Retooling the Librarian Workforce: Innovative Post-Master's Certificate Program for Developing Inter-Professional Informationalists (IPI)
Abstract

In alignment with IMLS's strategic goal of Lifelong Learning, this project aims to retool the diverse librarian workforce, develop an innovative educational model, and foster collaboration between libraries and a learning organization. Through a partnership among seven bicoastal academic health sciences libraries (Harvard University, MCPHS University, Tufts University, Boston University, Stanford University, University of California at Los Angeles, University of California at San Francisco) and one LIS Program (Simmons University), this project creates a post-Master's certificate program in the area of Inter-Professional Informationist (IPI), for the purpose of bridging the gap between traditional and emergent skills in health sciences librarianship and increasing the diversity in the IPI workforce. IPI adopts embedded library services and the informationist approach to enhance biomedical scientific research and practice. Ten librarians in the program will complete seven IPI courses, and project partner institutions will connect them with researchers and clinical leaders who will supervise their capstone experience. This two-year project features planning, student recruitment, a four-semester course offering, followed by evaluation, recommendation, solidification of the IPI framework, and dissemination.

This project has three goals: (1) Develop a unique bicoastal partnership among seven academic health sciences libraries across the country and a LIS program; (2) Develop an IPI conceptual framework bridging the gap between traditional and emergent skills in health sciences librarianship through a post-master's certificate program focusing on retooling librarians in the workforce; (3) Recommend extending the framework to STEM, Social Sciences, and the Arts and Humanities disciplines where there is a similar gap. The project will meet the three stated goals by carrying out following activities: (1) Coordinating and building robust bicoastal institutional partnerships; (2) Developing and identifying core skills and knowledge related to IPI; (3) Establishing and offering curriculum in IPI using a team of LIS faculty and practitioners; (4) Providing practical experience in IPI at collaborative research and clinical sites across the country; (5) Assessing the effectiveness of the IPI program to inform future LIS education and practice; and (6) Disseminating findings through presentations and publications to facilitate adoption of the IPI conceptual framework in STEM, social sciences, and the arts and humanities. The IPI curriculum includes seven courses, offered over four semesters: Foundations to IPI; Health Sciences and Biomedical Informatics; Collaboration and Leadership; Research Methods; Scientific Research Data Management; Applied Statistics; Capstone. This project will start in September 2019 and end in August 2021. For the purpose of evaluation, feedback will be gathered throughout the IPI program from different constituent groups via a variety of means, including pre- and post-program questionnaires, focus group sessions, student/faculty reflection essays, and one-on-one exit interviews. Annual retreats will also be a platform for instructors and capstone mentors to share their experiences and thoughts about the program.

This proposal is unique and innovative in bringing interdisciplinary and diverse partners together for the first time to create a groundbreaking IPI framework. It targets information professionals of diverse ethnic backgrounds and a wide age range, who have worked for a minimum of two years, and who might have limited opportunities to leave the workforce to retool themselves. The inclusion of eight bicoastal partners will enable the fostering of a varied and diverse applicant pool. The successful development of the IPI curriculum will become an education model for information professionals seeking to retool and/or advance employment in a dynamic and diverse inter-professional field of biomedical informatics and data management. The model will have a national impact in the broader area of LIS education by bridging the gap between theory and professional practice. A cohort of IPI leaders will initiate a community of practice of diverse professionals to redefine and enhance scientific research and clinical approaches. The further impact of this program is the transferability of the IPI framework as it will be extended to other fields. The IPI model will also promote best practices of interdisciplinary collaboration, pave ways for strengthening the research enterprise within or across institutions, and enhance research process and data sharing practices.

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In alignment with IMLS's strategic goal of Lifelong Learning, this project aims to retool the diverse librarian workforce, develop an innovative educational model, and foster collaboration among libraries and a learning organization. Through a partnership between seven bicoastal academic health sciences libraries (Harvard University, MCPHS University, Tufts University, Boston University, Stanford University, University of California at Los Angeles, University of California at San Francisco) and one LIS Program (Simmons University), this project creates a post-Master's certificate program in the area of Inter-Professional Informationist (IPI), for the purpose of bridging the gap between traditional and emergent skills in health sciences librarianship and increasing the diversity in the IPI workforce. IPI adopts embedded library services and the informationist approach to enhance biomedical scientific research and practice. Ten librarians in the program will complete seven IPI courses, and project partner institutions will connect them with researchers and clinical leaders who will supervise their capstone experience. This two-year project features planning, student recruitment, a four-semester course offering, followed by evaluation, recommendation, solidification of the IPI framework, and dissemination. As a pilot program, the successful delivery of IPI curriculum will be an education model for information professionals seeking employment in a dynamic inter-professional field.

Statement of Broad Need

The term "informationist" was coined in 2000 by Davidoff and Florance, who suggest informationists will "ultimately become a part of almost every clinical staff and service, as ubiquitous as head nurses or office managers" (p. 997). In 2003, the National Library of Medicine (NLM) defined the informationist as "information specialists who have received graduate training and practical experience that provides them with disciplinary background both in medical and biological sciences and in information sciences/informatics. Their cross training provides informationists with a unique perspective on the acquisition, synthesis and application of information to problem solving and program development in their chosen area" (Oliver and Roderer, 2006, p. 43). Describing informationists for any subject domains, Bracke (2017) claims that "an informationist is a professional with information expertise and experience with a specific academic discipline, providing in-depth services within the work context that discipline rather than a library" (p. 451). Bracke (2017) further outlines three primary attributes of an informationist: (1) "an understanding of both information science principles and the academic discipline," (2) "strong searching and information synthesis skills," and (3) "being embedded within a clinical setting or inclusion as part of research team" (p. 452).

The notion of "embedded librarianship" was originated from the term "embedded journalists" in war zones (Shumaker, 2009; Blake et al., 2014). Shumaker (2009) indicates that embedded services feature "the librarian becomes a member of the customer community rather than a service provider standing apart" (p. 265). By physically collocating with their customer groups, embedded librarians "move from a supporting role into partnership with their clientele" (Abrizah, Inuwa, & Afiquah-Izzati, 2016, p. 636). Changes from the traditional to embedded librarianship include being anticipatory as opposed to responsive, providing customized services instead of standardized services, running ongoing projects rather than single transaction-based services, and working as a partner instead a passive service provider (Shumaker, 2012).

In 2000, Davidoff and Florance proposed to establish a national educational program "to train, credential and pay for the services of information specialists" (p. 997). It consists of four principles: (1) informationists must understand both information science and the essentials of clinical work; (2) informationists must have practical working skills of synthesizing and presenting medical literature and functioning in a clinical care team; (3) training programs "should be accredited, and graduates of those programs certified" (p. 997); and (4) the entire health care system must recognize the importance of

informationists and "actively include them in the process of care" (p. 997). Between 2003 and 2008, NLM sponsored Individual Fellowship for Informationist, and "during the life of the Informationist fellowship program, which ended in 2008, nine people received support for coursework and internships to prepare them for new career directions" (Florance, 2013, p. 4). In 2010, the National Institute of Health (NIH) issued NLM Administrative Supplements for Informationist Services, funding NIH-funded scientists who embedded an informationist to their research teams.

Even though there were efforts through NLM to provide partially funded job opportunities for embedding librarians, there has been no formal training for these librarians prior to becoming an informationist. Giuse, Sathe, and Jerome (2006) stated "NLM's current informationist fellowships, …. are highly individualized and likely will not foster national models for training and education that are generalizable across institutions and practice domain" (p. viii). In 2008, NLM's funding ended. Furthermore, NLM does not fund post-Master's training unless it is a Ph.D. in bioinformatics. NLM does not see it as its mission to provide funding for continuing education of librarians (Florance, 2017, personal communication). Consequently, the only possible way of obtaining education for IPI is through LIS programs. To date, there are very few formally certified educational programs in LIS schools on informationists. An informal review (performed by a student assistant of Prof. Rong Tang) of close to 60 ALA accredited LIS programs revealed there were no dedicated courses in embedded librarianship, informationist services, and very limited offerings in biomedical informatics. Compounded by budget cuts or resource constraints in academic or special libraries, the implementation of informationists service models is, to a large extent, unaccomplished (Polger, 2010; Bracke, 2017). Ploger (2010) found that out of 370 respondents from health science libraries in Canada and the US, 78% indicated that their institutions did not participate in informationist services. Sathe, Jerome, and Giuse (2007) reported that significant barriers to implementation of ISIC practice included "funding," "lack of formal training or education programs," and "lack of qualified candidates" (p. 271). Rankin et al. (2008) found challenges related to need of informationists' education were: (1) "lack of qualified candidates," (2) "need to increase workforce size and accelerate recruitment," (3) "need for multiple formal training programs to produce qualified workers," and (4) "lack of consensus on credentialing strategy" (p. 200). It is clear that the current workforce needs to be largely retooled to position itself to fill viable informationist roles.

Meanwhile, employers in academic health science libraries (AHSLs) hold vacancies in IPI positions and have difficulties hiring qualified LIS graduates. In the special issue of JeSLIB (2013, 2(1)), a number of informationists cited their lack of academic preparation, field experience, and subject knowledge in embedded librarianship and in the scientific research process as obstacles to their success. Results "confirmed that libraries lack personnel with the technical skills needed for management and curation of data, and there is a need for continuing education programs emphasizing best practices for RDS" (Goldman, Kafel, & Martin, 2015, p. 12). An ongoing conversation with bicoastal partnering library directors reinforced the strong need for existing professionals to acquire skills for retooling themselves for these emergent roles. These directors indicated a significant gap in LIS curricula to meet these needs and the missing options for alternative modes of continuing education beyond a formal Ph.D. program.

To summarize, there is nearly no educational program in the US providing a much-needed formal learning and training curriculum in the realm of IPI. This proposed project intends to bridge this gap by focusing specifically on the diverse librarian workforce. As pointed out by Giuse et al. (2006), IMLS would be a viable funding resource for information specialist in context (ISIC) with a focus on "next generation education of information professionals" (p. 65).

Project Design

The current LIS marketplace recognizes a significant gap in expertise among recent and past graduates. Employers from varying information service fields increasingly demand new skillsets beyond those provided in conventional LIS programs. Various research and professional literature have called for a formal, certified educational program in IPI.

This project has three goals:

Goal 1. Develop a unique bicoastal partnership among seven academic health sciences libraries across the country and a LIS program

Goal 2. Develop an IPI conceptual framework bridging the gap between traditional and emergent skills in health sciences librarianship through a post-master's certificate program focusing on retooling librarians in the workforce

Goal 3. Recommend extending the framework to STEM, Social Sciences, and the Arts and Humanities disciplines where there is a similar gap.

The project will meet the three stated goals by carrying out following activities: (1) Coordinating and building robust bicoastal institutional partnerships; (2) Developing and identifying core skills and knowledge related to IPI; (3) Establishing and offering curriculum in IPI using a team of LIS faculty and practitioners; (4) Providing practical experience in IPI at collaborative research and clinical sites across the country; (5) Assessing the effectiveness of the IPI program to inform future LIS education and practice; and (6) Disseminating findings through presentations and publications to facilitate adoption of the IPI conceptual framework in STEM, social sciences, and the humanities.

Activity 1. Coordinating and building robust bicoastal institutional partnerships

Our institutional partners include seven AHSLs on the East and West Coasts: Harvard Medical School, Tufts Health Sciences, MCPHS University Library, Boston University School of Medicine, Stanford School of Medicine, UCSF Library and UCLA Biomedical Library. Throughout the project, institutional partners will work closely at various phases, develop strong connections of one another, and nurture and grow an IPI community of practice. They will participate in project design and delivery, cohort selection, curriculum development, and capstone site administration. Partners will identify and connect students with researchers or clinical teams who will mentor students in their capstone. The project team online meeting involving all partners will take place every three weeks. A project-wide retreat will be held annually. Partners will be involved in the IPI Spring 2020 Orientation. An online graduation ceremony for the IPI cohort will be held in June 2021.

Activity 2. Developing and identifying core skills and knowledge related to IPI

The development of IPI core skills and knowledge are guided by the informationists' competency framework as shown through Figure 1, as initially laid out by Giuse et al. (2006), later expanded by Rankin, Grefsheim, & Canto (2008), Robison, Ryan, & Cooper (2009), and Bracke (2017), among others. This framework will be further verified and modified through our conversations with various stakeholders, advisory board, and relevant communities in Fall 2019.
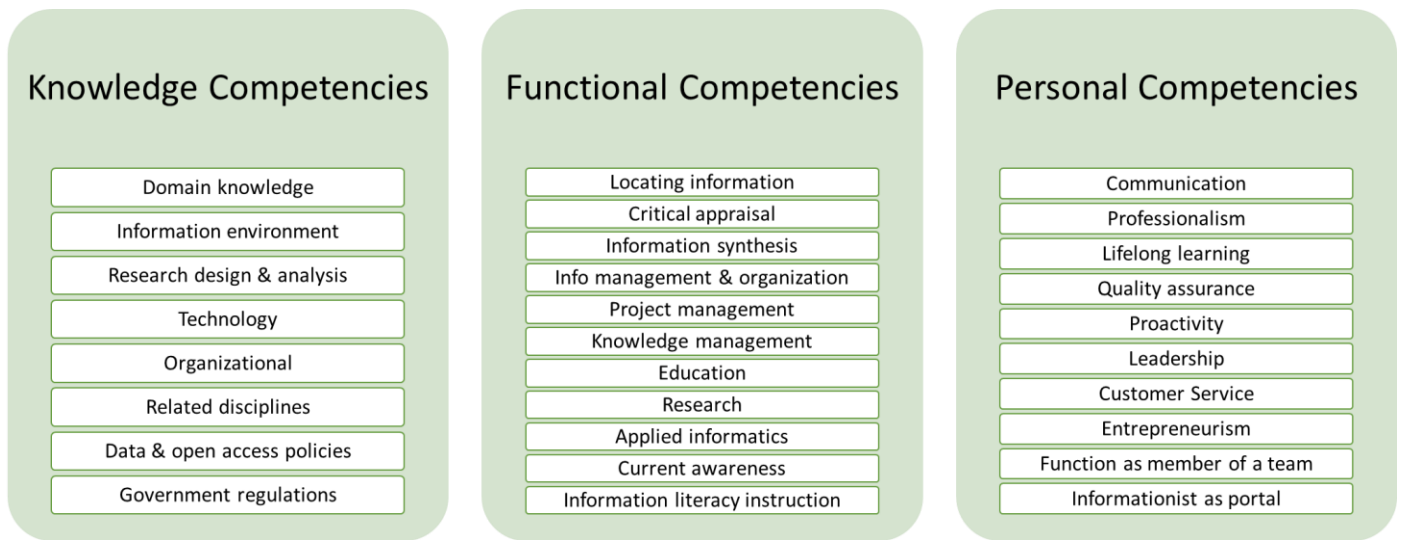
Figure 1. Competency Framework for informationists

Activity 3. Establishing and offering curriculum in IPI using a team of LIS faculty & practitioners

We propose seven courses for the IPI curriculum, offered over four semesters: Foundations to IPI; Health Sciences and Biomedical Informatics; Collaboration and Leadership; Research Methods; Scientific Research Data Management; Applied Statistics; Capstone. Figure 2 outlines the proposed IPI curriculum and its attributes.

Figure 2. The IPI curriculum in connection with the informationists' Competency Framework

The *Foundations of IPI* course covers all competency levels at a higher level with its focus is on the overview of IPI as a profession and practice. The information environment and workflow of an IPI will be outlined, as well as the organizational directions and systems thinking. The *Health Sciences and Biomedical Informatics*, *Research Methods,* and *Applied Statistics* courses speak to both the knowledge and functional competencies concerning technology, information synthesis and evaluation, and research design and analysis. The *Collaboration and Leadership* course covers personal competencies of communication, entrepreneurism, leadership, function as a team, and more. The *Scientific Research Data Management* course will address data curation and management that is now a part of informationists'

work. Capstone is an opportunity for students embedding themselves to clinical practices or research projects as an informationist in training.

Activity 4. Providing practical experience in IPI at collaborative sites across the country

Within the role of informationists at AHSLs, there are clinical and research informationists. While clinical informationists primarily attend "clinical rounds and protocol searching" (Whitmore, Grefsheim, & Rankin, 2008, p. 138), research informationists focus on gathering competitive intelligence information, helping with manuscript preparation, performing data analysis, and co-authoring articles. A research informationist, "works with researchers more 'upstream' in the research process rather than just with the products produced at the end of the research lifecycle" (Carlson and Keneale, 2011, p. 167). In recent years, a growing trend for successful research informationists is their contribution in research data management (Gore, 2013; Hanson, Bakker, & Svirsky, 2013; Hasman, Berryman, & Macintosh, 2013). Martin (2013) indicates that "As biomedical science becomes more data intensive, researchers are faced with a range of data management challenges, problems, and needs. Health sciences librarians are ideal partners for offering scientists at their institutions a range of data management services" (p. 1). Research Informationists' involvement in the data services may vary from creating "a comprehensive data dictionary" and "a standardized data request form" (Gore, 2013, p. 22), to assigning metadata to incoming data, naming and labeling research variables, and finding a data repository (Hasman et al., 2013). As reported in the special issue of JeSLIB, more research informationists are providing "the deepest and most detailed data management support" to scientific research teams "to date" (Hanson, et al., 2013, p. 25).

For the IPI program, the practical experience will be gained via a multi-phased capstone project. A capstone is a culminating academic and practical experience for the students in their second and final semester. The Capstone course will include two Phases. In Phase I of Summer 2020, students will be introduced to various sites and mentors, and students will be observing and journaling from what they learn about the sites. The end product of the Phase I Capstone is a proposal written by the students on their preferences of the sites and their plan of work for their proposed capstone. In Phase II, students are embedded into a research or clinical team at one of the partner institutions according to their Phase I proposal, and are expected to spend a total of 100 hours. They will participate in weekly online meetings to share their experiences with fellow students and the course instructor. Students are expected to keep a journal documenting their experiences and submit it as a part of their final report. The final report will also include a summary, reflection and critical analysis of Capstone and the IPI program. Examples of a capstone project include: being involved in conducting a research project, assisting in research data collection and management, performing literature searches, assisting with research writing or the renewal of grants. A student embedded in a clinical team will participate in patient rounds or medical training opportunities within the medical center/hospital/clinic. The hosting clinical team leader serves as a mentor and directs students to perform various clinical activities.

Activity 5. Assessing the effectiveness of the IPI Program to inform LIS education & practice

Throughout the IPI program, feedback will be gathered from different constituent groups about the IPI orientation and individual courses. Prior to the offering of IPI courses, pre-program surveys will be conducted, data are gathered from students, instructors, and capstone mentors with regard to their experiences, skillsets, and expectation of the IPI program. For each course, reflection essay will be submitted by students and instructors. Formal summative evaluation and assessment of the project will be performed in summer 2021, with data collection efforts will start in April 2021. Feedback will be gathered via a variety of means, including pre- and post-program questionnaires, focus group sessions, students/faculty reflection essays, and one-on-one exit interviews. Annual retreats will also collect

comments from instructors and capstone mentors. Table 1 outlines the categories for which the evaluation data will be gathered.

Table 1. Evaluation Categories, Measurements, and Sources of Data

Groups	Category	Points of Measurement	Sources of Data
IPI Students	Satisfaction	Satisfaction with IPI orientation; Individual courses; Capstone; Overall IPI program	Course evaluation Post-program survey Reflection essay One-on-one exit interview
	Confidence	Confidence in IPI competency: Knowledge, Function, Personal; Own marketability, career directions, and impact	Pre- & post-program survey Focus group sessions Reflection essay One-on-one exit interview
	Improvement & growth of research or clinical Skills	The extent to which their research or clinical skills improved and grown	Course evaluation Pre- & Post program survey One-on-one exit interview
	Experience with embedded process	Positive experiences and challenges in capstone project	Journal and reflection essay at the end of the Capstone One-on-one exit interview
	Conception of IPI Framework and future directions	Overall reflection of IPI program and suggestions on IPI framework and future directions of this program	Post-program survey Focus groups One-on-one exit interview
IPI Instructors	Courses taught in terms of content and teaching approaches	Content covered and teaching strategies used Quality of students work	Post-program survey Reflection essay of the course Focus groups
	Feedback from colleagues and students	Comments from colleagues and students with regard to their teaching and learning experiences	Post-program survey Reflection essay of the course Focus groups
	Challenges and solutions	What have worked and what do not work Specific challenges, solutions, & lessons learned	Post-program survey Reflection essay of the course Focus groups
	Overall reflection of courses and IPI curriculum	IPI course content and pedagogy	Post-program survey Reflection essay of the course Focus groups
	Conception of IPI Framework and future directions	Overall reflection of IPI program and suggestions on IPI framework and future directions of this program	Pre- & Post-program survey Focus groups Retreat
Capstone mentors	Satisfaction with the students and the experience in managing capstone on-site	- Satisfaction rating - Expectation rating (room for improvement, meet expectation, exceed expectation)	Pre- & Post-program survey Reflection essay of the capstone Focus groups
	Lesson learned from mentoring and managing capstone	Summary of specific lessons learned	Pre- & Post-program survey Reflection essay of the capstone

			Focus groups
	Challenges in coordinating capstone	Time requirement vs expected time requirement Interaction rating on interacting with students; interacting with researchers and clinicians	Pre- & Post-program survey Reflection essay of the capstone Focus groups
	Overall value and benefits of the capstone	Values and benefits for - Students - Sites - Communities	Pre- & Post-program survey Reflection essay of the capstone Focus groups Retreat
	Conception of IPI Framework and future directions	Overall reflection of IPI program and suggestions on IPI framework and future directions of this program	Pre- & Post-program survey Focus groups Retreat

Activity 6. Disseminating findings through presentations and publications to facilitate adoption of the IPI conceptual framework in STEM, social sciences, and the humanities

Throughout the project, the PI and Co-PI, in working with the advisory board and the partners, will make great effort to document and analyze various project activities and results. A conceptual framework of IPI program will be developed where the competency framework (Figure 1) will be modified, enhanced, and further connected with various curriculum components and learning segments. The resulting IPI framework will be disseminated and presented to various forums and conferences. The PI and Co-PI will present project progress at various conferences such as ALA, MLA, ALISE, and SLA. Papers will be submitted to peer-reviewed journals such as Journal of Education for Library and Information Science, Journal of the American Medical Association, or Journal of eScience Librarianship.

An IPI project website will be created at the launch of the project and actively promoted. This website will be updated regularly on project's activities and milestones, to provide information about the IPI curriculum, highlights of informationists, research projects, and clinical teams, and student achievements. News about the project will be posted to appropriate listservs. With the guidance of their instructors and mentors, students will submit a paper or poster on their IPI experience to a related conference such as MLA or ALISE. Students are eligible to apply for students travel and professional development fund supported by Simmons and SLIS. Students will be encouraged to share their experiences with a broad LIS community.

Timeline. This two-year project includes a sequence of activities as shown in Table 2. The formal class sessions will start in Spring semester 2020. With the exception of the Capstone course, the courses will be offered online via synchronized live sessions. The class sessions will be held in the afternoon of the Pacific Time and evening of Eastern Time to accommodate students' working schedule. All students' tuitions will be funded through the project with 8 funded by the grant and 2 by Simmons University through financial aid. The project planning, course development, conversations with various stakeholder groups, and recruitment will take place in Fall 2019. In Spring 2020, the first suite of three courses will be offered. In Summer 2020, students will take Capstone Phase I. In Fall 2020, a second suite of three courses will be offered. In Spring 2021, students will take Capstone Phase II. Students may participate in May 2021 Simmons' commencement. There will be an online graduation ceremony held in June 2021. A summative evaluation of the project will be performed in the summer of 2021. Findings will be disseminated through reports and presentations at conferences or forums.

Table 2. IPI Program Timeline and Activities

Months/Semester	Activity
1-4 (Fall 2019)	Planning, Course development, Conversation with stakeholders, & Recruitment (recruit 10 students, from East & West Coasts)
5-10 (Spring 2020)	Semester 1 Course offering: Foundations of IPI; Health Sciences and Biomedical Informatics; Research Methods
11-13 (Summer 2020)	Semester 2 Course offering: Capstone/Field Experience Phase I
14-17 (Fall 2020)	Semester 3 Course offering: Collaboration and Leadership; Scientific Research Data Management; Applied Statistics
18-22 (Spring 2021)	Semester 4 Course offering: Capstone/Field Experience Phase II (Options for research and clinical tracks)
22-24 (Summer 2021)	Evaluation, Curriculum recommendation, Sustainability Plan, IPI conceptual framework, Dissemination

Diversity Plan

The IPI program recruiting will not only target a diverse set of students from the current workforce under the traditional measure of diversity, but also seek out diversity in work experiences and the types of clientele they have served. Institutional partners will be actively involved in helping us to identify and recruit a diverse group of students based on their networks. The recruitment announcements will be sent to academic institutions at a variety of geographic locations, as well as to association listservs such as African American Medical Librarians Alliance SIG of MLA, REFORMA, and Black Caucus of the American Library Association. We will recruit graduates from the ALA Spectrum Scholarship Program. We will work with the Office of Organizational Culture, Inclusion and Equity and Human Resources at Simmons University and SLIS admission staff to actively formulate strategies to increase diversity in IPI enrollment. Students will be recruited nationally, with special emphasis on the recruitment of underrepresented groups and diverse educational and workplace backgrounds. IPI partners will utilize their human resources departments and admissions staff to identify and help us to recruit from as diverse a pool of students as possible.

In addition to recruiting students of diverse ethnic backgrounds, this project addresses the challenges of the aging workforce of librarianship. With IPI students being a part of workforce, some will be mid-career and in their 40s to 60s, and do not have the opportunities to take off from their family and financial responsibilities to pursue an advanced degree. Our IPI program will address the challenges that this specific demographic faces with respect to continuing education that could lead to promotion or other career advancements. Furthermore, we will identify people with a variety of ethnic backgrounds, expertise, and experiences to serve as mentors for the IPI students' capstone projects. Through this effort, the IPI program will be strengthened by both a diverse group of students from workforce and a diverse group of instructors and mentors. Consequently, the IPI program will foster the development of inter-professional networks and produce successful graduates who add new dimensions to diversity and inclusion to the library profession.

Sustainability Plan. After the project is completed, Simmons SLIS will take responsibility of continuing with the post-master's certificate program in IPI and experiment with expanding the IPI setting to other STEM fields, Social Sciences, and Arts and Humanities disciplines. The curriculum model and course materials will be published on the project website so that other LIS schools can adopt and utilize for their

own programs. The project evaluation reports will provide insights in how IPI students have gained knowledge and skills and how institutional partner sites have benefited from this experience. The IPI Framework, together with papers and reports based on the project process, will help the LIS community to sustain, revise, and continuingly improve an educational model that meaningfully bridges the LIS theory with professional practice.

Project Deliverables. There are 5 deliverables: (1) Community of practice for post-graduate students; (2) Conceptual framework of IPI; (3) IPI Curriculum; (4) Assessment document, analysis of lessons learned, and recommendations for other STEM, Social Sciences, and Arts and Humanities disciplines; and (5) Project reports and presentations. Figure 3 presents the main characteristics of the project:
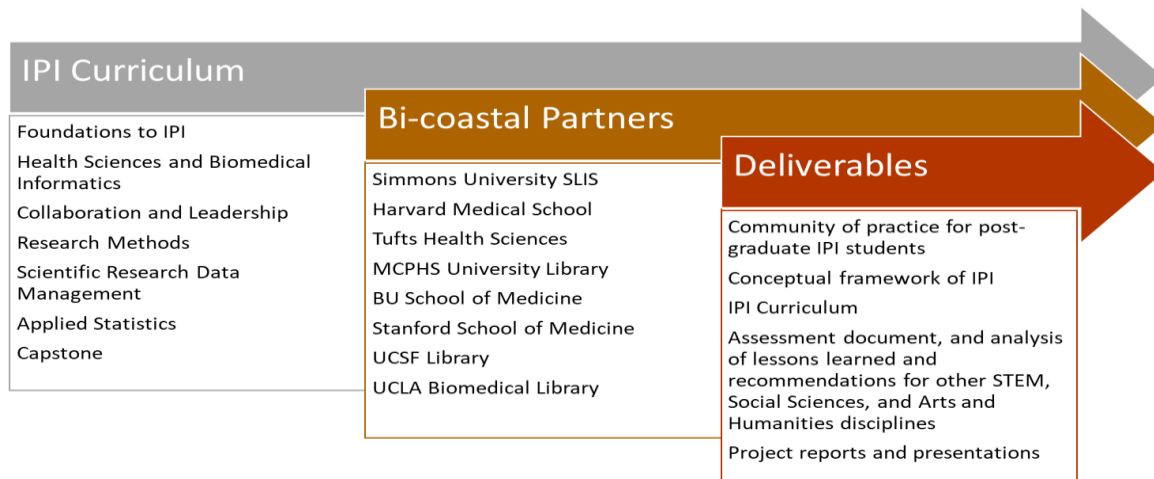

Figure 3. The IPI project components: Curriculum, partners, and deliverables

Broad Impact

This proposal is unique and innovative in bringing interdisciplinary and diverse partners together for the first time to create a groundbreaking IPI framework. It targets information professionals of diverse ethnic backgrounds and a wide age range, who have worked for a minimum of two years, and who might have limited opportunities to leave the workforce to retool themselves. The inclusion of 8 bicoastal partners will enable the fostering of a varied and diverse applicant pool. As a pilot program, the successful development of IPI curriculum will become an education model for information professionals seeking retooling and/or advanced employment in a dynamic and diverse inter-professional field of biomedical informatics and data management. The model will have a national impact in the broader area of LIS education by bridging the gap between theory and professional practice. A cohort of IPI leaders will initiate a community of practice of diverse professionals to redefine and enhance scientific research and clinical approaches.

The further impact of this program is the transferability of the IPI framework as it will be extended to other STEM fields, Social Sciences, and Arts and Humanities disciplines. The IPI model will also promote best practices of interdisciplinary collaboration, pave ways for strengthening research enterprise within or across institutions, and enhance research process and data sharing practices. Additional impacts include providing meaningful strategies to foster the continuing development of existing workforce and exemplifying lifelong learning for LIS professionals. The success of this project which involves practicing librarians, scientists, and LIS faculty members, could by itself serves as a model for interdisciplinary and

interprofessional collaboration. This should be an example of a forward looking, ground-breaking endeavor for LIS education and LIS practice.

Project Resources

PI and Co-PI. Rong Tang (PI) is an associate professor, Director of the Ph.D. Program in School of Library and Information Sciences, Simmons University. Dr. Tang's areas of teaching and research include research methods, digital information services, usability & UX research, data science curriculum, and open data services. Dr. Tang is internationally known for her research and teaching, especially on UX and information behavior research. Dr. Tang was the PI of numerous funded research projects, including grants from American Psychological Association, OCLC Library & Information Science Research Program, and a NEH Subaward with WGBH. Dr. Tang is a member of RDMLA (Research Data Management Librarian Academy) leadership team. Dr. Tang will lead all aspects of the project, including recruiting students, creating course content, coordinating IPI curriculum, evaluating the project, and developing the IPI framework. Dr. *Elaine Martin* (Co-PI) is Director of Harvard Countway Library of Medicine. An expert in scientific data management, she led multiple funded projects in RDM, including RDMLA. Dr. Martin will work with Dr. Tang on all main activities, with an emphasis on curriculum oversight for the Capstone project and coordination of bicoastal sites.

Capstone Partners. A major strength of this project is the rich set of experienced librarians and library directors involved in this project as capstone partners. This include *Mary Blanchard,* Director, and *David Flynn*, Assistant Director of Library and Information Management Education, at Boston University School of Medicine, Alumni Medical Library; *Eric Albright,* Library Director, and *Rebecca Morin*, Head of Research & Instruction, Hirsh Health Sciences Library, Tufts University; *Richard Kaplan,* Dean of Library and Learning Resources, Director of Libraries, MCPHS University; *Elaine Martin,* Director of Harvard Countway Library of Medicine; *Heidi Heilemann,* Associate Dean for Knowledge Management and Library Director, and *Colleen Cuddy*, Director, Research and Academic Collaboration, Lane Medical Library, Stanford University; *Chris Shaffer*, University Librarian, Assistant Vice Chancellor, UCSF; and *Rikke Ogawa*, Director of the Louise M. Darling Biomedical Library, UCLA.

Advisory Board. We will form an IPI advisory board consists of eight to ten key stakeholders including informationists, NLM/NIH staff members, LIS faculty members, and scientists. At this point, the confirmed board members are Carol Tenopir (Faculty, Univ of Tennessee), Sanda Erdelez (Faculty, Simmons Univ), Joyce Backus (NLM), Keith Cogdill (NIH), and Julie Goldman (Informationist, Harvard Medical School). We have identified several individuals such as Joseph Janes (Faculty, Univ of Washington), Margaret Henderson (Informationist, San Diego State Univ), Sally Gore (Informationist, Univ of Massachusetts), Joanne Nicholson (Social Scientist, Brandeis), and Evans Whitaker (Family Practice Doctor, UCSF) as potential board members. The Advisory Board will be chaired by Dr. Sanda Erdelez, Director of Simmons SLIS. The board will meet online every two months during which the PIs and Project Manager will report the project progress, and seek feedback and guidance on crucial project matters.

Simmons University

Retooling the Librarian Workforce: Innovative Post-Master's Certificate Program for Developing Inter-Professional Informationalists (IPI)

Schedule of Completion: Year 1 (September 2019 – August 2020)

Activities	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20
Project-wide retreat	■											
Planning	■	■										
Project website launch	■											
Project website update & maintenance	■	■	■	■	■	■	■	■	■	■	■	■
Recruitment		■	■	■								
Conversations w/ stakeholders on IPI framework		■	■									
Course development	■	■	■	■								
Spring IPI program orientation					■							
Course offering					■	■	■	■	■			
Evaluation & feedback gathering								■	■	■	■	■
Capstone Phase I										■	■	■
Project meeting	■	■	■	■	■	■	■	■	■	■	■	■
Advisory Board meeting		■		■		■		■		■		■
Project report & presentation								■	■	■	■	■

Simmons University

Schedule of Completion: Year 2 (September 2020 – August 2021)

Activities	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21
Project-wide retreat	■											
Project Website Update & maintenance	■	■	■	■	■	■	■	■	■	■	■	■
Course offering	■	■	■	■								
Evaluation and feedback gathering	■	■	■	■	■	■	■	■	■			
Capstone Phase II					■	■	■	■	■			
Summative assessment & evaluation report										■	■	■
IPI Graduation (Online Ceremony)										■		
Project meeting	■	■	■	■	■	■	■	■	■	■	■	■
Advisory Board meeting		■		■		■		■		■		■
Final Report, presentation, & publication										■	■	■

DIGITAL PRODUCT FORM

Introduction

The Institute of Museum and Library Services (IMLS) is committed to expanding public access to federally funded digital products (e.g., digital content, resources, assets, software, and datasets). The products you create with IMLS funding require careful stewardship to protect and enhance their value, and they should be freely and readily available for use and re-use by libraries, archives, museums, and the public. Because technology is dynamic and because we do not want to inhibit innovation, we do not want to prescribe set standards and practices that could become quickly outdated. Instead, we ask that you answer questions that address specific aspects of creating and managing digital products. Like all components of your IMLS application, your answers will be used by IMLS staff and by expert peer reviewers to evaluate your application, and they will be important in determining whether your project will be funded.

Instructions

All applications must include a Digital Product Form.

☐ Please check here if you have reviewed Parts I, II, III, and IV below and you have determined that your proposal does NOT involve the creation of digital products (i.e., digital content, resources, assets, software, or datasets). You must still submit this Digital Product Form with your proposal even if you check this box, because this Digital Product Form is a Required Document.

If you ARE creating digital products, you must provide answers to the questions in Part I. In addition, you must also complete at least one of the subsequent sections. If you intend to create or collect digital content, resources, or assets, complete Part II. If you intend to develop software, complete Part III. If you intend to create a dataset, complete Part IV.

Part I: Intellectual Property Rights and Permissions

A.1 What will be the intellectual property status of the digital products (content, resources, assets, software, or datasets) you intend to create? Who will hold the copyright(s)? How will you explain property rights and permissions to potential users (for example, by assigning a non-restrictive license such as BSD, GNU, MIT, or Creative Commons to the product)? Explain and justify your licensing selections.

A.2 What ownership rights will your organization assert over the new digital products and what conditions will you impose on access and use? Explain and justify any terms of access and conditions of use and detail how you will notify potential users about relevant terms or conditions.

A. 3 If you will create any products that may involve privacy concerns, require obtaining permissions or rights, or raise any cultural sensitivities, describe the issues and how you plan to address them.

Part II: Projects Creating or Collecting Digital Content, Resources, or Assets

A. Creating or Collecting New Digital Content, Resources, or Assets

A.1 Describe the digital content, resources, or assets you will create or collect, the quantities of each type, and the format(s) you will use.

A.2 List the equipment, software, and supplies that you will use to create the content, resources, or assets, or the name of the service provider that will perform the work.

A.3 List all the digital file formats (e.g., XML, TIFF, MPEG) you plan to use, along with the relevant information about the appropriate quality standards (e.g., resolution, sampling rate, or pixel dimensions).

B. Workflow and Asset Maintenance/Preservation

B.1 Describe your quality control plan. How will you monitor and evaluate your workflow and products?

B.2 Describe your plan for preserving and maintaining digital assets during and after the award period of performance. Your plan may address storage systems, shared repositories, technical documentation, migration planning, and commitment of organizational funding for these purposes. Please note: You may charge the federal award before closeout for the costs of publication or sharing of research results if the costs are not incurred during the period of performance of the federal award (see 2 C.F.R. § 200.461).

C. Metadata

C.1 Describe how you will produce any and all technical, descriptive, administrative, or preservation metadata. Specify which standards you will use for the metadata structure (e.g., MARC, Dublin Core, Encoded Archival Description, PBCore, PREMIS) and metadata content (e.g., thesauri).

C.2 Explain your strategy for preserving and maintaining metadata created or collected during and after the award period of performance.

C.3 Explain what metadata sharing and/or other strategies you will use to facilitate widespread discovery and use of the digital content, resources, or assets created during your project (e.g., an API [Application Programming Interface], contributions to a digital platform, or other ways you might enable batch queries and retrieval of metadata).

D. Access and Use

D.1 Describe how you will make the digital content, resources, or assets available to the public. Include details such as the delivery strategy (e.g., openly available online, available to specified audiences) and underlying hardware/software platforms and infrastructure (e.g., specific digital repository software or leased services, accessibility via standard web browsers, requirements for special software tools in order to use the content).

D.2 Provide the name(s) and URL(s) (Uniform Resource Locator) for any examples of previous digital content, resources, or assets your organization has created.

Part III. Projects Developing Software

A. General Information

A.1 Describe the software you intend to create, including a summary of the major functions it will perform and the intended primary audience(s) it will serve.

A.2 List other existing software that wholly or partially performs the same functions, and explain how the software you intend to create is different, and justify why those differences are significant and necessary.

B. Technical Information

B.1 List the programming languages, platforms, software, or other applications you will use to create your software and explain why you chose them.

B.2 Describe how the software you intend to create will extend or interoperate with relevant existing software.

B.3 Describe any underlying additional software or system dependencies necessary to run the software you intend to create.

B.4 Describe the processes you will use for development, documentation, and for maintaining and updating documentation for users of the software.

B.5 Provide the name(s) and URL(s) for examples of any previous software your organization has created.

C. Access and Use

C.1 We expect applicants seeking federal funds for software to develop and release these products under open-source licenses to maximize access and promote reuse. What ownership rights will your organization assert over the software you intend to create, and what conditions will you impose on its access and use? Identify and explain the license under which you will release source code for the software you develop (e.g., BSD, GNU, or MIT software licenses). Explain and justify any prohibitive terms or conditions of use or access and detail how you will notify potential users about relevant terms and conditions.

C.2 Describe how you will make the software and source code available to the public and/or its intended users.

C.3 Identify where you will deposit the source code for the software you intend to develop:

Name of publicly accessible source code repository:

URL:

Part IV: Projects Creating Datasets

A.1 Identify the type of data you plan to collect or generate, and the purpose or intended use to which you expect it to be put. Describe the method(s) you will use and the approximate dates or intervals at which you will collect or generate it.

A.2 Does the proposed data collection or research activity require approval by any internal review panel or institutional review board (IRB)? If so, has the proposed research activity been approved? If not, what is your plan for securing approval?

A.3 Will you collect any personally identifiable information (PII), confidential information (e.g., trade secrets), or proprietary information? If so, detail the specific steps you will take to protect such information while you prepare the data files for public release (e.g., data anonymization, data suppression PII, or synthetic data).

A.4 If you will collect additional documentation, such as consent agreements, along with the data, describe plans for preserving the documentation and ensuring that its relationship to the collected data is maintained.

A.5 What methods will you use to collect or generate the data? Provide details about any technical requirements or dependencies that would be necessary for understanding, retrieving, displaying, or processing the dataset(s).

A.6 What documentation (e.g., data documentation, codebooks) will you capture or create along with the dataset(s)? Where will the documentation be stored and in what format(s)? How will you permanently associate and manage the documentation with the dataset(s) it describes?

A.7 What is your plan for archiving, managing, and disseminating data after the completion of the award-funded project?

A.8 Identify where you will deposit the dataset(s):

Name of repository:

URL:

A.9 When and how frequently will you review this data management plan? How will the implementation be monitored?