

# Systematic Review Collaboration & Data Governance in a Medical Library

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## Abstract

The Conducting Systematic Review Collaboration (CSRC) is an initiative designed to enhance the quality of the systematic review (SR). This initiative was created by implementing the SR collaboration infrastructure, governance model, and practices to manage the SR collaboration. Ambassadorial and 3C (communication, cooperation, and collaboration) models were used to implement the SR collaborative initiative. This study sought to design the SR data governance and analytics model to scale the SR collaboration in a military medical library.

*Keywords:* systematic review collaboration, systematic review data governance, systematic review, librarianship

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## Introduction

Systematic review (SR) collaboration services in academic universities facilitate the management of evidence-based research, academic publication, and scholarly collaboration between librarians and the wider academic communities (Healy et al., 2020; Kallaher et al., 2020). Various models and structures have been implemented to initiate and sustain collaborative academic partnerships with scholars due to the ever-increasing need to evaluate and appraise published biomedical literature in libraries (Lightfoot et al., 2015; Luca & Ulyannikova, 2020). The library's capacity and expertise in scalable SR services have been enhanced by the service-oriented, user-centered, cost recovery, two-tiered, online, offline, and self-service resources, as well as librarian mentoring (Knehans et al., 2016; Lightfoot et al., 2015; Luca & Ulyannikova, 2020; McKeown & Ross-White, 2019; Roth, 2018). Team-based and librarian-collaborator models effectively develop the required set of skills and competencies to foster education and collaboration with clinicians (Lightfoot et al., 2015; Roth, 2018). Although researchers have published on librarian collaboration in conducting a SR, the implementation of a data governance model for SR collaboration has not been studied. Thus, the data governance concept and framework are unique for management of SR collaboration. The objective of this study is to introduce a data governance concept and framework for collaborative endeavors among military library and clinical researchers in conducting a SR. The data governance definition will be introduced in this study. Outreach, SR methodology, and study protocols contribute to the quality of SRs, enhance manuscript publication, and promote librarian authorship (Folb et al., 2020; Healy et al., 2020). However, the demand for scalability of SR services highlights emerging challenges associated with the management, processes, collaboration selectivity and prioritization, librarians' workload, data analysis, and data governance (McKeown & Ross-White, 2019). This research suggests the value of the data governance model and knowledge management as a service model based on Data, Information, Knowledge, and Wisdom (DIKW) as a model for SRs' data governance and value metrics (Ackoff, 1989). DIKW hierarchy, often used to manage information, can be used to measure the SR collaboration by using DIKW's four elements to understand the information support offered to researchers and communicate the value of SR collaboration to leadership. Each of these elements captures the data that can be potentially transformed into the data as a service through the data evolution from the data context, the meaning of the data, and insight into the data. Thus, author hypothesize that the use of DIKW elements for SR data governance generates the data during the SR collaboration, which allows assessment of the value of SR collaboration by inferring data as a service, information as a service, and wisdom as a service from SR

collaboration data. Moreover, inferred data from SR collaboration can serve as precedents for the design of the data governance framework and value analytic model for SR services.

Academic libraries and communities are conducive to collaborative services in conducting a SR. The transformation of library services, partnership with peer libraries, and outreach to the scholarly community have resulted in successful collaboration and publication of SRs (Kallaher et al., 2020). Nevertheless, in terms of our academic counterpart libraries, little is known about fostering a collaborative service in conducting a SR in a military-medical environment. The implementation of SR services in a military-medical library is described here. The study's objective is to enhance the quality of SR collaboration and data governance and strengthen the organizational environment of shared goals of excellence in clinical practice and learning through collaboration and education.

## Methods

Darnall Medical Library (DML) is a small federal medical library that provides information services and collaboration initiatives to Walter Reed National Military Medical Center (WRNMMC) healthcare providers to support medical readiness, healthcare, and graduate medical education (GME). Information and research literacies are essential skills and competencies for scholarship and healthcare practice. DML supports GME post-graduate trainees in scholarly activity and clinical care through information mentorship, research lectures, and collaborative initiatives. The implementation of the SR collaborative initiative in military libraries and centers could enhance information and research literacy in GME trainees, SR manuscript quality, and librarians' value. Thus, the library SR collaborative initiative is crucial for clinical providers (e.g., clinicians, residents, nurses) to enhance the quality of the SR, authorship, and scholarship.

### Environmental Scan

An environmental scan was conducted to understand researchers' SR publications and assess the potential of designing a SR collaborative initiative in DML. A literature search was conducted in PubMed to identify SRs published by WRNMMC researchers from 2015 to 2020. The search for published articles by affiliation was conducted in PubMed (e.g., (Walter Reed National Military Medical Center[affiliation]) OR (Walter Reed Army Medical Center[affiliation]) OR (National Naval Medical Center[affiliation])); Filters: Meta-Analysis, Systematic Review, Humans, from 2015/1/1 - 2020/1/1). The literature search was conducted to understand researchers' SR

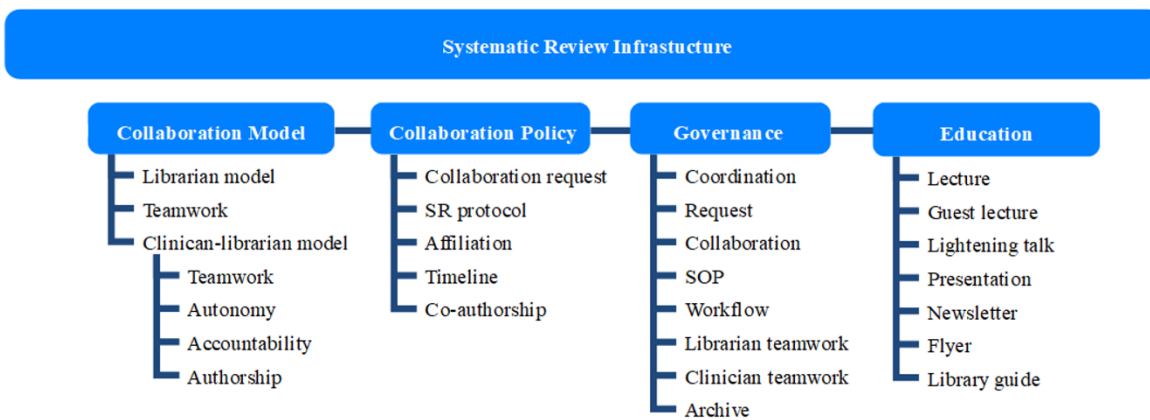
conduction, publication, and collaboration pattern with librarians (DML librarians and non-DML librarians). Interviews with GME leadership were held to assess their interest in collaborative SR initiatives. A Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis was conducted to assess the library’s information resources and potential for initiating a collaborative SR service. The action research method of analyzing the SR collaborations in libraries was implemented to design SR infrastructure, data governance, information solutions, and an ethical framework for the collaborative initiative (Coughlan & Coughlan, 2002).

### Collaborative Initiative Infrastructure

An initiative on conducting the SR was initiated by designing the SR initiative infrastructure – including librarian–clinician and librarian teams models, librarian–clinical team collaborative policy, governance practice, education, and promotion plan (Figure 1). Collaborative infrastructure is defined as a set of entities involved in conducting and publishing SR. Collaboration model, collaboration team policy, governance practice, SR lecture, and promotion plan (designed in this study) are a foundation of the collaborative infrastructure. This infrastructure supports researchers in collaborating on conducting SR (Figure 1).

Figure 1

SR Infrastructure: Collaboration Model, Collaboration Policy, Governance, and Education.



Note. Collaboration model includes the foundational elements of SR collaboration strategies through a variety of collaborative approaches. The collaboration policy model is effective for collaborative partnerships and publications. Governance represents a structural hierarchy of processes, coordination, and management. Education highlights the diverse educational outreach to the scientific community that is effective in outreach and learning.

The ambassadorial model was used to implement, promote, and scale SR services (Bass & Avolio, 1993; Reilly & Ryan, 2008), while librarian team and librarian-collaborator team models were adapted for SR collaboration (Kallaher et al., 2020). Ambassador model in this study is defined as a formal communication with researchers to promote SR collaboration between librarians and the clinical community. This model delineates the brand ambassador marketing methods or brand ambassador term for the SR collaboration or development of the SR service. The 3C model (communication, cooperation, and collaboration) was adapted for team collaboration (Choi, 2017; Denise, 1999; Fuks et al., 2008; Kock, 2008; Swart & Henneberg, 2007).

### SR Data Governance

The plan for the SR infrastructure, implementation, collaboration, and data governance was designed (Cheong & Chang, 2007). The data governance for strategic, operational, tactical, and daily phases was developed using the scientific inquiry process (Choi, 2017; Dahlberg & Nokkala, 2015; Koltay, 2016; Korhonen et al., 2013; Leonelli, 2019). Data governance in this study is defined as an information framework designed to enhance the collaboration between the library and collaborative constituency teams in conducting a SR through the stewardship model of SR collaboration processes, SR processes management, information knowledge management system of SR collaboration, and communication between collaborative teams (see Figures 1 and 2, Glossary, and Tables 2 and 3).

Data governance is a novel concept in the realm of SR collaboration. So far, research has yet to be published on the use of a data governance framework and the role of data governance for SR collaboration. Data obtained during the collaboration offers insight into the collaborative process among constituencies. Due to the recent interest in using data to manage library processes, governing a SR collaborative process is most likely useful for decision-making to enhance the quality of SR initiatives and strengthen the value of information support. Thus, this research attempts to design and implement data governance for SR collaboration.

### Education Infrastructure

The SR library guide and information resources on planning and conducting SRs were implemented. Library lectures (planning a SR, writing a SR protocol, and study question design) were designed and taught on a quarterly basis. Consultations on collaboration and conduction of SRs were implemented to increase awareness of the SR methodology and library SR collaborative initiative. Instruction and educational outreach to the Directorate of Education Training and Research (DETR), GME

programs, and the Department of Medicine (DOM) were conducted. Professional training and education of the librarian team were implemented to enhance librarians' skills and competencies.

## Information Technology Infrastructure

The Conducting Systematic Review Collaboration (CSRC) initiative is based upon the 3C model (Choi, 2017; Denise, 1999; Fuks et al., 2008; Kock, 2007). However, the scalability of collaborative initiatives and data governance require technological modernization for successful collaboration and productivity. Waterfall and Agile models are effective in designing scalable and collaborative SR endeavors (Blank & Dorf, 2020; Cohan, 2018). The planning of a scalable SR service in a virtual environment is based on a conceptual approach to the start-up and development phases when libraries transitioned to online and remote environments during the COVID-19 pandemic (Blank & Dorf, 2020; Cohan, 2018; Startup Commons Global, 2018). RedCap (Research Electronic Data Capture) was selected as the application of choice after evaluating various digital tools and applications and their suitability for collaboration within a small library and research environment. RedCap offers autonomy, control, and a secure environment to manage SR data and collaboration. It is an electronic database that allows us to capture SR data and incorporate interoperability into workflows, as well as authorize, control, and safeguard scholarly collaboration with researchers. The database's interoperability, HIPAA, 21 CFR Part 11, FISMA, and international compliance standards allow us to control the collaborative environment while personalizing security policies and regulations. It also provides an ethical and secure collaborative environment while ensuring intellectual ownership, research integrity, and the ethics of scholarly collaboration and publication (Harris et al., 2019; RedCap, 2024).

## Results

### Environmental Scan

Of the 2,671 articles published by WRNMMC researchers from 2015 to 2020, 47 articles (systematic reviews and/or meta-analyses) met the criteria for analysis. The inclusion criteria were articles' publication type (systematic review, meta-analysis), affiliation (WRNMMC), and publication date (2015-2020). The collaboration with DML librarians resulted in four first-author SRs/meta-analyses, seven SR protocols registered with the SR registration database, and three SR presentations at professional conferences. The remaining published SRs were conducted with non-DML librarians.

SWOT analysis was used for the planning and management of the SR initiative. Strengths, weaknesses, opportunities, and threats were identified using the four-quadrant box. Then, a two-by-two matrix was used to project the possibility of designing an SR collaborative initiative by understanding the opportunities and threats in designing and implementing SR collaboration and data governance. Librarians' SR training, experience, and library resources offered the opportunity to design and promote SR collaboration and improve SR quality through co-authorship with researchers. Lack of research time and commitment towards conducting a SR is a weakness of SR collaborative initiative. Questions about researchers' knowledge of SR methodology and experience in conducting an SR were administered to researchers by the SR coordinator upon submission of the collaboration request. SWOT analysis showed that formal training and previous experience in conducting SRs were strengths for both librarians and clinicians. A lack of practical experience in conducting an SR by clinicians and librarians was identified as a weakness.

### **DML Collaborative Initiative**

The DML CSRC initiative was established in 2015 after conducting an environmental scan and assessment to design a potential scalable collaborative service valuable to clinical teams and residents (Table 1). The CSRC initiative was conceptualized by aligning the organizational and library mission toward excellence in scholarship and clinical care. The librarian team and librarian-collaborator models are SR collaboration constituencies engaged in collaborative teamwork. The librarian team, initially comprised of three librarians, has grown to four librarians who are certified in conducting SRs. DML librarians attended workshops and trainings for librarians on conducting an SR, providing an SR service, and collaborating with research teams. Presently, the DML collaboration team consists of an SR coordinator and a librarians' collaborative team. All librarians are certificated in conducting, providing, and collaborating with researchers on SRs (Rethlefsen et al., 2015; Foster, 2015).

The CSRC initiative is based upon the 3C model, where the SR coordinator fosters communication, coordination, and cooperation among the librarian team and librarian-collaborator. The collaborative initiative was piloted with two clinical teams resulting in the registration of SR protocols and the later publication of SRs. Initiative infrastructure and design were modernized in 2021 to a hybrid model (online and offline) for collaboration, education, and promotion to stakeholders and potential collaborators. The Ambassador model was implemented to enhance the quality and value of collaborative initiatives between the library and the medical community. The

SR collaboration model was implemented to initiate the SR service, design the collaboration infrastructure, and build a librarian collaboration team (Table 1).

**Table 1**

*Planning and Designing a Systematic Review Initiative in a Medical Library*

<b>Problem &amp; Solution</b>	<b>Vision &amp; Leader</b>	<b>Initialization &amp; Promotion</b>	<b>Collaborative Model &amp; Command</b>
Environmental Scan	Implementation		Model & Team
Mission, vision, strategy			
Constituencies			
Phase 1.			
<ul style="list-style-type: none"> <li>• Entrepreneurial ambition.</li> <li>• Potential initiative or services.</li> <li>• Potential library and command value.</li> <li>• Scalable market.</li> </ul>	<ul style="list-style-type: none"> <li>• Identifying initiative's mission and vision.</li> <li>• Conceptualizing the initiative.</li> <li>• Identifying initiative's strategy and milestones.</li> <li>• Designing initiative structure, processes, outcomes, and value.</li> <li>• Founding and leading.</li> </ul>	<ul style="list-style-type: none"> <li>• Commitment to initiative.</li> <li>• Team skills and competencies.</li> <li>• Piloting collaborative initiative.</li> </ul>	<ul style="list-style-type: none"> <li>• Collaborative 3C model.</li> <li>• Scalable infrastructure.</li> <li>• Data governance.</li> <li>• Librarian team building.</li> </ul>
Phase 2.			
<ul style="list-style-type: none"> <li>• Initial idea for service development and its potential value.</li> <li>• Idea ownership.</li> </ul>	<ul style="list-style-type: none"> <li>• Team building.</li> <li>• Team training.</li> </ul>	<ul style="list-style-type: none"> <li>• Initiative Design.</li> <li>• Identifying key performance indicators (KPIs).</li> <li>• Identifying potential collaborators.</li> <li>• Identifying potential team members.</li> <li>• Encouraging a commitment to collaboration.</li> </ul>	<ul style="list-style-type: none"> <li>• Collaborator-librarian team building.</li> </ul>
Phase 3.			
<ul style="list-style-type: none"> <li>• Initial idea for data governance.</li> <li>• Idea ownership.</li> </ul>	<ul style="list-style-type: none"> <li>• Designing a data governance model.</li> <li>• Identifying analytical databases and software.</li> <li>• Identifying security model.</li> <li>• Identifying analytical methods.</li> </ul>	<ul style="list-style-type: none"> <li>• Data collection.</li> <li>• Data quality.</li> <li>• Piloting data collection and analytical software.</li> <li>• Piloting data governance and security models.</li> <li>• Piloting analytics methods.</li> </ul>	<ul style="list-style-type: none"> <li>• Standardization of analytical model.</li> <li>• SOP standardization.</li> <li>• Scale the analytical model.</li> <li>• Safeguarding data.</li> </ul>

*Note:* A three-phase environmental scan concludes the problem evaluation and the collaborative systematic review initiative design process. The systematic review initiative's initialization and implementation process is characterized by three-phase steps and corresponding steps per phase. The design of collaborative infrastructure and data governance follows a three-step process, with corresponding steps' components based on collaborative models and command concepts.

The model for designing an initiative consists of four steps: identifying the problem and finding a solution (problem and solution), understanding the vision and goals, and leadership (vision & leadership), implementing and promoting initiative (initiation & promotion), and designing a collaborative model (collaborative model). Mission, vision, strategy, and constituencies are the foundation for developing an initiative. The environmental scan provides information for the design of the initiative, including the implementation strategy, collaboration model, and teams. Each of the four steps is further developed during the three phases to structure the initiative. Entrepreneur ambitions, command, scalable market, idea ownership, and performance indicators terms are defined in the study glossary (Hermans et al., 2015) (Figure 2).

## Figure 2

### *Glossary for Planning and Designing a Systematic Review Initiative in a Medical Library*

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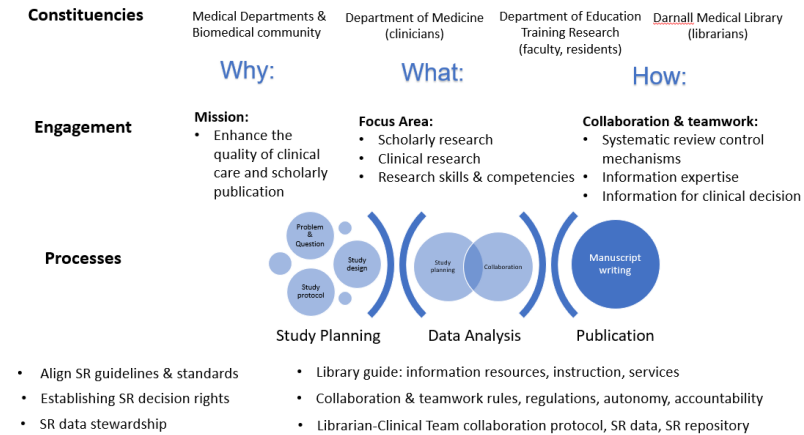
- Entrepreneur ambitions are defined as individualistic characteristics aimed at innovating, motivating, and implementing a novel initiative (Hermans et al., 2015).
  - Command – “Command is the authority which an individual in the military service lawfully exercises over subordinates by virtue of rank or assignment.” (Swain & Pierce, 2017)
  - Scalable market is defined as innovative collaboration that can sustain or potentially grow (Hill, 1990).
  - Idea ownership is defined as an idea expressed by an individual, who owns the expression of idea.
  - Performance Indicators are defined as a measure of initiative’s effectiveness useful for performance enhancement (Parmenter, 2015).
  - Decision rights are defined as interdisciplinary collaboration framework based on principles of research ethics and collaboration in conducting a systematic review.
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*Note:* Definition of foundational elements valuable for design and implementation of systematic review collaboration.

The SR data governance model was designed to coordinate SR collaboration processes, decision-making, data stewardship, and engagement with constituencies (Figures 1, 2, and 3).

Figure 3

Data Governance Model for Systematic Review Collaboration



*Note:* Engagement with constituencies entails assessing the mission and identifying a focus area for collaboration and teamwork. The collaborative process consists of the main areas (planning, data analysis, and publication) related to librarians' information expertise. Process management encompasses SR methodology, collaboration, and SR data stewardship based on principles of collaboration, ethics, and decision rights. Education, information guides, and support introduce the alignment of SR guidelines and standards.

SR data management Standard Operating Procedures (SOPs) were developed to manage the data through collaboration (Table 2).

**Table 2**

*SR Data Management SOPs*

Data Management Process Components	SOP Types
Identifying SR data	collaboration request, study protocol, study literature search strategy, literature yield, study flow chart diagram, study written methodology, submission manuscript, published articles
Managing SR process	systematic review coordination, librarian–clinical team coordination, librarian–clinician collaboration, education
SR data quality	flow chart diagram, literature search strategy
Collaboration issue resolution	mediation of collaborative teamwork by the coordinator
Stakeholder care and support	library resources, tools, training
Stakeholder communication	briefs, classes, presentation, flyer, outreach
Measuring, reporting, & monitoring value	research and author impact

*Note:* Components of data management processes correspond to the design of SOPs and SR data governance.

SOPs is a document designed to outline the steps of the SR process including the SR request, SR process, and SR collaboration process with librarians and researchers (e.g., SR request form, SR collaboration, SR consultation, librarian–research collaboration steps, SR project archiving) to ensure the consistency of tasks conducted by the librarian and researcher. SOP documents instruct the librarian and researcher about the scope of the SR process, required qualifications, steps, and conditions for SR conduction and collaboration. SOP was designed during the initiation of the SR collaborative initiative and revised by the librarian team. SR SOPs were implemented

upon submitting the SR collaboration request and used throughout the entire SR collaboration process after the research team agreed to librarian–researcher collaboration and co-authorship. SOPs were used to enhance the quality of SR collaboration with researchers through the SR process. SOPs for data identification, collection, quality, and curation processes were designed. Established collaboration processes were used to discover, transform, validate, and publish the data (metadata), then archive it.

Collaborative infrastructure was transformed, resulting in the implementation of a hybrid model (online and offline) to enhance SR collaboration during the pandemic outbreak in 2020. The 3C model was used to transform existing collaboration resources and processes into a hybrid model (online and offline) (Denise, 1999; Firdaus, 2018; Fuks et al., 2005; Gava et al., 2012). The transformation was conducted in two steps: (a) consolidating SR collaboration information and data, integrating, and standardizing critical components towards the SR collaboration data governance and analytics; (b) creating infrastructure to manage the collaborative process, simplifying access to information resources, applications, instructions, and securing data governance and collaborative environment. SR policies and SOPs for conducting and collaborating with clinicians were implemented. Software applications (MS Access and Teams), SOPs, processes, communication, and SR instruction were adapted for an on-and-offline environment (Table 2).

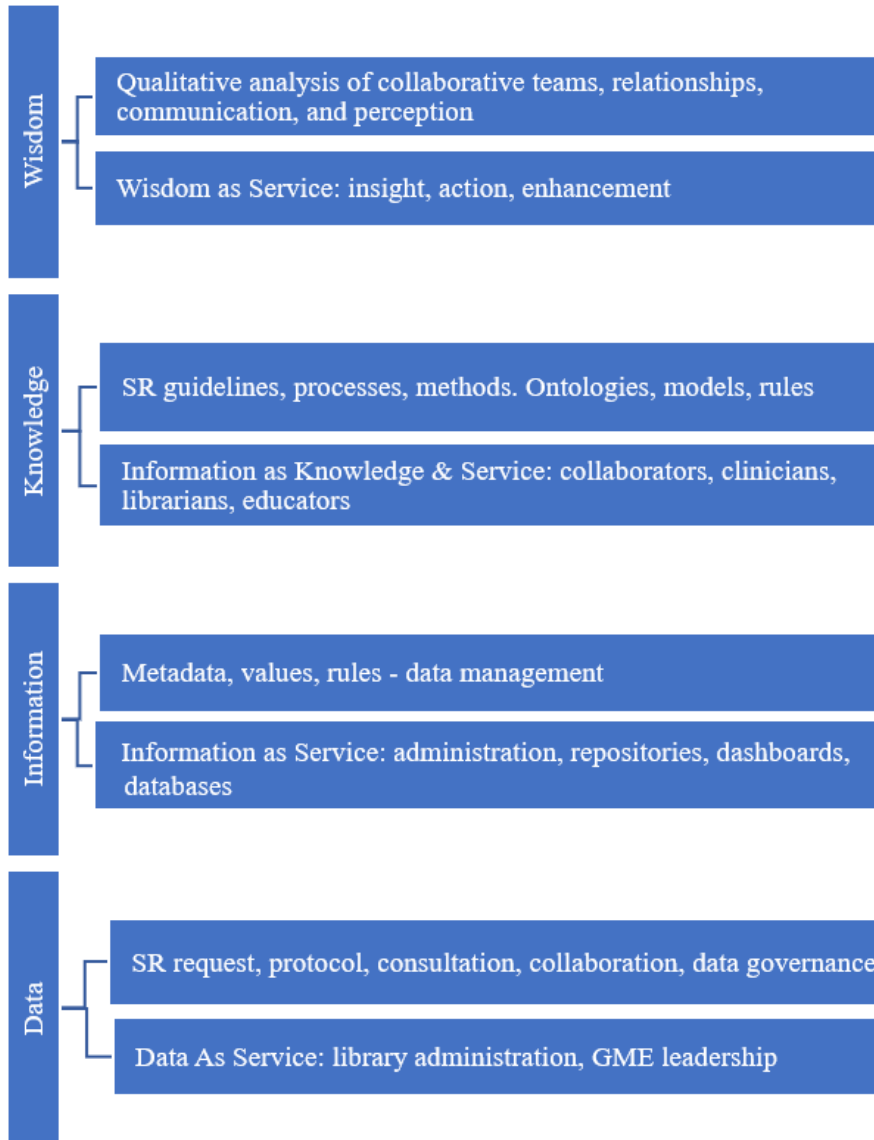
The decision rights serve as the foundation for collaborative initiatives among interdisciplinary healthcare professionals and librarians, with the aim of enhancing clinical care and healthcare decision making through research. The collaborative teams of subject specialty experts and librarians are instrumental in designing, conducting, and publishing SRs. Researchers' collaboration is based on decision rights principles of ethical research and team collaboration in conducting research, including SRs or meta-analyses. The collaboration and teamwork rules, regulations, autonomy, and accountability are characteristics of an effective SR collaborative initiative. SR collaboration and teamwork is based on research ethics and researchers' roles and responsibilities in designing, conducting, and publishing reviews. The commitment and responsibility of each team member contributes to collaboration effectiveness. Role ambiguity, disagreement, and team conflict are reduced by adapting principles of research ethics, authorship, and research responsibility. For example, military researchers are often rotated within their stations and might require prioritizing their military duties. In these instances, the effective communication rules adopted by the team reduce conflict and ensure the continuity of research collaboration. Another example is the diversity of SR knowledge, experience, and skills in conducting reviews

among researchers. Therefore, SR team collaboration effectiveness is characterized by the researcher's inclusivity through learning SR methodology and the researcher's learning aptitude and autonomy. In a military environment, researchers' roles and responsibilities in collaborative research are often tracked by the team leader and coordinated by collaborative librarians and the library's SR coordinator. Therefore, the decision rights are based on research ethics, team collaboration ethics, research autonomy, and authorship responsibility in conducting and publishing SR research.

The Data, Information, Knowledge, and Wisdom (DIKW) model was used to manage the SR data. The DIKW model transforms the SR collaboration process and SOPs (Figure 4). The DIKW pyramid offers an understanding of the value of SR collaboration through the interaction between the data, information, knowledge, and wisdom. In this case, the DIKW pyramid shows the value of SR collaboration to researchers and librarians. Also, DIKW measures library support through SR collaboration and education using data as a service, information as a service, information as a knowledge and service, and wisdom as a service inferred from SR collaboration data to assess the SR collaboration value (Figure 4).

Figure 4

*Systematic Review Collaboration Data, Information, Knowledge, and Wisdom (DKIW) Hierarchy*



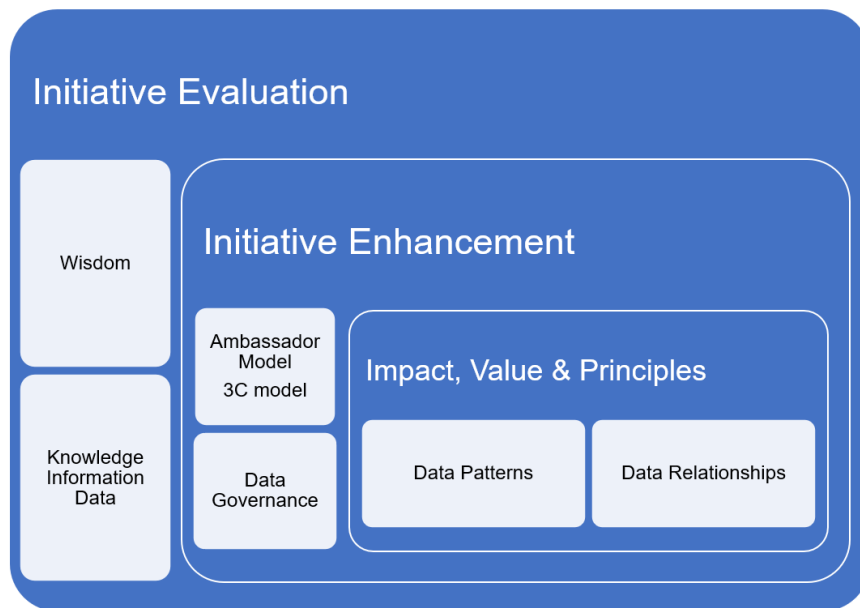
*Note:* The segments of DKIW represent an association of information services, and the evolution of data, information, and wisdom is instrumental in the process of assessing the value of the SR collaboration initiative.

The initiative analytics model was designed to assess the value of SR collaboration. Additionally, knowledge as a service and wisdom as a service models

were designed to explore the SR publication key and performance key indicators for educational and scholarly excellence as the outcome of the SR collaborative initiative.

Figure 5

*Initiative Analytics and Value of Collaborative Initiatives*



*Note:* The assessment of the SR initiative and collaborative partnerships identified key components as effective criteria for evaluation, enhancement, impact, and alignment with ethical values and principles.

## Education Infrastructure

An information solution service consisting of information resources, tools, services, instruction, and other helpful resources in conducting an SR was designed for collaborators. An SR initiative was implemented to instruct and consult on planning and conducting an SR, data management, data communication, data analysis, and article publication. Training (via lecture and consultations) and collaboration consultations were conducted to enhance the quality of SR collaborations. Lectures were offered to learners on planning an SR, SR research protocol design, research question development, and literature search to enhance learners' knowledge of SR methodology, formulating research questions, research study design, and critical appraisal of published literature. The SR library guide was designed to promote SR collaboration and scholarship. Librarian team training and collaboration meetings were

conducted twice per year. Flyers, pamphlets, library orientations, and presentations were implemented to promote the SR collaboration.

The SR coordinator led the team building and training, SR collaboration data governance, processes, rules of engagement, data and information management, analytics, education, and promotion of the collaboration to constituencies. Additionally, the SR coordinator oversees SR collaboration, conducts education outreach to potential collaborators, coordinates librarian-clinician collaboration, and implements librarians' training. Also, the SR collaboration coordination conducted by SR coordinator involves education and outreach to prospective collaborators, coordinating librarian-clinician collaboration, and librarian education.

Table 3

*Coordination of a Systematic Review Collaboration*

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**I. Collaborator Education and Outreach**

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SR Coordinator designs educational instruction on conducting an SR (lectures and presentations covering SR collaboration, research question development, protocol development, data management, and other topics).

- Teaches SR lectures to clinicians and residents
- Consults and instructs clinicians and residents on conducting an SR, including standards, guidelines, and processes
- Offers presentation to targeted clinical departments and GME programs
- Designs SR promotional material (flyers, Intranet posts, posts for department newsletters, and others)
- Promotes SR collaboration by scheduling a presentation to GME and DOM by arranging meetings with GME and DOM chiefs

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**II. Librarian-Clinician Collaboration Coordination**

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SR Coordinator conducts an initial meeting with clinician collaborator.

- Conducts initial meeting with a potential SR clinician collaborator
- Instructs on the SR collaboration process
- Consults on SR standards, guidelines, requirements, processes, publication
- Instructs on development of the SR study question, SR study protocol, SR publication
- Describes the collaboration process with librarians
- Mediates the SR clinician-librarian collaboration
- Solicits librarian interest for collaboration with collaborators
- Oversees the SR collaboration with libraries and librarians

SR Coordinator oversees the SR data governance and data management practices.

- Designs SR collaboration SOPs (SR request form, clinician-librarian collaboration SOPs, Librarian SR data management SOPs)
- Designs the structure of the SR archive (MS Access, Excel, and other tools)
- Acquires the SR collaboration data from librarians
- Enters all SR collaboration data into SR database
- Curates the SR collaboration database
- Revises the SOP and SR database and modernizes the SOP and SR database
- Analyzes SR collaboration data
- Presents the data to library administration

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### **III. Librarian Education**

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SR Coordinator designs and oversees SR training and education (quarterly meetings).

- Designs a SR SOPs, collaboration processes, and training
- Enhances librarians' collaborations through discussions and experience sharing
- Discussion of academic publications on SR process, collaboration, and SR in health care

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*Note. SR coordinator harmonizes SR education and outreach, collaboration between librarian-clinician collaboration, and SR training for librarians.*

## **Discussion**

Librarians attempting to set up an SR service in a military library environment are most likely to encounter challenges impeding the implementation of collaborative service in military medical centers, military non-medical libraries, and non-military medical centers. The diversity of library types and the number of library staff supporting the library mission influence the setting up of SR services in military and non-military library environments. Researchers described Army Medical Department Medical Library and Information Network (AMEDD MEDLI-NET) as a consortium of various library types (biomedical, research, technical, and academic libraries) to support military medical readiness (Potter et al., 2004). Brown-Syed (2008) argued that military librarians supporting military missions, personnel, and families overseas are often overlooked. Also, library role and operation magnitude vary among non-medical military libraries (e.g., U.S. Department of Defense Military Education Research and Library Network (MERLN)) (Sherwin, 2007). Therefore, library type (e.g., school, hospital), catalog (e.g., access and volume of information resources required to conduct

reviews), and the number of readily available and certified information professionals are contributing factors and differences to consider when setting up an SR initiative.

Academic medical, research, and hospital libraries differ in their collection content, specialty resources, and access to information resources required for conducting an SR. Similarly, the mission of the military medical library differs from hospital, school, and association libraries. For example, academic military medical libraries primarily support students and professors in education and research. In contrast, military medical libraries support healthcare providers (e.g., clinicians, healthcare professionals, nurses) by locating information resources and providing information services to improve healthcare. Also, access to information technology tools and applications used for an SR could be limited in a military medical environment. Another barrier to implementing a collaborative SR service in military medical center libraries is a potential lack of research time for clinical providers (Borah et al., 2017). Research studying the barriers to conducting SRs in military medical libraries is being conducted presently. Study findings will be published upon completion of the research.

Non-military medical libraries are research, academic, and health libraries in academic medical schools, hospitals, research centers, and private organizations. Their research priorities vary and depend on the organization's research and faculty expertise. Non-military medical libraries can access Open Access (OA) tools and information technology (IT) applications that streamline the SR process and collaboration between researchers and librarians. The military medical library has limited access to OA tools and IT applications. RedCap is among many tools often used in literature management and team communication, but implementation and maintenance of this application may have barriers in a military medical setting (Eastwood, 2022; Lyon et al., 2014). Access to various IT and collaboration tools contributes to streamlining information services and implementing innovative approaches enhances sustainable collaboration between librarians and researchers in conducting an SR in non-military libraries. Access to open source and commercial applications are barriers to setting up an SR service in military medical libraries. Thus, diversity among military, medical military, non-military, and non-military medical libraries contributes to their unique differences that must be considered when developing SR initiatives.

Starting an SR service in a military library setting can be challenging, necessitating an array of multi-disciplinary and interdisciplinary skills and competencies (Bullers et al., 2018; Hashemian et al., 2021; Rankin et al., 2008). Librarians need leadership skills and SR certification to design SR collaboration services in military

libraries. Although library missions, priorities, resources, and staff vary among medical libraries, this study found that the leadership, expertise, and inclusive environment improve librarians' chances of introducing collaborative concepts and designing, implementing, and scaling the collaborative initiative to conduct an SR in a military-medical setting. An SR project proposal describing the formation, validation, and growth stages of the collaborative initiative helped the SR coordinator communicate the mission and goals of the potential initiative to library administration and stakeholders (Table 1, Figures 1 and 3). This study found that the service design, collaboration model, management, and shared values are driving forces for successfully implementing and ensuring the sustainability of the SR initiative. The SR governance model and SOP and knowledge management adopted as a service model provide guidance for the librarian team when building a greater understanding of collaborative processes to reduce data management challenges, optimize collaborative processes and librarian workload, implement a data governance model, and infer emerging values of SR services (Figures 1, 3, 4, and 5). Also, the SR governance model assists in implementing best practices for effective collaboration, coordination, and cooperation between librarians and collaborating teams. Researchers noted that the SR service timeline, librarians' training and experience, and the number of conducted and completed reviews by librarians affect the scalability and management of collaborative projects (Leonelli, 2019). DML collaboration highlights the value of librarians' knowledge and expertise shared with the clinical team (Epstein, 2014). This study also found that action research was instrumental in implementing the SR collaboration service, addressing information problems, strengthening teamwork, and contributing to scientific knowledge through a collaborative initiative (Ackoff, 1989).

The study found that ambassadorial leadership tends to involve the librarian team in expanding library services by initiating collaboration between the library and clinical teams. The librarians' information broker skills and ambassadorial leadership model blend the unique qualities of an SR leader. The expansion of collaborative services in a military environment is sustained by implementing a virtual model (Ryan & Reilly, 2007). The virtual model relies on IT tools to enable collaboration and communication among the dispersed researchers conducting an SR. The online environment consists of IT communication platforms and software (e.g., Intranet) for SR collaboration and communication. It also integrates the IT tools and data governance framework for data stewardship and security. The SR collaboration virtual model is especially effective in the military environment when collaborators are scattered throughout various geographical locations and medical libraries. This research recommends a centralization of SR collaborative initiative to enhance scholarship across

military medical centers. The benefits of centralization in a military setting are highly qualified information experts, shared information resources, and high-quality publications. The centralized collaborative initiative compensates for the lack of professional expertise, information resources, and training in military medical libraries, allowing coordination and leading SR collaboration of dispersed and diverse military medical teams. We speculate that through shared leadership, internal-and-external boundary spanning, advocacy (Rankin et al., 2008), and virtual collaborative systematic services, we can expand and build trusting collaborations, networks, and a community of scholars in a military environment. Shared leadership and management are crucial elements for cooperative service in the organizational environment established between the library and collaborator teams (Coughlan & Coughlan, 2002). They effectively create a collaborative environment and enhance communication between collaborating teams, librarian teams, and library resources.

Moreover, this study finds that the ambassadorial model bridges the gap between the library and military communities through information resources and librarians' expertise working toward a mutual goal of publishing a quality evidence-based synthesis (SR or meta-analysis). At the same time, we found that the transformational leadership model is adequate for team building, fostering education, and collaboration. The ambassadorial-model-based approach helps to communicate the value of the library, librarians, and SR service to the library and to GME leadership. Moreover, this study noted that transformational and ambassadorial models enhanced communication and collaboration among the library, GME leadership, clinician, and librarian teams. The librarian-collaborator model enhances the quality of SRs and acceptance of manuscripts for publication. The ambassadorial model adapted in our practice enhanced the SR service by bridging the gap between the library and GME leadership. Co-authorship and collaboration in conducting an SR allow library administration and collaborative clinical teams to use librarians' information expertise and library resources to enhance clinical care and publish review articles (Luca & Ulyannikova, 2020; Ludeman et al., 2015; McKeown & Ross-White, 2019). This study found that coordination of the SR collaboration helps manage the collaborator's expectation of completion and the subsequent publication of an SR. Also, the coordination of SRs and SR collaborations strengthens the organizational environment in the library and the military center toward the shared mission of evidence-based knowledge practice and publication. Thus, the transformational and ambassadorial models adapted for the CSRC initiative in this study show promising attributes for SR initiative development in military-medical centers.

Librarian–clinician co-authorship enhances clinical care and evidence-based knowledge (Spencer & Eldredge, 2018). The additional value-added element of collaboration often dismissed is the educational value of instruction while collaborating and consulting on conducting an SR. Although the mean (m) time for conducting an SR by a librarian is 30 hours (Ossom Williamson, 2019), the librarian–collaborator’s SR collaboration time with junior scientists and residents often increases due to necessary guidance on SR methodology and SR process. This study confirms the previous finding of the educational value of information literacy and experiential learning for junior clinicians and residents (Perrier et al., 2014). For example, as a service model (Figure 4), information as knowledge management highlights the librarian's contribution to information literacy training and skills development for novice collaborators. Research lectures and consultation on conducting an SR enhanced residents' and clinicians' information literacy skills in identifying and selecting information resources, managing citations, and critically appraising published literature resulting in the authorship of published SR articles. During the SR consultation and collaboration, librarians are involved in information mentoring, information literacy training, evidence-based medicine, research process instruction, and feedback to enhance the research and clinical skills required for conducting an SR.

Moreover, the SR collaboration serves as an example of experiential learning paving the way for enhancing the information literacy and scholar-practitioner model for residents and junior clinicians. Another value of collaboration is the rank of authorship (e.g., first author) that contributes to the author's research impact. Finally, a librarian–clinician collaborator team strengthens the organizational environment of a shared mission to support excellence in clinical practice and GME through collaboration, information literacy instruction, and co-authorship. Therefore, the library and collaborative team strengthen an organizational environment of mutual inclusion and a shared mission for excellence in education.

A promotional, educational, and outreach program was designed to promote the value of an SR service and enhance collaboration with clinical teams. Although the SR collaboration service consisted of four available qualified librarians to collaborate with clinical teams, collaborations were conducted with non-DML librarians. The professional network among military clinicians resulted in collaboration with peers from other military and civilian medical centers. SR collaboration resulted in the publication of three SRs. The collaborative peer network likely encourages undertaking additional SRs because of the available expertise, skills, and specialties. Understanding the stakeholders' relationships, networks, and competing priorities is crucial to dialog between librarians and stakeholders (Koschmann & Kopczynski, 2017).

Interdisciplinary collaboration is based on interdependence, newly created professional activities, flexibility, collective ownership of goals, and reflection on the process (Bronstein, 2003). Researchers state that collaboration is realizable through the library and medical center administration and the biomedical community (Seaburn et al., 1996). The SR collaborative initiative enhances library teamwork and supports scholarship at the medical center. For example, the SR consultations, collaborations, and lectures reflect the value of experiential learning when conducting an SR and collaborating with librarians. By analyzing the processes of collaboration between librarians and clinical teams, the evidential result is attaining the wisdom, knowledge, skills, and competencies beyond the understanding of specialty literature. SR collaboration emphasizes scholar-practitioner activities toward scholarly publication, collegial communication, and interdisciplinary collaboration. The success of the collaboration on SRs is associated with the key performance indicators of scholarly activities, experiential learning (e.g., critical appraisal, problem-solving, analysis and synthesis, and others), and the scholar-practitioner approach (e.g., research skills, author impact, and others) for education and practice. Additionally, an engagement between libraries and stakeholders highlights the balance of power and opportunity to improve the quality of the SR (Ludeman et al., 2015; Spencer & Eldredge, 2018). Thus, the interdisciplinary collaboration and relationships of stakeholders are interdependent, especially with the pace of the modernized workforce and information technologies in a contemporary information environment that challenges them to rethink their communication and cooperation (Deetz, 1992; Luca & Ulyannikova, 2020; Ryan & Reilly, 2007).

The SR governance model, process management, SOPs, and analytics are recommended for library administration to infer the value of collaborative SR services. The DIKW hierarchy (Figures 3 and 4) adapted in the SR collaboration process and SOP to gather the data for analysis to scale up the SR service and identify collaboration performance key indicators. Presently, DIKW and governance models are being piloted to optimize data stewardship. The limitation of the study is the relatively small sample size to generalize the scalability of data governance and knowledge management as service models for value analytics of library-led SR collaborations. Data governance (phase 3) is piloted to optimize the process, standardization, and security. Another limitation is the integration of information technologies in collaborative processes. The initial study aimed to modernize SR data governance by using open-source technologies for collaboration, communication, and management of the SR service. However, this study used only IT approved by the Defense Information Systems Administration (DISA) to build the SR infrastructure. Also, the scope of SRs, the volume

of collaborative requests, the researcher's knowledge of SR methodology, and the librarian workforce could potentially hinder the implementation of the collaborative initiative in a small library. Future research would identify SR performance key indicators, collaboration metrics, data governance scale, and dynamics of SR collaboration.

## Conclusion

Transformational and ambassadorial leadership models help SR coordinators develop SR collaboration initiatives with clinical teams in the military-medical center. The ambassadorial leadership model creates the environment for collaboration and cooperation by bridging the differences in knowledge of SR methodology, processes, and information literacy by creating sensible collaboration with clinical teams while remaining sensitive to knowledge and skills gaps and providing training to build missing skills. Librarians offer interdisciplinary knowledge, information expertise, information management, and leadership skills to clinical teams when collaborating on conducting an SR. During the SR collaboration with the clinical team, the leader-follower model empowers librarians to address the mutual goals of excellence in scholarship, information literacy, and quality of clinical care. Educational resources, training, and consultation help novice clinicians plan and manage SR processes effectively.

SR SOPs, management tools, and analytical software effectively manage the collaboration process, analysis of collaboration, and collaborative data governance. Furthermore, implementing an SR data governance and analytics model supports the mission, encourages collaborative engagement, and enhances collaboration by deploying models and processes.

Collaboration with librarians contributes to the quality of the SR collaboration with clinical teams, enhances the quality of SR publications, and increases the recognition of the library's value in the military-medical center. In addition, SR collaboration between the librarian and a clinical team strengthens the organization's environment and mutual inclusion toward shared goals of excellence in research and clinical practice through collaboration and education.

This study fills a gap in the research on SR services and librarian collaboration by offering an SR data governance framework to implement and scale collaboration in medical libraries and military environments on conducting SR. There was no prior research on the management and scale of SR collaborative initiatives in military medical libraries. This research study fills a gap in the literature on libraries' SR services by

designing: a) an architect plan to design SR collaborative initiatives in the library (Table 1); b) an SR infrastructure and collaboration model and policy for SR collaboration, governance, and outreach (Figure 1); c) an SR data governance model for collaborative initiatives in library and military environments (Figure 3), d) an analytics model to assess the value of collaborative initiative (Figure 5); e) an information model for assessment of the value of library and librarians in the collaborative initiative. Thus, implementation of an SR architect plan, infrastructure, and data governance framework has the capacity not only to govern SR collaboration but also to scale collaborative initiatives in the library, highlighting the value of libraries and librarians to improve GME and research collaboration.

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