions. We focused on these two groups in our analysis of success factors, omitting consideration of the large majority of respondents who gave mixed responses.

Table 4.6 presents the composition of Group 1 and Group 2.

Table 4.6: Composition of Group 1 and Group 2

| | Question 8: Staffing Over Time | Question 21: Demand over Time | Question 22: Number of Services Over Time |
|----------------|--------------------------------------|-------------------------------------|----------------------------------------------------|
| Group 1 (n=11) | Increased | Increased | Increased |
| Group 2 (n=16) | Stayed the same or Decreased | Stayed the same or Decreased | Stayed the same or Decreased |

Table 4.7 presents an analysis of Groups 1 and 2 by organization type. It shows that diverse organizations were included in both groups in similar proportions.

Table 4.7: Group 1 and Group 2 By Organization Type

| | Q2 S1 – Which of the following categories best describes the type of organization in which you work? | | | | | |
|---------|------------------------------------------------------------------------------------------------------|------------|-------------|----------------|-----------|-------|
| | Government | Academic | For-profit | Not-for-profit | Other | Total |
| Group 1 | 1 9.1% | 3 27.3% | 5 45.5% | 1 9.1% | 1 9.1% | 11 |
| Group 2 | 2 12.5% | 6 37.5% | 6 37.5% | 2 12.5% | 0 0% | 16 |
| Total | 3 11.1% | 9 33.3% | 11 40.7% | 3 11.1% | 1 3.7% | 27 |

4.2 Factors Associated with Success

It was possible to analyze the responses of these two groups for significant differences using the Small Sample Discrete Inference based on Mid *P*-value technique. (See Appendix C for details.) The following differences in answers between Group 1 and Group 2 were identified at the $p = 0.05$ level where a value of $p = 0.05$ means that there is a 5% probability that the observed difference in answers, or any greater difference, was a random event. Differences in response do not imply causality; what we can say is that the differences are associated with reported increases in staffing, demand, and number of services provided.

Twenty-two differences between the answers of Group 1 and Group 2 were found at the $p=0.05$ level of significance or below. Table 4.8 presents them in order of significance from lowest p value to highest.

Table 4.8 Significant Differences between Group1 and Group 2

| <u>Question*</u> | <u>Factor</u> | <u>p-value</u> | <u>Interpretation</u> |
|------------------|---------------------------------------------------|----------------|---------------------------------------------------------------------------------------------|
| Q33j | Word of Mouth Promotion | 0.00005 | Group 1 is much more likely to benefit from Word of Mouth advertising |
| Q34k | Financial Measures Tracked | 0.0005 | Group 1 is much more likely to use financial measures to evaluate performance |
| Q35 | Metrics Used to Justify Services | 0.0005 | Group 1 is much more likely to use metrics to demonstrate the value of and justify services |
| Q34b | Research Projects Counted | 0.001 | Group 1 is much more likely to count research projects as one of its metrics |
| Q33f | Print Promotions Used | 0.003 | Group 1 is much more likely to promote services using print media |
| Q25 | Authorization by Organization Management Required | 0.007 | Group 1 is much less likely to require organizational management approval to initiate |

| | | | |
|----------------|--------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------------|
| | | | specialized services |
| Q18e | In Depth Research Performed | 0.008 | Group 1 is much more likely to perform in-depth research |
| Survey 1, Q17b | Provided training away from library facilities | 0.008 | Group 1 is much more likely to provide instruction or training away from a library |
| Q18h | Data Analysis Performed | 0.011 | Group 1 is more likely to perform data analysis |
| Q34m | Anecdotes on Impact and Value Collected | 0.014 | Group 1 is more likely to collect anecdotes as one of its metrics |
| Q29b | Customer Manager Integrates Librarian into Group | 0.016 | Group 1 is more likely to involve a customer manager in integrating the librarian into the customer group |
| Q34c | Documents Delivered Counted | 0.016 | Group 1 is more likely to count documents delivered as one of its metrics |
| Q18c | ILL/Doc Delivery Service Provided | 0.017 | Group 1 is more likely to provide document delivery services |
| Q18g | Competitive Intelligence Provided | 0.017 | Group 1 is more likely to perform competitive intelligence |
| Q20b | Shared Instructional Responsibility | 0.017 | Group 1 is more likely to share instructional responsibility; to co-teach |
| Q33a | Formal Orientation Used to Promote Services | 0.021 | Group 1 is more likely to publicize its services through formal orientation programs |
| Q36d | Customer Contributes Input to Performance Review | 0.024 | Group 1 is more likely to have input from the customer group in the librarian's performance review |
| Q30a | Written Agreement Exists | 0.034 | Group 1 is more likely to have a written agreement with the customer group |
| Q26b | Library Manager Authorized Service | 0.039 | Group 1 is more likely to require the library manager to authorize specialized services |
| Q15 | Continuing Education Required | 0.046 | Group 1 is more likely to require the librarian to participate in continuing education |
| Q34a | Reference Questions Counted | 0.047 | Group 1 is more likely to count reference questions as one of its metrics |
| Q34f | Training Attendance Counted | 0.048 | Group 1 is more likely to count attendance at training sessions as one of its metrics |

*All questions are from the Phase 2 Survey except where noted.

4.3 Success Themes

The twenty-two significant attributes can be grouped thematically to present a survey of practices that Group 1 (Successful) programs engage in significantly more frequently than Group 2 (Other) programs. These themes include: marketing and promotion; service evaluation; services provided; and management support.

Three significant attributes are grouped under the category of marketing and promotion:

- Word-of-mouth promotion;
- Use of printed promotional materials such as brochures, flier, or posters; and,
- Promotion through presentations at formal new-employee orientations.

The importance of word of mouth is not surprising. One expects that a successful, highly valued service will be actively promoted by its users through communication with other users and potential users. What may be more surprising is the importance of the other two media, especially when contrasted with newer media and electronic media, such as blogs and websites. This is perhaps a reminder that traditional and low-tech media still have their place in promoting information services.

Seven different factors, or one-third of all factors significant at the .05 level or better, are related to the theme of service evaluation. The two most significant of all ($p=.0005$) are that:

- Financial outcomes, such as Return on Investment or cost avoidance, are measured; and,
- Service metrics are used to justify the continuation of services.

These factors suggest that demonstrating the impact of specialized information services, if possible in financial terms, may be of the utmost importance in persuading organizational decision-makers to support these programs.

The presence of the third factor, collection of anecdotes about the impact of specialized services on customer work and outcomes, suggests that evaluation factors need not always be quantitative in nature. The other four service evaluation factors are all counts of research projects, documents delivered, reference questions, and training session attendance. It is somewhat surprising that these factors, which relate to activity but do not directly demonstrate value, appear, while other factors do not. Apparently these metrics may still be useful in the operation and management of specialized library and information services programs.

Six significant factors relate to the nature of services provided. Four are sophisticated, value-added services:

- In-depth research,
- Competitive intelligence,
- Training that is held away from library facilities,
- Shared instructional responsibility with subject faculty, and data analysis.

This clustering of activities supports a theme encountered in much of the literature: that the nature of the librarian's work becomes more sophisticated, with an emphasis on expert analysis and judgment, as the librarian becomes embedded in the customer group's work. The presence of the sixth significant factor, document delivery, is perhaps a reminder that basic service needs do not disappear as more advanced tasks are added. Rather, they may form an essential infrastructure.

The fourth and final theme is that of management support. Six factors are grouped under this theme. They are:

- Authorization from any level of management in the organization *was not* required prior to the initiation of specialized services
- A manager/leader of the customer group facilitated the integration of the service provider into the group
- The customer group contributes feedback to the librarian's performance review
- A written agreement exists between the customer group and the service provider group
- Authorization was required from the library/information group manager for the initiation of specialized services
- Continuing education related to the customer group's area of specialization is required of the embedded librarian

Taken together, these factors suggest a strong engagement between library / information service management and management of the group receiving the embedded library services to support the specialized services. In successful programs, higher level management authorization is not as likely to be required, and library managers are able to authorize the initiation of specialized services. Customer managers are more likely to provide active support through helping the embedded librarian become integrated into the group, and by providing input to the librarian's performance review. Documentation of the agreement is more likely to exist (this may take the form of a librarian's job description), and there is a requirement for continuing education.

4.4 What's Missing

Our discussion of success factors would not be complete without a discussion of some factors that we expected to be related to success, but that were not found to be significantly related in our analysis.

The following factors were analyzed and found not significant at the $p=0.10$ level or below:

- Question 13, Education level
- Question 14, Relevant training or work experience
- Question 16, Support for continuing education

- Question 27, Documentation at time service was initiated
- Question 28, Type of documentation created at service initiation (Note: Answer 28c, “Performance plan specifying delivery of services to the group” could not be analyzed because none of the respondents in Group 2 checked this option. No significant statistical difference was found between Group 1 and Group 2 in all other options of Q28.)
- Q32, Written reports to library management or executives outside the customer group

Some of these factors, such as possession of the MLS degree and, to a lesser extent, possession of a Bachelor’s degree in a relevant field, were widespread in both Group 1 and Group 2. Others, such as creating a written agreement at the time services are established, were infrequently reported by both groups. Some of these factors may merit future study. All we can say at present is that they do not appear to be related to our model of success.

5 Conclusion and Recommendations

5.1 *The State of Embedded Librarianship*

Our research has confirmed a number of important facts about embedded librarianship:

It is alive and well. Almost 50% of direct information service providers deliver specialized services to one or more specific customer groups in their organization, which we consider the essential characteristic of embeddedness.

It is widespread. We found embedded library services programs in diverse types of organizations and diverse industry segments. Higher education institutions predominate both in the literature and in our survey, but For-profit, Not-for-profit, and Governmental organizations are also well represented. Legal, Financial and other professional services, Media, and other industries, are well represented – along with Health Services, which pioneered the concept through its clinical medical librarian programs and has developed a rich literature.

It is growing. While 60% of respondents said that embedded services programs had been in existence for over ten years in their organizations, the numbers of programs in existence for shorter periods indicates steady, if gradual, growth.

It depends on the relationship-building skills of the librarian. We have identified seven activities that the majority of embedded librarians engage in that show close collaboration with customers and shared responsibility for outcomes. The importance of relationship building skills was reinforced by our site visits and interviews with embedded librarians. Librarians who succeed in building strong working relationships see themselves and their roles as not limited to their job description. They volunteer for administrative and social roles that enable them to build relationships. They look for ways to contribute to their organizations in unexpected ways. They are sometimes considered “not just a librarian” by others in the organization – and they use this image to exploit opportunities to bring their information professional skills to bear in novel ways.

It depends on the librarian’s knowledge of the customer domain – however that knowledge is acquired. To participate fully in customer organizations and take on shared responsibility, embedded librarians develop a good understanding of the customer’s organization and work. In some cases this may require relevant academic degrees. However, there appear to be many successful embedded librarians who have acquired their domain knowledge on the job.

It changes the nature of the librarian’s work. Embedded librarians perform a variety of sophisticated, value-added services. They contribute to their customer groups through activities like product testing, organizing symposium series, and participating in curriculum reviews: activities that are not generally thought of as roles for librarians. At the same time, they continue to be responsible for many traditional services, such as document delivery. The layering of complex, value-added functions on top of basic services means that embedded librarians are in great demand, very busy, must be highly motivated, and run the risk of burnout.

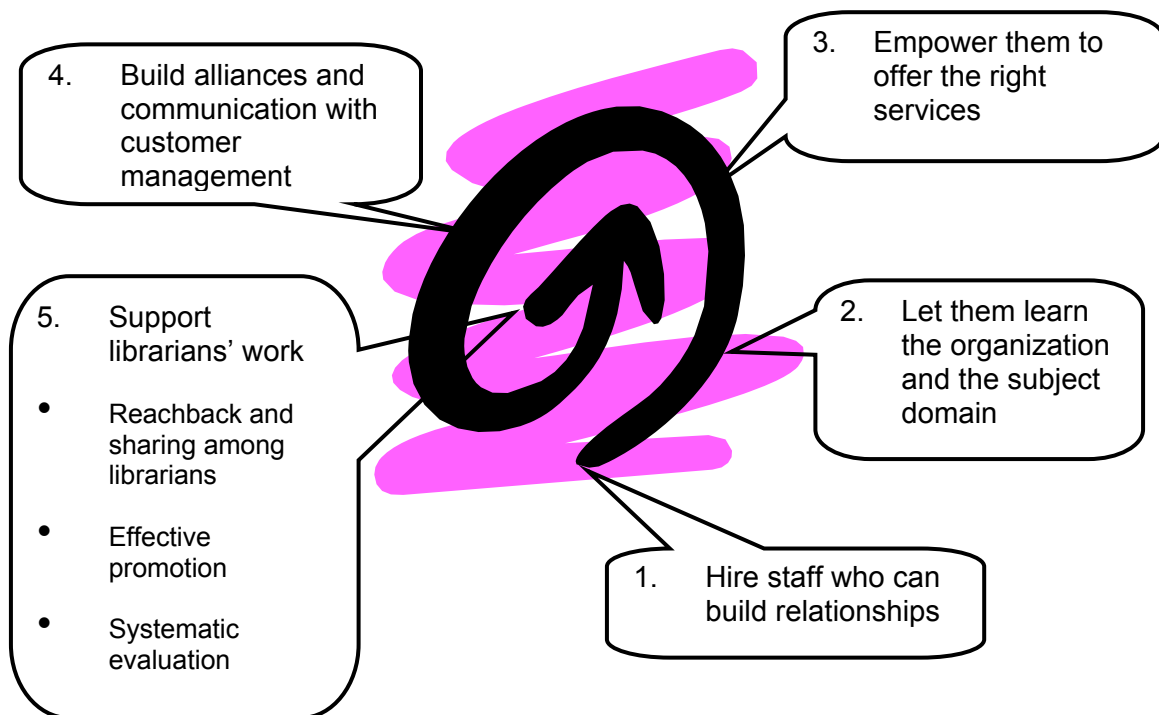
It is succeeding largely because of the outstanding skills and exemplary dedication of individual embedded librarians. In our research, through surveys and

site visits, we have come to think that many of the successful embedded librarians in our profession today are swimming upstream. They are achieving wonderful professional accomplishments and providing great value to their organizations, but their role and their needs may be dimly perceived and poorly understood by both library and customer managers. They are local heroes, but their successes may evaporate unless more effective management support can be brought to bear.

5.2 The Virtuous Cycle for Embedded Library Services

In the course of our research, we have come to the view that there is a critical need to strengthen the management of embedded library services. Just as the embedded role calls for new skills on the part of embedded librarians, it calls for new management strategies. Therefore, we propose a series of steps for those who are managing library and information services.

We present this series of management steps as the “Virtuous Cycle for Embedded Library Services” -- a model for management action to develop and sustain this promising service model and achieve a strategic repositioning of information services in the workplace.



In the following paragraphs, we elaborate on this model.

5.2.1 Hire Staff Who Can Build Relationships

In his management classic, *Good to Great*, Jim Collins says, “get the right people on the bus.” (Collins, 2001) Our first recommendation echoes his principle. The *sine qua non* of embedded library services is the librarian’s ability to establish strong interpersonal relationships with customers. As our survey data and site visits show, these librarians excel at relationship building and are highly motivated. We believe that the expansion of

5.2.2 Let Them Learn the Organization and Subject

Our survey results and site visits have both demonstrated the importance of the librarian's domain knowledge. Note that by "domain knowledge" we mean both knowledge of a specific academic or professional domain, such as biosciences or securities law, and knowledge of the workings of an organization. Our site visits in particular have highlighted the importance of both kinds of knowledge. Our research has also indicated that formal academic study, continuing education, and on-the-job learning all play a part in the development of the necessary knowledge. The key question for the manager is, how will librarians in your organization acquire the knowledge they need. We believe this is essentially a local decision. Does your organization place value on an academic degree, and will you therefore make possession of a degree a hiring requirement? Or are you in an environment where you can hire relatively junior employees without extensive domain knowledge, and give them opportunities to learn on the job?

5.2.3 Empower Them to Offer the Right Services

Our research found a range of services being delivered by embedded librarians. The common threads among successful programs were that the range of services increased over time, and that sophisticated, value-added services were layered on top of basic library and information services. We infer that as librarians gain trust and credibility with their customer groups, they are pulled into new roles and functions, depending on the priorities of their customers. Library managers must encourage this flexibility and give embedded librarians the freedom to shift their roles in response to customer needs.

5.2.4 Build Alliances and Communication with Customer Management

This step may pose the greatest challenge for library managers, but we believe that it is essential. Without it, embedded library services will not achieve optimal scale and sustainability, nor deliver the organizational benefits that they are capable of. This step incorporates practices from the themes of evaluation and management support highlighted in our analysis of models of success.

The analysis indicates that successful programs are more likely to include measurement of activities, and assessment of the value and impact of services. Further, these programs communicate their metrics to customer management. The metrics are used as evidence of the importance of embedded library services. We believe that managers of successful embedded library services programs should pay careful attention to both evaluating their services and sharing that evaluation with their own superiors as well as their counterparts in the customer organization.

Another practice noted in our analysis of successful programs is the engagement of customer management in activities such as integrating the new embedded librarian into the group and providing input to the librarian's performance review. We see these activities as tangible signs of the manager's buy-in to the embedded service. We find it hard to imagine how an embedded service can thrive in the absence of this buy-in. Some managers "get it" and even go so far as to initiate embedded services for their organization. Others need to be marketed to, and we believe it is the job of library

managers to do this management-level marketing and to develop this buy-in among key customer managers.

In fact, these two activities, communicating the value of the service to the customer management, and soliciting help and feedback from the customer management, should constitute a set of intertwined, mutually reinforcing management functions.

5.2.5 Support Librarians' Work

The final recommendation in our "Virtuous Cycle" model requires almost as great a shift in management approach as the previous one. We have already discussed promotion and evaluation as differentiators of successful programs. We believe that the manager must lead these activities, and not leave them to the individual embedded staff.

We also believe, based on interviews rather than our survey data, that managing embedded services raises new staff management and coordination challenges.

Both survey data and site visits raised the issue of the embedded librarian's workload. We believe the library manager must take a role in helping staff to manage this workload. One strategy we suggest is to provide the ability for the embedded librarian to "reach back" into the central library staff for assistance. Another is to form staff teams, each with its own lead embedded librarian, and other library staff members who provide backup and support – and thereby gain opportunities to learn the customer domain. This model is being developed at the MITRE Corporation and was the subject of a paper presented at the 2009 SLA Conference by Trimble. (Trimble, 2009)

A related management challenge is to maintain collaboration and communication among embedded librarians. In an organization where there are several embedded librarians, each working with different customers, there is a risk that as ties to customers strengthen, ties to other librarians will weaken. Such an outcome is not desirable, and we do not think it is inevitable. Rather, we believe that the energetic and creative library manager can find ways to retain the collegiality that is the hallmark of library culture. Through library group projects, social occasions, or simple staff meetings, we believe that embedded librarians can retain their strong connection with a common library operation, even while building close relationships with their customers.

5.3 A Parting Word

We began this project with optimism about the embedded library services model. We conclude it with our optimism strengthened. We have seen that resourceful and energetic librarians are employing it successfully in organizations of many different types. We have seen that they share certain characteristics, which we believe contribute to their success. We have also come to realize how much we do not know, nor understand, and how much remains to be done in exploring this topic. We hope that others will add their stories and their insights, and we look forward to learning from them.

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