# Research Lifecycles as the Basis for Library Service Plans:

# An Annotated Bibliography

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## Abstract

The research lifecycle is a concept that has proved useful to academic librarians and administrators as they plan library services to support researchers at every stage of their work, from ideation to securing funding to publication and permanent archiving. This annotated bibliography highlights key journal publications, book chapters and reports published internationally from 2010-2017 that offer definitions or models of a "research lifecycle."

**Keywords:** research lifecycle; library services

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## Rationale for the Bibliography

The research lifecycle is a concept that has proved useful to academic librarians and administrators as they plan library services to support researchers at every stage of their work, from ideation to securing funding to publication and permanent archiving. The term *research lifecycle* took hold in the literature of library and information science after 2010. Many earlier works probed aspects of the research process as it related to individual projects, but the research lifecycle models are innovative because they extend analysis to processes of publication, archiving, and discoverability.

This annotated bibliography highlights key journal publications, book chapters and reports published internationally from 2010-2017 that offer definitions or models of a *research lifecycle*. Citations were selected from searches in Library and Information Science Abstracts (LISA), Google Scholar, and the Summon discovery service. Annotations summarize the context and scope of the range of definitions of "research lifecycle," with attention to recommendations for librarians, researchers and/or strategic planners.

Many studies applying a research lifecycle framework use ethnographic or survey methods to gather information from researchers about their research support practices and needs. Libraries use the research lifecycle model to ensure that staff is prepared to engage with researchers in new ways. To do this, evidence is gathered from librarians about their training and preparation to meet researcher needs and to educate students as future

researchers about documenting their methods and sharing their work.

Another focus of studies of research lifecycles is to explore expanding the library's traditional role of preserving and disseminating information in light of new trends in scholarly communication. Research data management is frequently a starting point for planning additional library support, and case studies detailing partnerships between libraries, information technology centers, and funding organizations are valuable points of reference for libraries planning to pursue stronger collaborations.

While the concept and phrase are useful for libraries in planning and publicizing their role(s) in university and research communities, it is worth noting that to date, the phrase *research lifecycle* is found almost exclusively in publications by and for the library and information science community. Research processes (which may or may not be cyclic) will look different depending on discipline and context. While existing models range from comprehensive to elegantly concise, most academic libraries will be well served by listening carefully to the community of researchers and administrators that they serve and developing a customized model that takes into account the mission, language, and values of their unique community.

## References

Cox, A. M., & Verbaan, E. (2016). How academic librarians, IT staff, and research administrators perceive and relate to research. *Library & Information Science Research*, 38(4), 319-326. doi:10.1016/j.lisr.2016.11.004

Deng, S. & Dotson, L. (2015). Redefining scholarly services in a research lifecycle. *Creating the 21st Century Academic Library, Vol. 4, Research infrastructures* (pp. 77-92). Edited by Brad Eden. Rowman and Littlefield/Scarecrow Press.

Fourie, I., & Bakker, S. (2013). Value of a manageable research life cycle for LIS: A cancer library exploring the needs of clinicians and researchers as example. *The Electronic Library, 31*(5), 648-663. doi:10.1108/EL-04-2012-0034

Gessner, G. C., Eldermire, E., Tang, N., & Tancheva, K. (2017). The Research Lifecycle and the Future of Research Libraries. In D. M. Mueller (Ed.), *At the Helm: Leading Transformation: The Proceedings of the ACRL 2017 Conference* (pp. 533-543) ACRL. Retrieved from http://www.ala.org/acrl/sites/ala.org.acrl/files/content/conferences/confsandpreconfs/2017/TheResearchLifecycleandtheFutureofResearchLibraries.pdf

Johnson, R. P. (2017). Consume, reproduce, extend and connect: Sustaining our research lifecycle. *Bulletin of the Association for Information Science and Technology, 43*(4), 24-29. doi:10.1002/bul2.2017.1720430407

Kwon, N. (2017). How work positions affect the research activity and information behaviour of laboratory scientists in the research lifecycle: Applying activity theory. *Information Research: An International Electronic Journal, 22*(1).

Liu, S. (2017). Embedding library services in research stages: Chinese subject service and the research lifecycle model. *International Journal of Librarianship, 2*(1), 16-31. Retrieved from http://ojs.calaijol.org/index.php/ijol/article/view/24

Mamtora, J. (2013). Transforming library research services: Towards a collaborative partnership. *Library Management, 34*(4), 352-371. doi:10.1108/01435121311328690

Maxwell, D. (2016). The research lifecycle as a strategic roadmap. *Journal of Library Administration, 56*(2), 111-123. doi:10.1080/01930826.2015.1105041

Tenopir, C., Allard, S., Douglass, K., Aydinoglu, A. U., Wu, L., Read, E., Manoff, M., & Frame, M. (2011). Data sharing by scientists: Practices and perceptions. *PLoS ONE, 6*(6), e21101. doi:10.1371/journal.pone.0021101

Vaughan, K. T. L., Hayes, B. E., Lerner, R. C., McElfresh, K. R., Pavlech, L., Romito, D., Reeves, L.H., … Morris, E. N. (2013). Development of the research lifecycle model for library services. *Journal of the Medical Library Association: JMLA, 101*(4), 310-314. doi:10.3163/1536-5050.101.4.013

Yu, F., Deuble, R., & Morgan, H. (2017). Designing research data management services based on the research lifecycle: A consultative leadership approach. *Journal of the Australian Library and Information Association, 66*(3), 287-298. doi:10.1080/24750158.2017.1364835

**Annotated Bibliography**

Cox, A. M., & Verbaan, E. (2016). How academic librarians, IT staff, and research administrators perceive and relate to research. *Library & Information Science Research*, 38(4), 319-326. doi:10.1016/j.lisr.2016.11.004

According to Cox and Verbaan, with libraries becoming involved in research data management (RDM), a much deeper relationship between libraries with researchers throughout the research lifecycle is created. In their 2016 study, the authors examine how librarians, IT staff, and research administrators view research and their own relation to it. Following semi-structured interviews with professional services staff in one higher education institution in England, researchers observed that librarians frequently talked about research when discussing research-led teaching or collection-related activities and to a lesser extent through reference work or copyright. IT managers viewed research via infrastructure or specialist expertise and research administrators tended to see research through the roles of administrative support and policy influence. After analyzing the three professional groups in the study, Cox and Verbaan argue that is becoming critical for librarians to develop more of a deeper grasp of stakeholder perspectives as libraries become more involved in research support.

Deng, S. & Dotson, L. (2015). Redefining scholarly services in a research lifecycle. In B. Eden (Ed.), *Creating the 21st century academic library, Vol. 4, Research infrastructures* (pp. 77-92). Rowman and Littlefield/Scarecrow Press.

The University of Central Florida's Research Lifecycle Toolkit is one of the most frequently cited research lifecycle models. The UCF Research Lifecycle Toolkit, which is shared in their institutional repository, includes posters, infographics, conference

presentations and a book chapter documenting the work of several iterations of the UCF Research Lifecycle Committee beginning in 2010. The most comprehensive overview of the concept and work published to date is the book chapter by Deng and Dotson, which describes the development of the initial "mental model" and the subsequent new services and enhanced partnerships with other campus entities. The UCF model sequences four sub-cycles: the Planning Cycle, the Project Cycle, the Publication Cycle and the 21st Century Digital Scholarship Cycle. Color-coding on the diagram indicates needed infrastructure in high-performance computing, the institutional repository, and research data management. The book chapter identifies steps taken to provide library support at each stage and describes collaborations, new or adapted job titles and responsibilities, training and workshops that were a result of the committee's vision.

Fourie, I., & Bakker, S. (2013). Value of a manageable research life cycle for LIS: A cancer library exploring the needs of clinicians and researchers as example. *The Electronic Library, 31*(5), 648-663. doi:10.1108/EL-04-2012-0034

This article details a pilot study by Fourie and Bakker for a manageable research lifecycle that might enable library professionals assess the needs of their library users on an ongoing basis. In this study, which took place at the Central Cancer Library, The Netherlands Cancer Institute (Amsterdam), 24 employees (users and non-users of the library) were interviewed about their opinions of library services. Their approach is unique because the scope of their cycle is the development of new library services to support research, so their cycle iterates the research, planning, implementation, evaluation and ongoing improvement of library services. Following the cyclic model suggested and mapped in the article, the authors are confident that the needs of users can

be addressed by considering the context of library service and potential users, learning from subject literature and social networks, continued user surveys to collect and analyze data, and further reflection.

Gessner, G. C., Eldermire, E., Tang, N., & Tancheva, K. (2017). The Research Lifecycle and the Future of Research Libraries. In D. M. Mueller (Ed.), *At the Helm: Leading Transformation: The Proceedings of the ACRL 2017 Conference* (pp. 533-543) ACRL. Retrieved from http://www.ala.org/acrl/sites/ala.org.acrl/files/content/conferences/confsandpreconfs/2017/TheResearchLifecycleandtheFutureofResearchLibraries.pdf

Drawn from results of a longer 2016 study for Ithaka S+R ("A Day in the Life of a (Serious) Researcher. Envisioning the Future of the Research Library"), this conference paper maps four academic activities (brainwork, seeking information, self-discipline, and technology) onto an adaptation of Vaughan et al.'s lifecycle in order to imagine how libraries of the future might participate in developing technology to support a variety of academic workflows. Specific tools they suggest include note-taking, mapping and visualization tools; the authors call for cooperation from library vendors to allow more flexible access to licensed resources.

Johnson, R. P. (2017). Consume, reproduce, extend and connect: Sustaining our research lifecycle. *Bulletin of the Association for Information Science and Technology, 43*(4), 24-29. doi:10.1002/bul2.2017.1720430407

Johnson looks back at the development of the scientific method to remind researchers and librarians that once produced, new research must be disseminated and preserved in order to be of use in continuing to build new knowledge. Researchers must

consume, consider and extend the work of their predecessors by reproducing experiments; to do so effectively, they need to have good documentation of the materials, methods, software and tools used to conduct the initial research. Johnson alludes to the current "reproducibility crisis" by raising concerns about the scientific scholarly workflow since researchers working in parallel do not necessarily have access to the software, methods, or data of their colleagues. His solution is to use a research lifecycle model that emphasizes preserving and disseminating elements like research data, software and original code, and other technical elements in order to facilitate reproducing the work. Providing an overview of the various open access initiatives in the United States and internationally that have potential for researchers to capture and link connection to scholarly works and other organizations that focus on practice policy, preservation, and data management, he contends that it is still going to take a substantial amount of time to organize communities to meet a comprehensive set of needs.

Ketchum, A.M. (2017). Responding to change in scholarly communication. *Journal of the Medical Library Association: JMLA, 105*(1), 80-83. doi:10.5195/JMLA.2017.110

Ketchum affirms that scholars' views of the research lifecycle have changed due in part to how the Internet and digital technologies have altered scholarly communication, literature searches, data, and more. To add value during the research lifecycle, the author suggests that librarians become familiar with and be prepared to answer users' questions on documentation, dissemination, open access publishing, data management, copyright, and impact metrics. Additionally, by employing the research lifecycle analysis for strategic planning, librarians will be able to map resources and services to research tasks

or needs specific to their institutions, highlighting the capabilities of their librarians to better attract and serve researchers. Ketchum declares that by planning strategically, health sciences librarians in particular can demonstrate their value to their institutions as knowledgeable information resources who are able to support all aspects of the contemporary and ever-evolving research lifecycle.

Kwon, N. (2017). How work positions affect the research activity and information behaviour of laboratory scientists in the research lifecycle: Applying activity theory. *Information Research: An International Electronic Journal, 22*(1).

This study was conducted to investigate the characteristics of research and information activities of laboratory scientists in different work positions throughout the research lifecycle. Taking a qualitative research approach with in-depth interviews and field observations with 24 scientists in South Korea, Kwon attempted to answer the following questions: 1: In each phase of the research lifecycle, what are the key research activities of laboratory scientists in different work positions? 2: In each research phase, what are the key characteristics of the information behavior of laboratory scientists in different work positions? Results of the study indicate that work position was revealed as a critical factor characterizing scientists' research and information activities. Scientists in differing positions used a wide range of information sources for a variety of purposes throughout the research lifecycle. Kwon's findings show that it is critical for system designers and policymakers to help develop customized research support systems to meet the information needs of scientists in various work positions throughout their career stages.

Liu, S. (2017). Embedding library services in research stages: Chinese subject service and the research lifecycle model. *International Journal of Librarianship, 2*(1), 16-31. Retrieved from http://ojs.calaijol.org/index.php/ijol/article/view/24

Liu interviews mathematicians at Peking University to learn about their research process and develop a library service model that offers support across the research lifecycle. Cornell University Library's 2011-2015 strategic plan and the JISC model (published in Tenopir et al.), as well as studies about the effectiveness of Chinese subject specialist librarian roles, inform a set of interview questions about research support needs at the project preparatory stage, the research and development stage, and the results or output stage; Liu creates a diagram with library support services centered and surrounded by these three stages. She finds demand for a range of services including longstanding liaison librarian mainstays like collection development and training in database use as well as services like research data management, data analysis consulting, patent information assistance and writing help.

Mamtora, J. (2013). Transforming library research services: Towards a collaborative partnership. *Library Management*, *34*(4), 352-371. doi:10.1108/01435121311328690

Mamtora's study looks at the recent history and evolution of librarian roles in Australian research universities. She reviews documents created by ACRL, the UK Researcher Development Framework, and other organizations tasked with assessing library support for the needs of researchers; she selects the Queensland University Libraries Office of Co-operation (QULOC) comprehensive research lifecycle model as a basis for a survey of the gap between librarians' existing skills and needed professional

development in order to provide robust services across the research lifecycle. Survey results, evaluation exercises, and workshop descriptions are documented and will be of use to smaller university libraries interested in assessing and improving librarians' capacity to support researchers.

Maxwell, D. (2016). The research lifecycle as a strategic roadmap. *Journal of Library Administration, 56*(2), 111-123. doi:10.1080/01930826.2015.1105041

Maxwell argues that academic libraries need to strategically align themselves with campus priorities in order to survive. Taking a student focus, he argues that information literacy is necessary but "insufficient ... to justify the existence of today's academic library," suggesting that what employers truly value is genuine research experiences for undergraduates, which libraries can support by offering services for students and faculty alike around first mastery and then research planning, project development, publication, and digital preservation. Maxwell notes existing research lifecycle models, but his differs because it begins with student mastery and retains a student focus. On a practical level, he identifies specific collaborations and tools that libraries can pursue and promote - for example, his section on the project cycle suggests the libraries take the lead in training researchers in the use of note-taking and organizational tools. Maxwell's roadmap is useful for libraries looking to highlight their work with undergraduate students while seeking new ways to connect with campus research priorities.

Tenopir, C., Allard, S., Douglass, K., Aydinoglu, A. U., Wu, L., Read, E., Manoff, M., & Frame, M. (2011). Data sharing by scientists: Practices and perceptions. *PLoS ONE, 6*(6), e21101. doi:10.1371/journal.pone.0021101

This highly cited article reports the results of a survey of data sharing practices of

a network of scientists that uncovers some incentives and obstacles to sharing research data. It includes a research lifecycle diagram from the Joint Information Systems Committee (JISC) in the UK that positions the data lifecycle within a larger research lifecycle, a circle beginning with ideas and incorporating partners, proposal writing, the research process and publication; the research process segment is expanded to include a research data cycle focused on data management and sharing that opens the door for virtual research environments (VREs) where researchers can explore hypotheses using data gathered and shared for other projects. Conducted by LIS and informatics specialists, the survey explores data sharing practices and makes comparisons based on subject discipline, level of organizational support, geographic area and many other factors. The authors recommend leadership from the National Science Foundation and other organizations worldwide to facilitate data sharing and to make it easier for scientists to apply consistent and sound data management principles.

Vaughan, K. T. L., Hayes, B. E., Lerner, R. C., McElfresh, K. R., Pavlech, L., Romito, D., Reeves, L.H., … Morris, E. N. (2013). Development of the research lifecycle model for library services. *Journal of the Medical Library Association: JMLA*, *101*(4), 310-314. doi:10.3163/1536-5050.101.4.013

Authors of this article set out to answer this question: can the niche services of individual librarians across multiple libraries be developed into a suite of standard services available to all scientists that support the entire research lifecycle? A group of five librarians from the University of North Carolina at Chapel Hill (UNC-CH) Health Sciences and Kenan Science Libraries formed a team to discuss library services and methods of service delivery to the sciences. To achieve their goal, the researchers

conducted a literature review, developed a concept map to identify current and potential library services, and gathered data during an interactive poster session. Additionally, the authors established a pilot study population to develop and test their model. This linear process has allowed the team to plot library involvement along this continuum of stages: idea development, funding, proposal, conducting the research, and disseminating results. The researchers conclude that the library is poised to be a partner through the entire process, not just at the bookends of research. This research lifecycle model is flexible enough to change as the needs of the service group and researchers and the skills of the librarians evolve.

Yu, F., Deuble, R., & Morgan, H. (2017). Designing research data management services based on the research lifecycle: A consultative leadership approach. *Journal of the Australian Library and Information Association, 66*(3), 287-298. doi:10.1080/24750158.2017.1364835

Authors Yu, Deuble, and Morgan state that Research Data Management (RDM) is involved at every stage of the research lifecycle; therefore, it is strategically important to implement RDM support services in the context of the research lifecycle framework in libraries. The authors describe the deliberate leadership effort from the University of Queensland (UQ) Library in consultation with other support units to deliver effective RDM services to UQ researchers. The results of this effort include improved RDM guides and training programs for both RDM team members and faculty librarians and an enhancement of UQ eSpace's data collection capability. By engaging internal and external stakeholders, the authors have evidenced a positive change in the traditional view of RDM, which had been considered an administrative burden. With these

strengthened skills and knowledge, the RDM team is able to maximize the benefits for researchers by leading support services in consultation with multiple units across the university. Providing services based on the research lifecycle allows researchers to engage at point of need and the authors report that feedback has indicated that this is the preferred mechanism for all involved.