

Curriculum for Guidance in Managing Academic Biomedical Core Facilities

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- **National Institutes of
General Medical Sciences**



National Institute of
General Medical Sciences

Curriculum for Guidance in Managing Academic Biomedical Core Facilities

Interactions during Session

Questions can be addressed at selected intervals

- Chat function
- Raise hand icon

Service Core Facility Definition

Service core facilities can be defined as centralized shared resources that provide access to instruments, technologies, services, as well as expert consultation and other services to scientific and clinical investigators

Source: NIH Notice Number: NOT-OD-13-053 & NOT-OD-10-138

Service Cores are Essential Components of Academic Biomedical Research

For colleges, universities, and research centers, research cores play an increasingly critical role in supporting their mission to conduct cutting-edge research, recruit and retain faculty members, and secure external funding support.

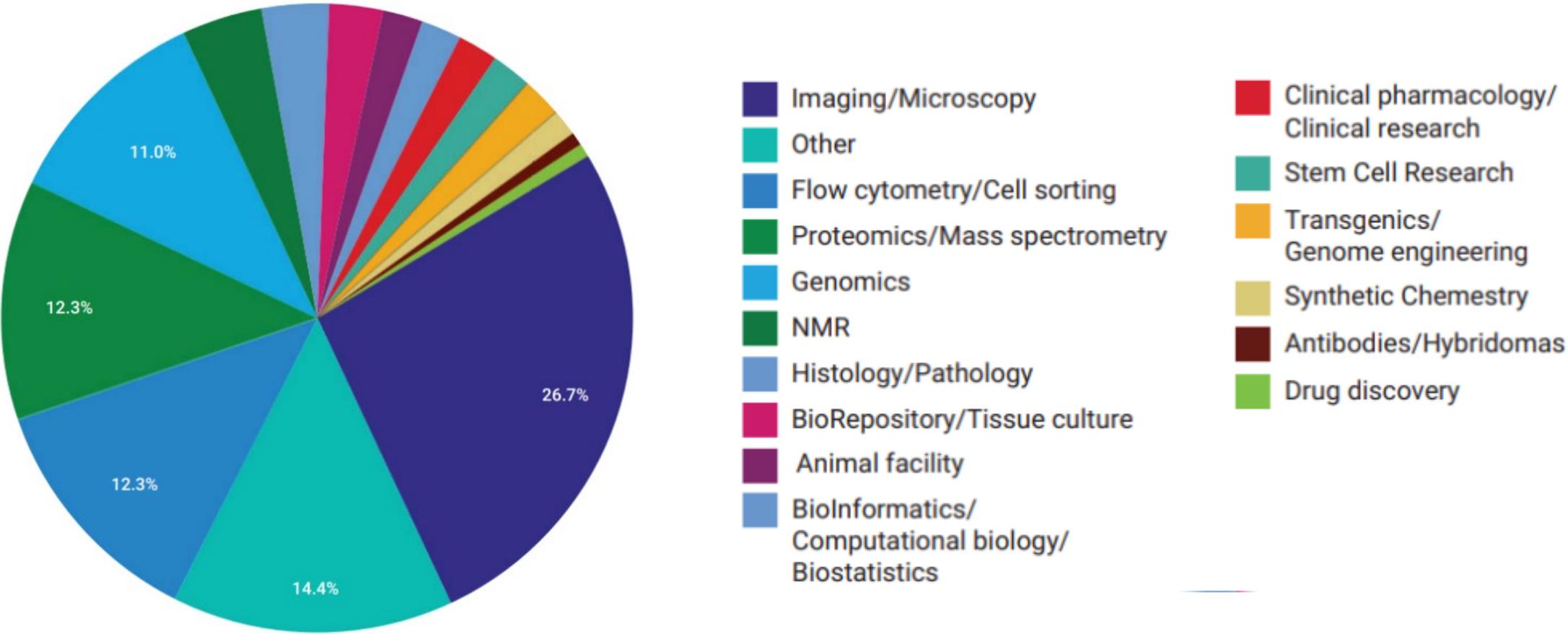
Bai & Schonfeld. What is a research core? A primer on a critical component of the research enterprise. (2021)
DOI: <https://doi.org/10.18665/sr.316205>
<https://sr.ithaka.org/publications/what-is-a-research-core/>

Common Service Cores in the Academic Biomedical Research Environment

- Flow cytometry
- Light microscopy
- Electron microscopy
- Mass spectrometry
- Proteomics
- MRI
- MicroCT
- MicroPET
- Behavior
- Sequencing
- Bioinformatics
- Pathology
- Biorepositories
- Animal facilities

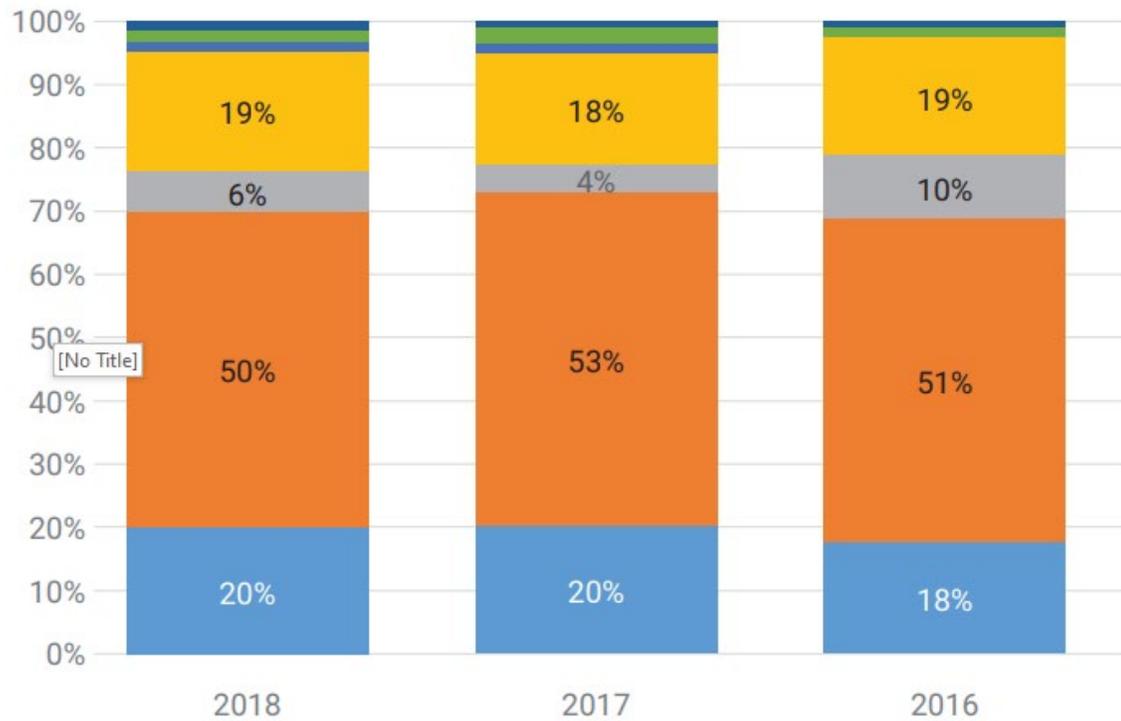


Distribution of Technologies Provided by Service Cores Across >100 Institutes



Strubczewski, "Shared Resource Facility Market Analysis," Agilent, Dec 2, 2019, <https://www.agilent.com/cs/library/whitepaper/public/whitepaper-led-ilab-core-facility-shared-resources-5994-1620en-agilent.pdf>. Summary of 244 responses from over 50 core types in over 100 institutes

Academic Service Cores Expenses Across >100 Institutes



Percentage of Expense by Type

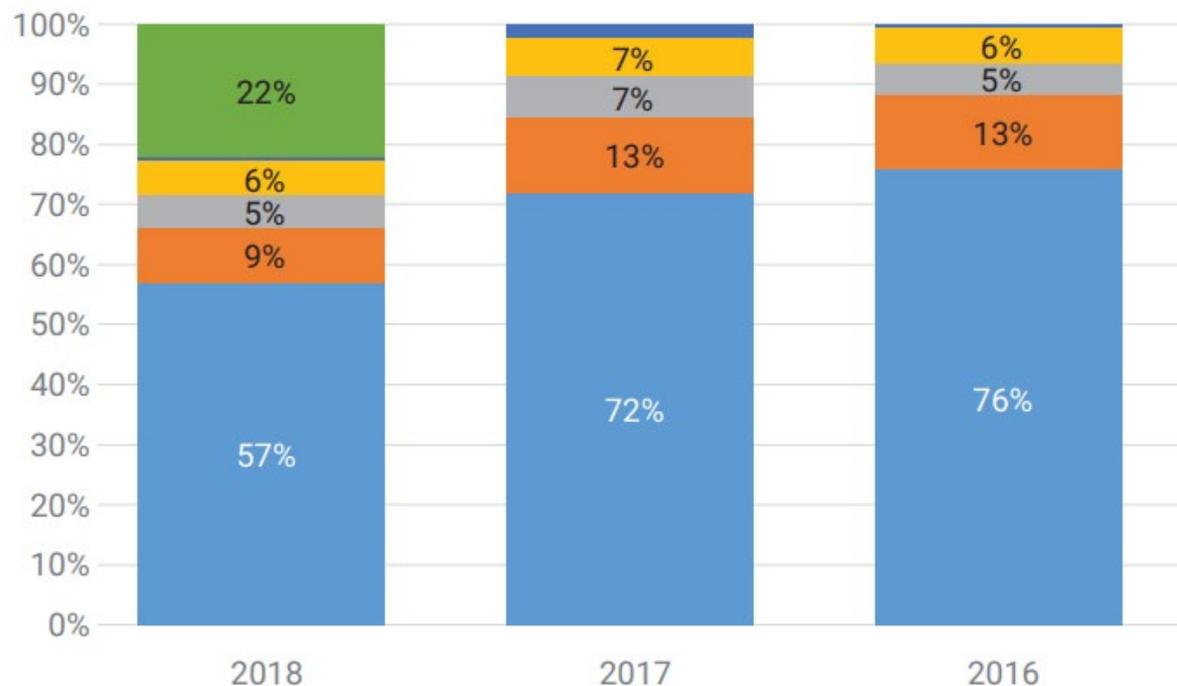
- Other
- IT and Software
- Overhead Costs
- Service Contracts/Equipment Maintenance
- Equipment Purchases
- Staffing Costs
- Consumable Costs

Note. Most expenses are fixed costs

Strubczewski, "Shared Resource Facility Market Analysis," Agilent, Dec 2, 2019, <https://www.agilent.com/cs/library/whitepaper/public/whitepaper-led-ilab-core-facility-shared-resources-5994-1620en-agilent.pdf>. Summary of 244 responses from over 50 core types in over 100 institutes

Academic Service Cores

Source of Income Across >100 Institutes



Percentage of Revenue by Source

- Subsidized
- Other
- Grants Specifically Awarded to Your Core
- External Corporate Customer Revenue
- External Academic Customer Revenue
- Internal Customer Revenue

Note. 2018 data included institutional subsidies for the first time

Strubczewski, "Shared Resource Facility Market Analysis," Agilent, Dec 2, 2019, <https://www.agilent.com/cs/library/whitepaper/public/whitepaper-led-ilab-core-facility-shared-resources-5994-1620en-agilent.pdf>. Summary of 244 responses from over 50 core types in over 100 institutes

Management of Academic Service Cores

The Ideal

A successful core accomplishes its mission of advancing science, enabling research, and improving access to technology while maintaining a stable income stream and operating in a cost-neutral fashion.

Bai & Schonfeld. What is a research core? A primer on a critical component of the research enterprise. (2021)
DOI: <https://doi.org/10.18665/sr.316205>
<https://sr.ithaka.org/publications/what-is-a-research-core/>

Management of Academic Service Cores

The Reality

However, recovering the operational costs entirely through revenue generated from user fees is very challenging for many research cores.

It is not uncommon for cores to resort to various external and internal sources of subsidy that help them pay for salaries of their staff and other expenses incurred by their daily operations.

Bai & Schonfeld. What is a research core? A primer on a critical component of the research enterprise. (2021)
DOI: <https://doi.org/10.18665/sr.316205>
<https://sr.ithaka.org/publications/what-is-a-research-core/>

Business Fundamentals for Core Facility Administration

Overview

Purpose of Curriculum – Assist in developing “the ideal”

Discuss processes for planning a sustainable service core facility

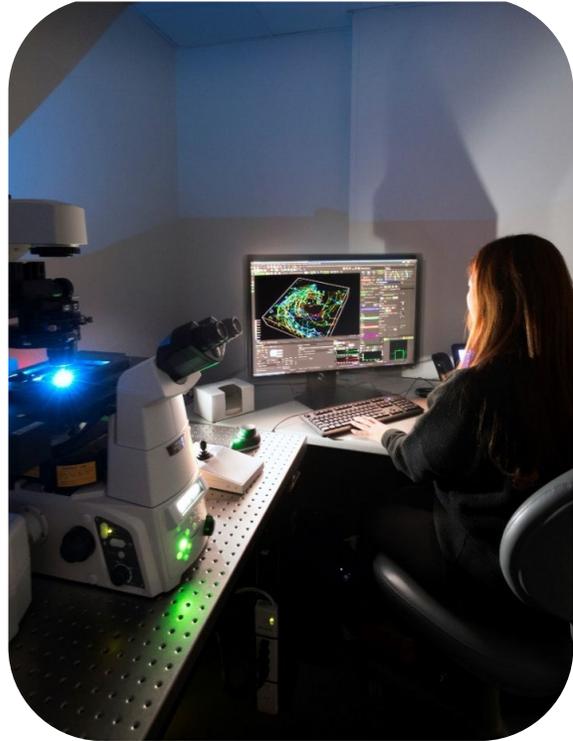
Management of:

- Personnel
- Facilities
- Finances
- High quality data acquisition

Questions?

- Chat
- Raise hand icon

Service Cores are Essential Components of Academic Biomedical Research



- Provide access to sophisticated technologies and/or highly skilled technical expertise
- Standardization of operating procedures
- Data acquisition as a model for rigor and reproducibility
- Operate in accord with NIH regulations

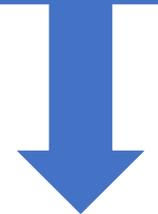
Service Cores Provide Access to Sophisticated Technologies

Need for Service Cores is likely to increase due to:

- High-cost of contemporary technology
- High cost of maintaining technology
- Skilled personnel to train and operate



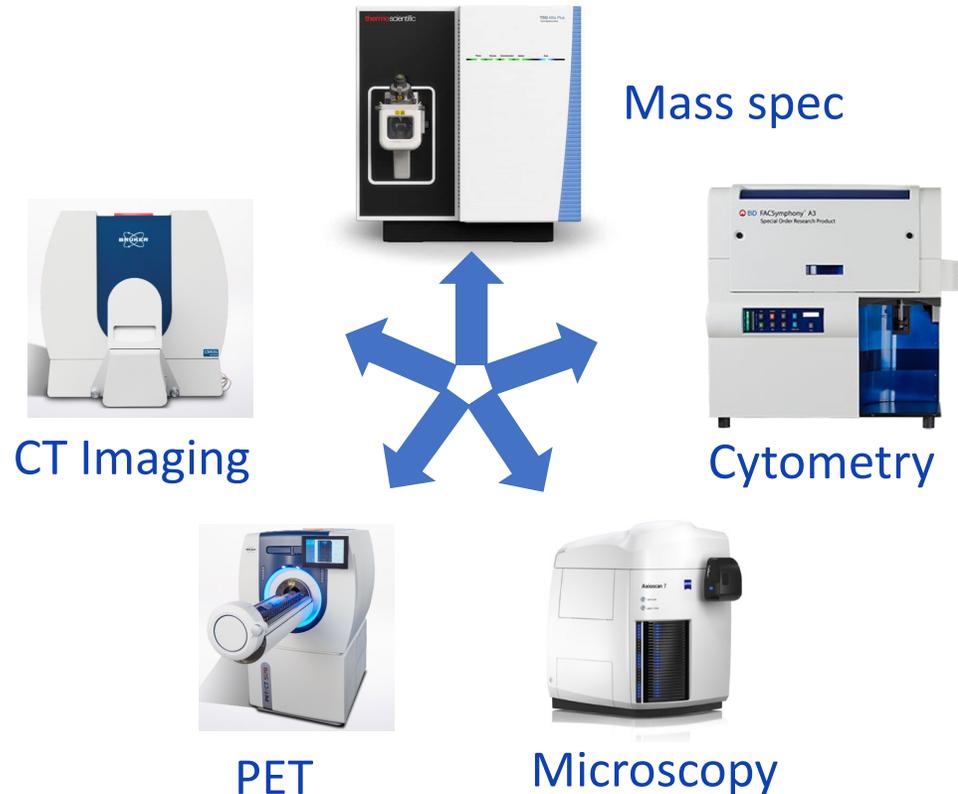
Previous need:
~\$25,000



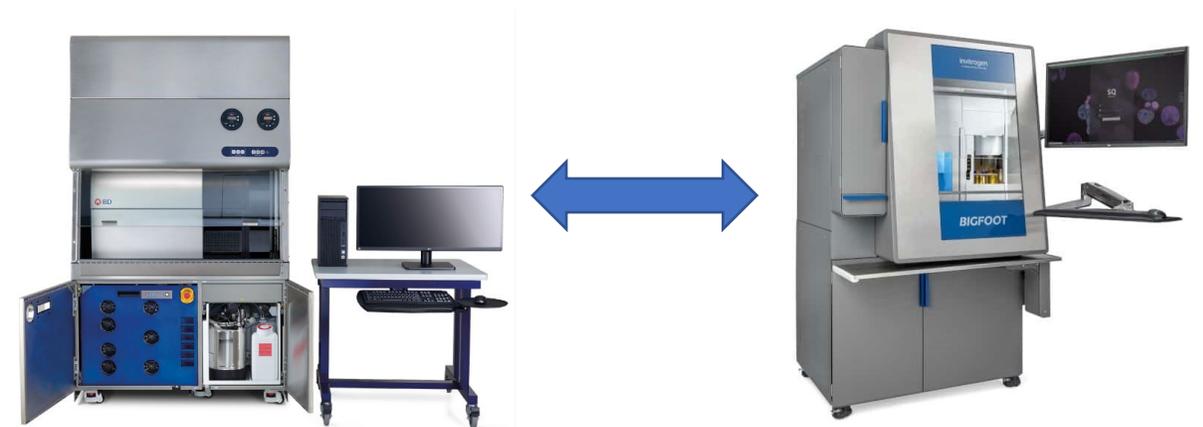
Evolving
requirement:
~\$250,000

Service Cores Can Prioritize Equipment Acquisition Decisions

Competition for Different Types of Equipment



Competition for Different Instruments of Similar Capability



Considerations

- “Work horse” vs cutting edge
- Benefits of consistent platform

Service Cores are a Mode of Generating Standardization of Operating Procedures

- Consistent facility development & oversight
- Training for director and staff
- Standardization of equipment function

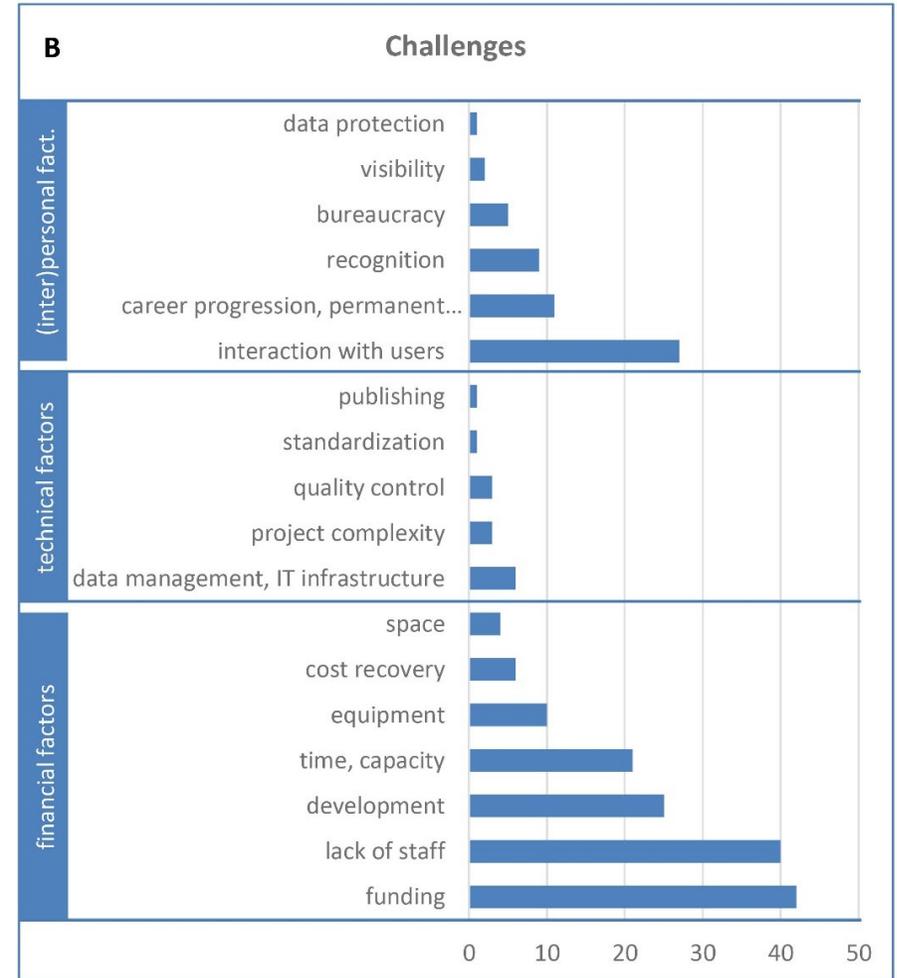
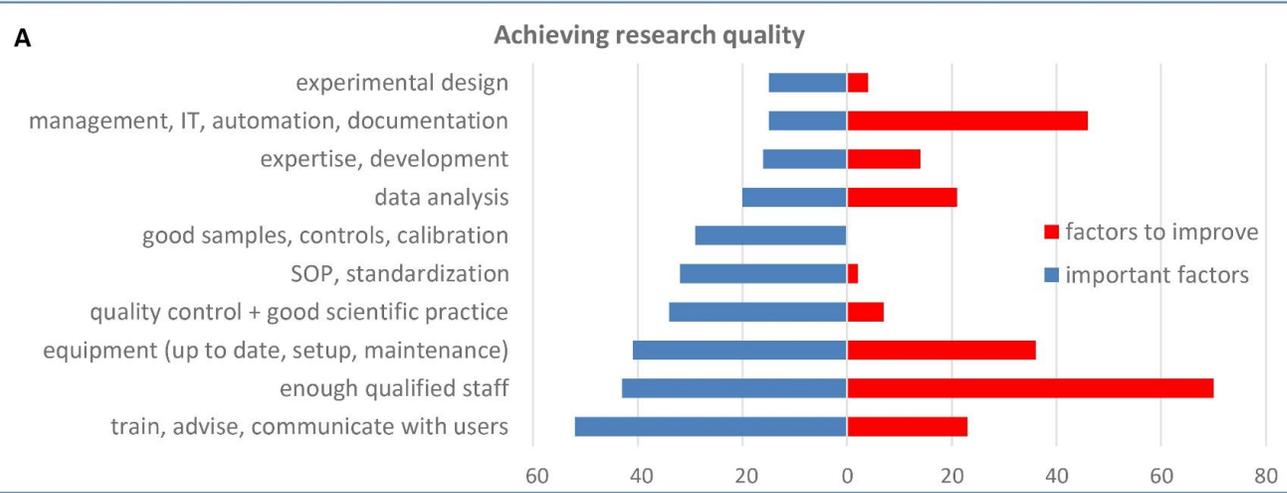
Service Cores are a Nidus for Promoting Rigor and Reproducibility Through Good Research Practice

Core facilities are an effective way of making expensive experimental equipment available to many researchers and are well placed to contribute to efforts to promote good research practices.

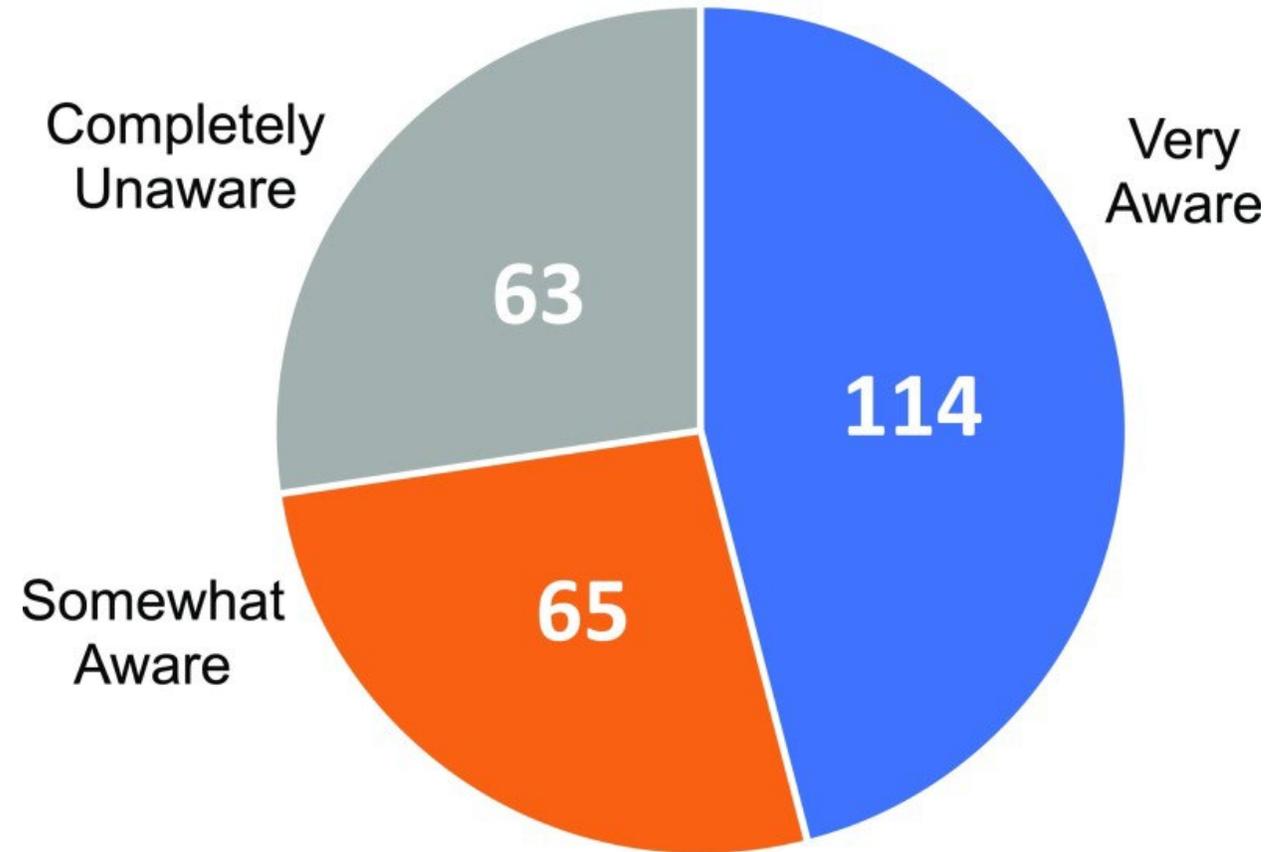
Kos-Braun, Gerlach, Pitzer. A survey of research quality in core facilities. *Elife*. 2020;**9**:e62212
253 cores of 30 different types



Service Cores are a Nidus for Promoting Rigor and Reproducibility Through Good Research Practice



Self-assessments of Core Facility Personnel Knowledge and Awareness of NIH Guidelines on Rigor and Reproducibility



Service Core Management: Regulatory Compliance

General Operating Principles

A typical core facility is a discrete unit within an institution having dedicated personnel, equipment, and space. In general, core facilities recover at least a portion of their costs by providing service associated with user fees that are charged to an investigator's funds, often to **NIH or other federal grants**.

Source: NIH Notice Number: NOT-OD-13-053 & NOT-OD-10-138

Regulations Governing in Service Core Management: NOT-OD-13-053 & NOT-OD-10-138

FAQs for Costing of NIH-Funded Core Facilities

Notice Number: NOT-OD-13-053

Key Dates

Release Date: April 8, 2013

Related Announcements

[NOT-OD-10-138](#)

Issued by

National Institutes of Health ([NIH](#))

Request for Comment on FAQs to Explain Costing Issues for Core Facilities

Notice Number: **NOT-OD-10-138**

Key Dates

Release Date: September 23, 2010

Related Announcements

[NOT-OD-13-053](#)

Issued by

National Institutes of Health ([NIH](#))

<https://grants.nih.gov/grants/guide/notice-files/NOT-OD-13-053.html>

<https://grants.nih.gov/grants/guide/notice-files/NOT-OD-10-138.html>

Appropriate Management of Service Cores to be a Protracted Institutional Benefit

Continuous evaluation process



Rationale for Development

- Research mission enhancement

Plan for Sustainability

- Financial viability
- Quality of staff and equipment

Decision for Sunset

- Old technology
- Changing research focus
- Duplicative services

Challenges of Developing a Curriculum for Service Core Management

Selected Difficulties of Curriculum Development

- Facilities vary in size, complexity, capacity, and technologies
- Institutional oversight is sporadic
- Variable attitudes to core facility subsidies

Questions?

- Chat
- Raise hand icon

Curriculum for Service Core Management Introductory Session

Session 1

- Overview of entire course
- Request for feedback on topics that participants would like to emphasize and expand in subsequent modules

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Curriculum for Guidance in Managing Academic Biomedical Core Facilities – Schedule for 2023

Topic	Date	Time (EST)
Operations	March 13	2-3:30 pm
Enhance data management and service core use	April 10	2-3:30 pm
Financial management	May 15	2-3:30 pm
Value assessment and contributions to the academic mission	June 12	2-3:30 pm

Curriculum for Guidance in Managing Academic Biomedical Core Facilities - Overview

Session	Element #	Topic
Operations	1	Plan for staffing and equipment
	2	Optimize staff and equipment usage and availability
Enhance data management and service core use	3	Manage information, data quality, and availability
	4	Enhance the user base
Financial management	5	Develop rate structures
	6	Fiscal management
Value assessment and contributions to the academic mission	7	Determine the value of service cores to the academic mission of the institute
	8	Institutional oversight

Operations

Session	Element #	Topic
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1. Plan for Staffing and Equipment

Service Cores are usually stand-alone units that need to have appropriate leadership and staffing to maximize use of high technology equipment



Strategies for Success

- Choose appropriate leaders and staff
- Trained on use and maintenance of equipment
- Tailor equipment type and volume
- Optimize location

1. Plan for Staffing and Equipment

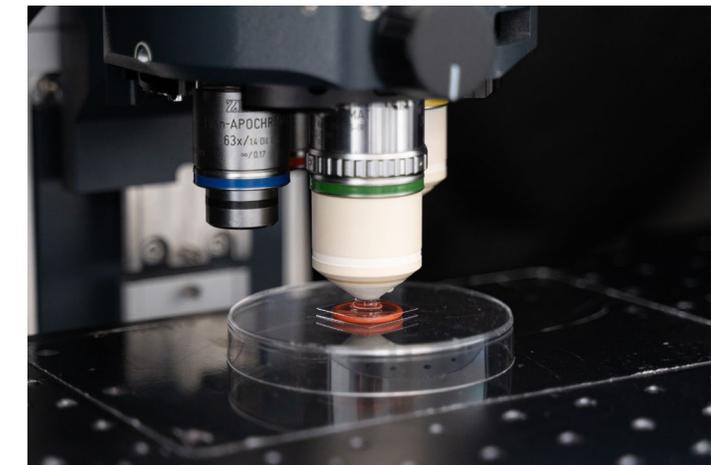
Discussion Points

Staffing

- Emphasize the need for “customer service”
- Establishment of job security
- Advancement options
- Enhance multiple skills: technical, business, management
- Recognition of contributions to research

Equipment

- Equipment purchases
- Equipment maintenance
- Equipment grants (S10) – who will write?
- Discourage equipment purchase by labs that replicate core equipment



2. Optimize Staff and Equipment Usage and Availability

Service Cores need to be organized to accommodate multiple users in a mode that optimizes the staff and equipment time



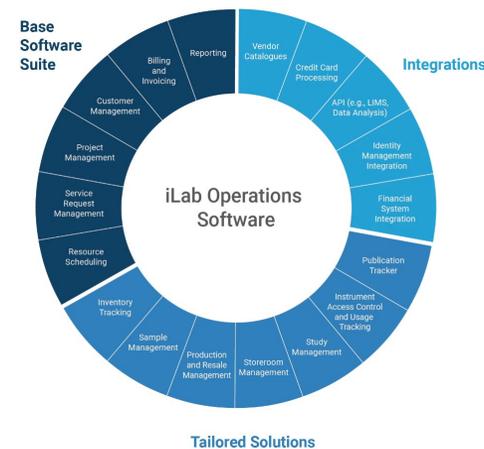
Strategies for Success

- Implement a web-based booking system
- Time management of equipment
- Uniform guidance across all users

2. Optimize Staff and Equipment Usage and Availability

Discussion Points

- Select service core facility management software
- Implement rules to enhance efficiency of use of equipment and staff
- Choose what to charge – booked or used time?
- Charge for training?



Agilent iLab



Stratocore

Questions?

- Chat
- Raise hand icon

Data Management and Enhancing Service Core Use

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3. Manage Information, Data Quality and Availability

An institutional core service should be managed in a mode that provides data that will be highly regarded with respect to rigor and reproducibility



Strategies for Success

- Develop SOPs and perform practices consistent with Good Research Practice
- Verify instrumentation
- Document reagents
- Data extraction, storage, and authenticity

3. Manage Information, Data Quality and Availability

Discussion Points

- Develop a standardized format for SOPs
- Process for evaluating equipment performance; including specialized and generalized equipment (eg. pipettes and balances)
- Associate pertinent reagent information with data analyses – minimum of catalog and batch number
- Transfer of local computer to user – the complications of large datasets



Pipette
Calibration



Weigh
Scale
Calibration

4. Enhance the User Base

A communication plan increases institutional awareness of services provided by core facilities



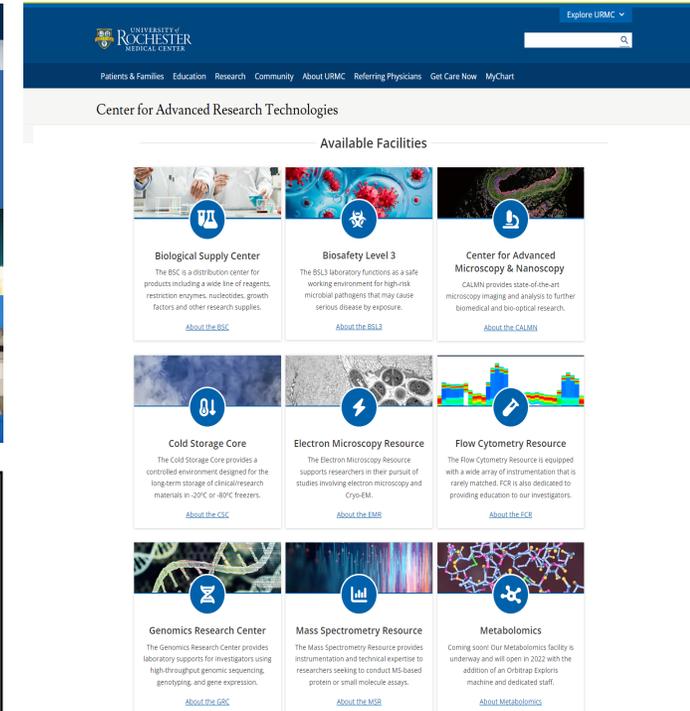
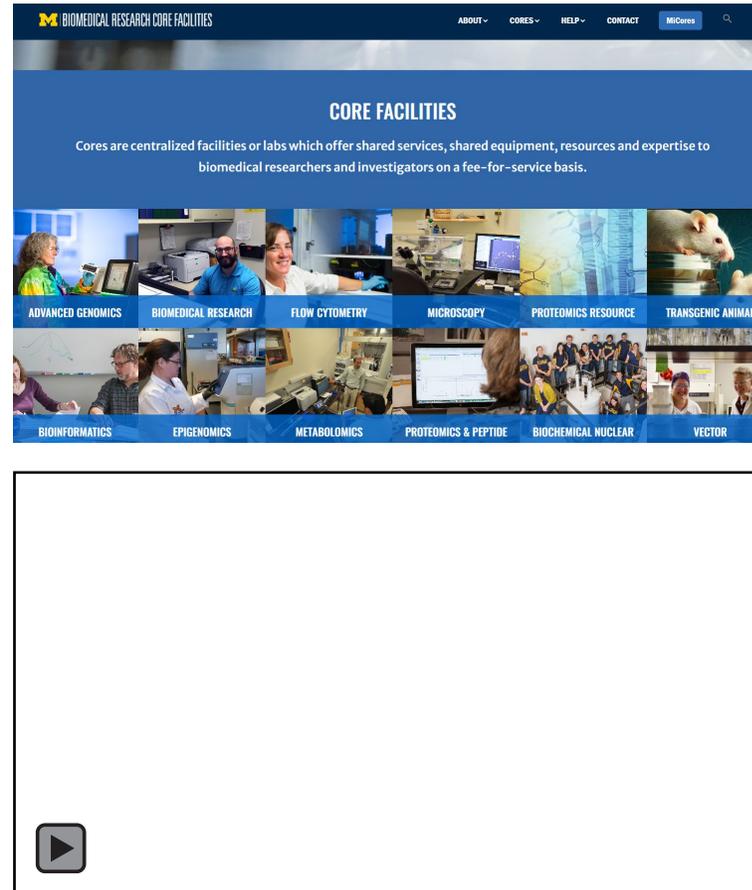
Strategies for Success

- Increase institutional awareness of services provided by core facilities
- Advertise to outside users

4. Enhance the User Base

Discussion Points

- Web sites
- Newsletters
- “Corridor” screens and posters
- Seminars
- Participate in course teaching
- Departmental visits
- Facility tours
- Link to startup packages



Bottom line – Multiple approaches are needed

Questions?

- Chat
- Raise hand icon

Financial Management

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5. Develop Rate Structures

Many biomedical service core facilities are supported by internal or extramural funding mechanisms when initiated. While this support may sustain a service core in the short term, implementation of a fiscal management plan at the initiation of the core will provide a path to sustainability



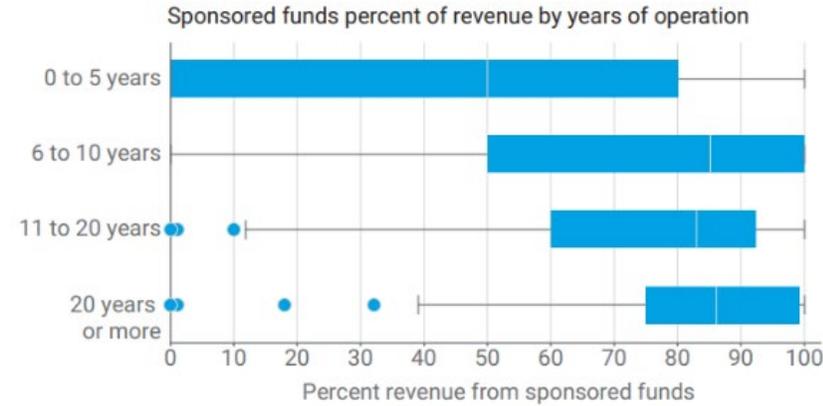
Strategies for Success

- Transition to a fee-for-service facility
- Maintain a fee-for-service core at prices that induce use
- Expand services of an existing fee-for-service core
- Attract external users

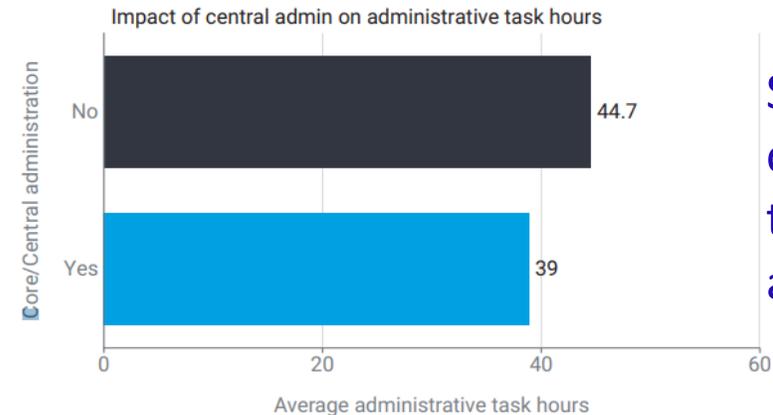
5. Develop Rate Structures

Discussion Points

- Decision to move to fee-for-service
- Detriment of free services
- Benefits of centralization
- Institutional support for maintenance fees
- External users: Academic vs Commercial



Cost recovery from sponsored funds increases after 5 years



Staff in centralized cores spend less time with administrative tasks

6. Fiscal Management

For cores to be sustained, develop a realistic fiscal management that is executed in a mode consistent with all applicable regulations.



Strategies for Success

- Develop rate structure
- Decision processes to determine subsidies in budget planning
- Monitor service use
- Determine how to charge for time booked versus used
- Maintain and update equipment through maintenance contracts and depreciation funds
- Comply with regulations

6. Fiscal Management

Discussion Points

- Develop rate structure
 - Personnel
 - Consumables
 - To depreciate or not depreciate
 - Maintenance contracts or self-insure
 - Number of services provide each year
 - Timing of implementation in a fiscal year
- Influence of the rates from other institutes for a similar service (apples to apples comparison?)

$$\frac{\left. \begin{array}{l} \text{Expenses} \\ \text{ALLOWABLE \& ALLOCABLE} \\ \bullet \text{ direct operating costs} \\ \bullet \text{ annual equipment depreciation} \\ \bullet \text{ subsidies \& prior-year expenses} \end{array} \right\}}{\text{Actual Usage or Number of Goods or Services Sold}} = \begin{array}{l} \text{Calculated} \\ \text{Rate Per} \\ \text{Unit} \end{array}$$

Starting a New Core
John Hopkins web site

Questions?

- Chat
- Raise hand icon

Value Assessment and Contributions to the Academic Mission

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7. Determine the Value of Service Cores to the Academic Mission of the Institute

Since institutional support is often critical to service cores' success, there should be an attempt to document their worth.



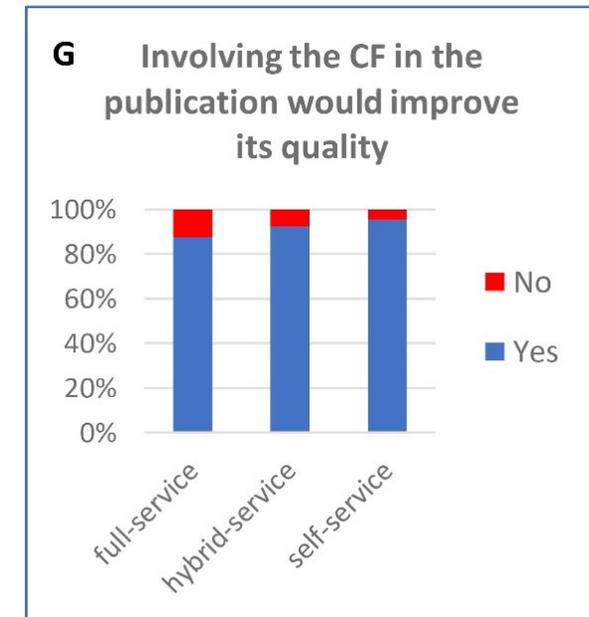
Strategies for Success

- Credit use of cores in publications
- Associate cores with extramural funding

7. Determine the Value of Service Cores to the Academic Mission of the Institute

Discussion Points

- Publication Credit
 - Honors system
 - Manual combing of PubMed
 - Track by ORCID number
 - Financial incentive
 - Involvement in manuscript writing
- Grant credit
 - Source of funding
 - Association of cores with extramural funding



8. Institutional Oversight

Cores confer both institution benefits and risk. To maximize the former and minimize the latter, facilities benefit from input of oversight structures.



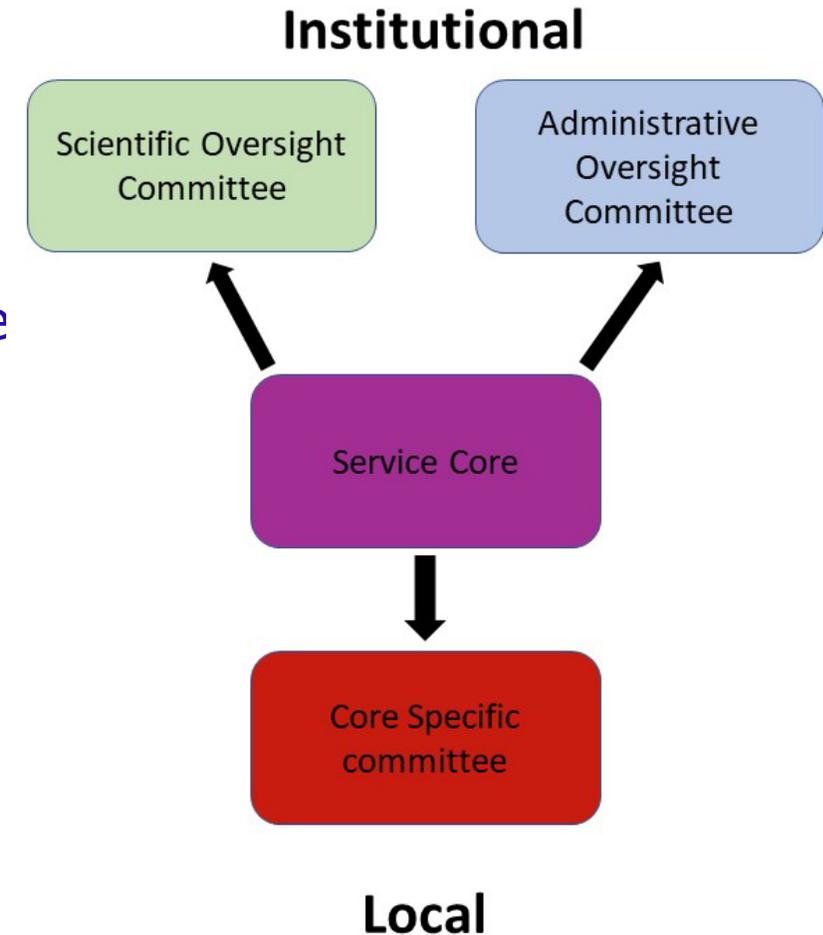
Strategies for Success

- Service core-specific oversight committee
- Scientific advisory oversight committee
- Administrative oversight committee

8. Institutional Oversight

Discussion Points

- Is a core-specific oversight committee needed?
- Are central oversight committees needed?
- Who should populate a scientific advisory committee (users, administrators, etc)?
- What are the range of responsibilities for the committee:
 - Appointing and removing personnel?
 - Oversight of operational efficiencies?
 - Decisions on equipment purchases?
- How to best populate an administrative oversight committee (central versus local administrators)?



Questions?

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Feedback

Alan Daugherty
alan.daugherty@uky.edu

Session recording and slides will be available at:
xleratornetwork.com