

Executive Summary and Recommendations

Shared Research Resources (SRRs) enable efficient and widespread access to state-of-the-art technologies and scientific expertise that have accelerated research for over 40 years. In 2017, the Federation of American Societies of Experimental Biology (FASEB) published the Maximizing Shared Research Resources Report,¹ which demonstrated the value SRRs bring to the research community and recommended strategies for providing access to consistent, cutting-edge science to investigators. To build on this report and assist shared resource providers in overcoming systemic challenges related to SRRs, FASEB SRR Task Force has identified five key areas that are fundamental to the recognition and sustainability of SRRs:

1. Improve institutional stewardship of SRRs
2. Expand access to SRRs
3. Grow a more diverse, equitable, and inclusive SRR workforce
4. Increase and sustain investments in SRRs
5. Prioritize sustainability in SRR decision-making

The Task Force's final report addresses these five objectives and outlines several recommendations in the following four sections:

- Regional, Institutional, and National Strategies (*Section I*)
- Role of Stakeholders and Funding Agencies (*Section II*)
- Institutional Responsibilities and Strategies for Advancement of SRRs (*Section III*)
- Strategies for SRRs (*Section IV*)

These sections consist of the following common themes:

- Sustained financial investments enable researchers to utilize the most up-to-date technologies and scientific resources
- Efficient planning is necessary for institutions to demonstrate conscientious stewardship of federal, philanthropic, and institutional investments
- Institutional policies naturally focus on economic sustainability, but should considering addressing all three components of sustainability²—environmental, social, as well as economic—to help ensure rigorous and equitable resource collaboration across departments and with other institutions, especially smaller and under-represented institutions

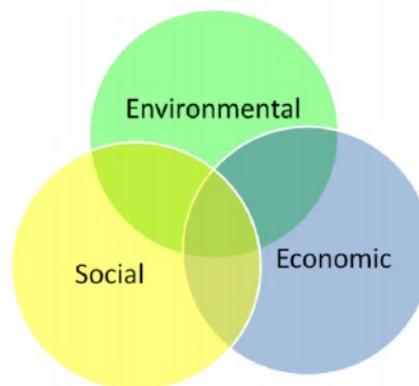


Figure 1

¹ See [Maximizing Shared Research Resources Recommendations and Survey Findings](#). FASEB. 2017.

² See [The Three Pillars of Sustainability](#). Environmental Protection Agency. 2015.

Section I: Regional, Institutional, and National Strategies

Regional, institutional, and national entities serve as the foundation by which SRRs operate to support the scientific enterprise. The following recommendations outline strategies to promote partnerships both within institutions and across institutional boundaries at the regional and national levels.

Regional and Institutional Strategies

1. Develop regional capabilities in Shared Research Resources (SRRs) to advance the strategic priorities of research institutions that meet the growing need for communities to benefit directly from science and interdisciplinary research efforts, including:
 - regional training opportunities
 - internships that leverage and enhance innovative public/private/industry partnerships
 - professional recognition and opportunities for SRR scientists
 - equitable access to SRRs for early and mid-career scientists, historically underfunded, under-represented minority researchers, non-research universities, and community colleges
2. Develop incentives to improve efficiency and sustainability of SRRs, including funding for infrastructure development, enhanced resource and data sharing, reduced duplication of SRRs, modernized equipment sharing and reuse, and technology training programs

National Strategies:

1. Provide funding mechanisms that address needs of research institutions across a range of capabilities and technical sophistication to ensure equitable access to a standard level of research infrastructure. These may include funds for basic and high-end equipment, faculty and staff development, and infrastructure support.
2. Prioritize principles of research rigor, reproducibility, and transparency for all funded programs, leveraging the interrelationship with SRR sustainability.
3. Raise awareness and leverage existing policies that can support programmatic intentions. Examples include the National Science Foundation Proposal & Award Policies & Procedures Guide,³ the National Institutes of Health Data Management and Sharing Policy,⁴ and policies in the Code of Federal Regulations (CFRs) that foster enhanced cost-effectiveness of SRRs by encouraging resource sharing and reduced duplicative purchasing where possible.⁵

³ National Science Foundation. [Proposal and Award Policies and Procedures Guide](#). 2020.

⁴ National Institutes of Health. [Final Policy for Data Management and Sharing](#). NOT-OD-21-013. 2020.

⁵ [2 CFR § 200.318](#) (d), [2 CFR § 200.318](#) (f), [2 CFR § 200.313](#) (c2)

Section II: Role of Stakeholders and Funding Agencies

Central to the success of regional and national partnerships is the role of stakeholders and funding agencies. The following recommendations emphasize their contribution to the future success of SRRs.

Stakeholders

Stakeholders such as institutions, professional societies, non-profit organizations, and private entities hold important roles in facilitating streamlined processes, revised rules, regulations, and approaches that enable regional and national sharing of resources, such as:

- managing indirect costs across regional and national networks
- more effective contracting and memoranda of understanding (MOUs) models to support such networks and enable team science
- removing barriers for sharing resources between intramural and extramural agencies.

Funding Agencies

Funding agencies are uniquely positioned to lead by example by incentivizing resource sharing, collaborative team science, and improved responsible conduct of research. The following recommendations do not require any changes to existing rules or regulations for federal funding but can be successfully implemented by revisions to existing or development of new funding opportunities and programs. Therefore, federal agencies should aim to:

- Sustain investments for research infrastructure, expanding mechanisms such as the National Institutes of Health (NIH) G20 and C06 grant mechanisms⁶ and the National Science Foundation's (NSF) Major Research Instrumentation Program⁷ to drive innovation.
- Ensure funding programs incorporate use of SRRs and expand opportunities for funding SRR scientists, basic equipment, shared multi-component instrumentation systems, service contracts, and instrumentational upgrades.
- Require applicants to provide institutional and/or regional inventories of equipment and shared resources as part of justification for funding of proposed new technology.
- Provide targeted funding for data tracking, enabling institutions to streamline mechanisms for updating and monitoring publications, grants, and collaborations that utilized SRR facilities.
- Integrate incentives for trainee workforce to educate future scientists about SRR career opportunities, including at the undergraduate, graduate, post-doctoral and community college levels. For example:
 - Adapt the R50 mechanism both across NIH Institutes and Centers and within NSF Directorates to train and financially support SRR scientists
 - Expand opportunities for trainees on F-, K-, and T grants to facilitate exposure to SRR technologies and resources
 - Provide internship opportunities that allows trainees to gain experience in scientific rigor and reproducibility in SRR laboratories

⁶ National Institutes of Health. [C06](#) and [G20](#) Activity Codes. NIH Central Resource for Grants and Funding Information. 2021.

⁷ National Science Foundation. [Major Research Instrumentation Program](#). Office of Integrative Activities. 2021.

Section III: Institutional Responsibilities and Strategies for Advancement of Shared Research Resources

Most academic institutions have a **strategic plan** that describes its mission and priorities and guides the allocation of existing resources and new investments. Institutions should incorporate and align Shared Research Resources (SRRs) into strategic plans whenever possible. This reflects the essential contributions of SRRs to build and maintain mission-critical research infrastructure and maximize efficient use of research dollars. To strengthen the return on investment and impact of SRRs, a central office should be established, led by a senior **SRR administrator**, and with guidance from an **SRR advisory committee**. It is imperative that institutions recognize the unique role of SRR staff and directors, including their critical expertise and contributions to the scientific enterprise. Comprehensive policies to reward these contributions and sustained support for their technical and professional development is necessary for continued scientific progress. Recognizing that SRRs operate at the unique intersection of science and business, establishing strong administrative models and good business practices will also ensure SRR success and sustainability.

Key Performance Indicators and Recommendations

The following recommendations highlight mechanisms to maximize the return on investment and impact of SRRs, separated into key institutional components:

1. *Institutional Oversight of SRRs*

FASEB recommends creating an institution-wide SRR Advisory Committee (SRAC) to enable SRRs compliance, address cultural differences in management of SRRs across departments and schools, and promote SRR awareness, institution-wide policies, and SRR best practices. More specifically:

- The SRAC members should consist of a mix of individuals knowledgeable about scientific research processes, federal guidelines, cost accounting standards, and the broad range of research endeavors across the institution, including its strategic plan and existing SRR capabilities and expertise.
- The SRAC should provide an effective mechanism for highlighting the contributions and benefits of SRRs toward achieving institutional goals. SRAC members could partner with SRRs to communicate these values across the institution.
- The SRAC should examine the flow of institutional funds and identify opportunities to connect SRRs with internal and external resources that align with the culture and capabilities of SRRs.

2. *Strategic Planning and Investment in SRRs*

To ensure a robust research enterprise, institutions should formulate a strategic plan that encompasses multiple interrelated domains: programmatic; faculty recruitment and retention; professional staff development; education and training; infrastructure, and disaster resiliency. Furthermore, SRR development should be considered as a cross-cutting capability that enables all domains of an institutional strategic plan. The strategic plan should include:

- Recognition and plans to leverage the integral value of SRRs to advance and sustain the productivity of an institutional research enterprise, with an emphasis on interdisciplinary SRRs to support collaborative and cross-cutting research

- Commitment to sustain financial investment in SRR technology, personnel, facilities, and administrative support
- Funding sources—mechanisms and models—identified and programmed where possible to support institutional strategic priorities for SRR development and sustainability
- Comprehensive alignment with the institutional strategic plan, with specific emphasis on collaborative engagement of key stakeholders in establishing expectations for SRR mission and metrics for business and scientific success (*see ecosystem, figure 2*)
- Disaster resiliency plans that enable SRRs and staff to prepare for, mitigate, respond to, and recover from challenges or emergencies that pose risk to the security and sustainability of SRRs
- A “Value Statement” that sets expectations and highlights the contributions of SRRs on achieving institutional goals, particularly emphasizing the faculty and staff
- Regular evaluation of SRRs to assure continued relevance to the research enterprise with detailed plans to sunset programs where necessary

3. *Management and Evaluation of SRRs*

For effective management and evaluation of SRRs, institutions should establish best practices and laboratory standards that incorporate:

- a centralized billing and reporting system
- data management resources and plan
- an independent or equitable space allocation plan, including contiguous space to co-locate cores where feasible
- strategic communication to foster a culture of sharing resources
- mechanisms for tracking impact and metrics for success
- requirements for SRR business plans⁸
- internal and external evaluation criteria of SRRs
- professional development of SRR personnel

In addition to day-to-day management, the roles, responsibilities, and interactions of SRR administration should be well-defined for both the institutional and core facility level to ensure efficient use of time and resources.

4. *Faculty and Staff Professional Development*

As critical components to SRR effectiveness, institutional leaders should recognize and highlight the unique contributions of SRR directors and staff by considering and actively including them throughout strategic planning deliberations.

Furthermore, SRRs must not overlook diversity, equity, and inclusion (DEI) as the foundation for strengthening the SRR talent pool. DEI in the SRR research environment refers to inclusivity of a broad range of individuals and identities, including but not limited to: race, gender, age, career stage, sexual orientation, disability, ethnicity, belief system, and veteran status. For more information about DEI and its role in ensuring a diverse workforce, please refer to FASEB’s resources.⁹

⁸ The Association of Biomolecular Resource Facilities (ABRF) frequently offers business courses. Visit ABRF’s recorded [online workshops](#) and Northwestern’s Kellogg School of Management [resources](#) for more information.

⁹ [Diversity, Equity, and Inclusion](#). FASEB. 2019.

The following recommendations will help recruit and retain the highest quality SRR personnel that provide essential contributions to academic research:

SRR Leadership Development

SRR Leaders possess a unique skillset, providing scientific, technical, and business expertise to the research enterprise. The following recommendations outline ways institutions can elevate SRR directors and faculty and staff, and further cultivate a personnel-focused SRR environment:

- Recognize the importance of SRR directors and staff and sustain support for their technical and professional development
- Provide a specialized career path for core directors and staff that considers both their scientific and management responsibilities. Career opportunities could include a family of job classification specific to SRRs and a non-tenure track path for SRR faculty
- Develop mentoring programs and partnerships with professional associations (e.g., ABRF, ISAC, etc.) to broaden training opportunities for SRR faculty and staff.
- Implement protected-time policies, establish expectations, and allocate resources that specifically support tenured and/or non-tenured faculty with dual responsibilities, particularly those with independent research and SRR facility management duties. Prioritizing these talents is critical to faculty recruitment, retention, and awarding of tenure.

5. *Metrics to Support SRR Professional Development.*

Key metrics are often the clearest mechanisms to demonstrate the effectiveness of SRR staff and their impact on supporting institutional research. The following recommendations delineate key metrics that can bolster support for SRR professional development:

- Develop mechanisms to track and maintain record of:
 - The total number of SRR-supported publications
 - Total number investigators who used SRR facilities
 - Total value of the grants used to fund SRR services (e.g., annual direct and indirect costs)
 - Total number of Shared Instrument Grants funded or other grants in which SRR directors are listed as Co-investigators or have effort paid directly from grants.
 - Includes other mechanisms such as loan leases, awards, philanthropy, etc.
- Develop acknowledgement policies to recognize SRR staff scientist contributions in publications, emphasizing the technical and scientific benefits gained through utilization of SRR facilities.
- Conduct community research and benchmarking studies to evaluate the possibility of developing an SRR-specific credentialing program that standardizes expectations and provides professional recognition.

6. *Connect SRR Advancement to Institutional Goals for Research Development and Sustainability*

Institutions are distinctly positioned to shift the institutional research culture toward SRR utilization, thus avoiding equipment duplication and ultimately improving efficiency in the utilization of laboratory space, utilities, and infrastructure. These benefits are particularly important given the considerable capital expense required to construct new laboratory space and the large energy consumption of laboratories due to ventilation requirements.

Therefore, the following recommendations outline ways to coalesce SRR priorities with institutional goals and maximize investments for sustainable research advancements:

- Coordinate with the SRR Advisory Committee and senior leadership to integrate SRRs in the institution's strategic plan
- Prioritize and incorporate SRR needs into the faculty recruitment process, including decisions on equipment purchase, research space allocation, renovation, and new construction.

7. Inter-Institutional, Regional, and National Partnership Opportunities

Formal collaborations between institutions can increase research capabilities of all scientists regardless of an institution's size and level of funding, further narrowing inequity gaps. The following recommendations can help SRRs attain this goal:

- Participate in regional and national resource sharing where feasible, ensuring activities align with institutional strategic plan.
- Refer to and adapt existing, successful models for managing funding flow and related F&A costs. State systems in Georgia, Texas, and the Chicago Biomedical Consortium are excellent examples.
- Partner with funding agencies to enhance transparency about ongoing institutional projects, inter-institutional collaborations, and technology developments to address gaps in communication, accountability, and scientific needs of SRRs.

Section IV: Strategies for SRRs

Shared Research Resources, SRR, (also known as core facilities, centers, divisions, laboratories, etc.) do not ascribe to a “one size fits all” model. Even within the same department, **no two facilities are identical**. Prescribing specific solutions for maintaining a successful SRR is difficult due to the heterogeneous nature of SRR management, operational models, and reporting structures. It has been shown that SRR centralization serves as a proven model to enhance research accessibility, productivity, and accountability.¹⁰

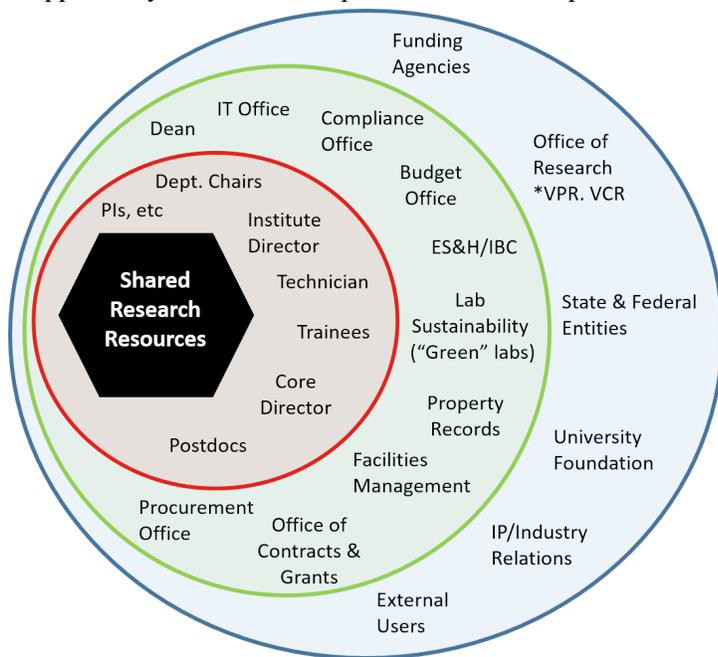
While facilities may vary across departments or regions, SRR stakeholders remain largely similar across institution and discipline. Identifying metrics significant to each stakeholder in the ecosystem creates an opportunity for SRRs to map out areas of overlap within the institution’s research infrastructure. The FASEB

SRR Task Force recommends focusing on the interrelationships between key stakeholders embedded in the SRR ecosystem as a means to develop strategies and best practices.

SRR Ecosystem

SRRs are part of an institution’s research ecosystem whose components need to work together through the exchange of information, financial needs, and human capital.

Figure 2: The diagram to the left illustrates the interrelationships of key stakeholders in the SRR ecosystem. This core-centric model depicts three rings that represent three broad but interconnected categories of stakeholders.



Core-Centric Model: Three Stakeholder Categories

Red	Green	Blue
<p>The innermost ring encompasses stakeholders who interact with the SRR on a frequent basis. Stakeholders in this layer are intimately involved in the day-to-day functions of the SRR and thus are most closely associated with the SRR facility.</p>	<p>The middle ring is the integrative/influencer layer. As the rings move further away from the core, the relationships become increasingly more abstract and direct interactions tend to be much less frequent. Key stakeholders in this layer provide a scaffold for the research infrastructure, enabling administrative functions that sustain vibrant research. It is therefore imperative that SRRs pay attention and cultivate a strong bi-directional relationship with these stakeholders.</p>	<p>The outermost ring, the strategic layer presents the most challenges for SRR given the infrequent communication level. It is important to pay attention to the goals and objectives of the institution’s strategic plans, and SRRs should identify key metrics that align with the institution’s strategic plans.</p>

¹⁰ Chang MC, Birken S, Grieder F, Anderson J (2015). [U.S. National Institutes of Health Core Consolidation—Investing in Greater Efficiency](#). *J Biol Mol Tech*. 2015 Apr; 26(1): 1-3.

Metrics

Institutions should recognize and commemorate the key contributions of SRRs. When SRR facilities succeed, institutions also succeed. SRRs are fast becoming a necessary and strategic piece of the research infrastructure and as such, deserve strategic funding considerations. In drafting their strategic plan, institutions should set clear expectations and guidelines for SRRs on which to measure the return on investment for both SRR facilities and institutions writ large. Metrics development is fundamental to this process.

The benefits of SRRs—direct and indirect—should be accounted for by collecting information on a broad set of key metrics detailed in the figure below. The FASEB SRR Task Force recommends adapting this list of metrics to best fit your SRR division and institutional needs. For additional information on SRR metrics, please also refer to the 2016 *Journal of Biomolecular Techniques* publication, “Metrics for Success: Strategies for Enabling Core Facility Performance and Assessing Outcomes.”¹¹

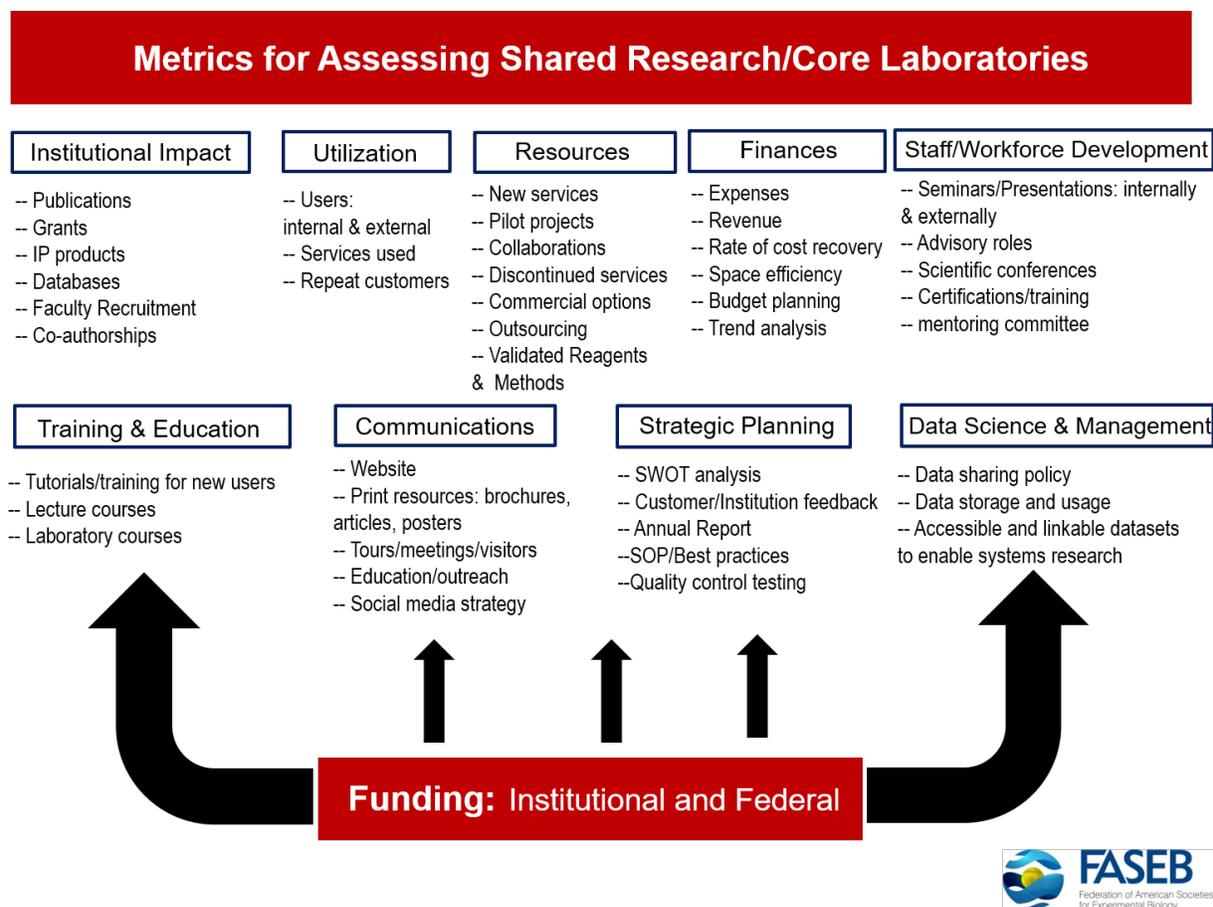


Figure 3

¹¹ Turpen PB, Hockberger PE, Meyn SM, Nicklin C, Tabarini D, Auger J (2016). [Metrics for Success: Strategies for Enabling Core Facility Performance and Assessing Outcomes](#). *J Biomol Tech*. 2016 Apr; 27(1): 25–39.

Strategies for SRRs – Recommendations:

The following recommendations will support SRR facilities in their goal to prioritize recognition of SRR value and contribution:

- Focus on the interrelationships between key stakeholders within the SRR ecosystem as a means to develop strategies and best practices (*Figure 2*).
- Designate the Shared Resources Advisory Committee to highlight the contributions and benefits of SRRs toward achieving institutional goals, partnering with independent SRR facilities to communicate these values across the institution.
- Develop metrics that incorporate feedback from users and stakeholders (*Figure 3*).
- Leverage available tools and incorporate into managements operations where feasible to enable SRR facility reporting on output and impact of SRRs.
- In addition to collecting data, regularly analyze metric trends of the SRR facility and incorporate results when revising or developing new strategic plans.

FASEB Summary Recommendations

Regional, Institutional, and National Strategies					
Recommendation	Report Page #	Action Required By:			
		Stakeholders	Institutions	Small Institutions	Funding Agencies
Develop regional capabilities in SRRs to advance the strategic priorities of research institutions and meet the growing need for communities to benefit directly from science and interdisciplinary research efforts	2	✓	✓	✓	✓
Develop incentives to improve efficiency and sustainability of SRRs	2		✓	✓	✓
Provide funding mechanisms that address needs of research institutions across a range of capabilities and technical sophistication	2		✓	✓	✓
Prioritize principles of research rigor, reproducibility, and transparency for all funded programs	2	✓	✓	✓	
Leverage, connect, and support existing databases to improve useability.	2	✓	✓	✓	
Raise awareness of existing policies that can support programmatic intentions	2	✓	✓	✓	

Role of Stakeholders and Funding Agencies

Recommendation	Report Page #	Action Required By:			
		Stakeholders	Institutions	Small Institutions	Funding Agencies
Sustain investments for research infrastructure, expanding mechanisms such as the NIH G20 and C06 grant mechanisms and NSF Major Research Instrumentation Program to drive innovation.	3				✓
Ensure funding programs incorporate use of SRRs and expand opportunities for funding SRR scientists, basic equipment, and shared multi-component instrumentation systems.	3		✓	✓	✓
Require applicants to provide institutional and/or regional inventories of equipment and shared resources as part of justification for funding of proposed new technology.	3		✓	✓	✓
Provide targeted funding for data tracking, enabling institutions to streamline mechanisms for updating and monitoring publications, grants, and collaborations that utilized SRR facilities.	3	✓	✓	✓	✓
Integrate incentives for trainee workforce to educate future scientists about SRR career opportunities, including at the undergraduate, graduate, post-doctoral and community college levels.	3	✓	✓	✓	✓
Adapt the R50 mechanism both across NIH Institutes and Centers and within NSF Directorates to train and financially support SRR scientists	3				✓
Expand opportunities for trainees on F-, K-, and T grants to facilitate exposure to SRR technologies and resources	3				✓
Provide internship opportunities that allows trainees to gain experience in scientific rigor and reproducibility in SRR laboratories	3	✓	✓	✓	✓

Institutional Responsibilities and Strategies for Advancement of SRRs

Recommendation	Report Page #	Action Required By:			
		Stakeholders	Institutions	Small Institutions	Funding Agencies
Create an institution-wide SRR Advisory Committee (SRAC) to enable SRR compliance, address cultural differences in management of SRRs across departments and schools, and to promote SRR awareness	4		✓	✓	
Formulate a strategic plan that encompasses multiple interrelated domains	4		✓	✓	
Establish best practices and laboratory standards that incorporate a broad range of reporting mechanisms and SRR professional development	5	✓	✓	✓	
Recognize unique contributions made by SRR by actively considering and including directors, faculty, and staff in deliberations	5-6		✓	✓	
Provide a specialized career path for core directors that considers both their scientific and management responsibilities	6		✓	✓	
Develop mentoring programs and partnerships with professional societies	6	✓	✓	✓	✓
Implement protected-time policies, establish expectations, and allocate resources that specifically support non-tenured faculty with dual responsibilities	6		✓	✓	✓
Develop mechanisms to track and maintain record of grants, publications, collaborations, etc.	6	✓	✓	✓	
Develop acknowledgement policies to recognize SRR staff scientist contributions in publications, emphasizing the technical and scientific benefits gained through utilization of SRR facilities	6	✓	✓	✓	
Conduct community research and benchmarking studies to evaluate the possibility of developing an SRR-specific credentialing program that standardizes expectations	6	✓	✓	✓	

Institutional Responsibilities and Strategies for Advancement of SRRs

Recommendation	Report Page #	Action Required By:			
		Stakeholders	Institutions	Small Institutions	Funding Agencies
Prioritize and incorporate SRR needs into the faculty recruitment process, including decisions on equipment purchase, research space allocation, renovation, and new construction.	7		✓	✓	
Participate in regional and national resource sharing where feasible, ensuring activities align with institutional strategic plan.	7		✓	✓	
Refer to and adapt existing, successful models for managing funding flow and related F&A costs. State systems in Georgia, Texas, and the Chicago Biomedical Consortium are excellent examples.	7		✓	✓	
Partner with funding agencies to enhance transparency about ongoing institutional projects, inter-institutional collaborations, and technology developments to address gaps in communication, accountability, and scientific needs of SRRs.	7	✓	✓	✓	✓

Strategies for SRRs

Recommendation	Report Page #	Action Required By:			
		Stakeholders	Institutions	Small Institutions	Funding Agencies
Institutions should set clear expectations and guidelines for SRRs on which to measure the return on investment for both SRR facilities and institutions writ large.	9		✓	✓	
Focus on the interrelationships between key stakeholders within the SRR ecosystem as a means to develop strategies and best practices (<i>Figure 2</i>).	10	✓	✓	✓	
Designate the Shared Resources Advisory Committee to highlight the contributions and benefits of SRRs toward achieving institutional goals, partnering with independent SRR facilities to communicate these values across the institution.	10		✓	✓	
Develop metrics that incorporate feedback from users and stakeholders (<i>Figure 3</i>).	10	✓	✓	✓	
Leverage available tools and incorporate into managements operations where feasible to enable SRR facility reporting on output and impact of SRRs.	10	✓	✓	✓	
In addition to collecting data, regularly analyze metric trends of the SRR facility and incorporate results when revising or developing new strategic plans.	10		✓	✓	