Core Facilities Working Group
Report to the Vice Chancellor for Research, Economic Development, and Engagement
March 15, 2019

Executive Summary

In response to a request from Vice Chancellor Jay Golden, a multidisciplinary, faculty-led Core Facilities Working Group was convened in October 2018 to discuss research equipment usage and access at ECU. Working Group members, each representing different university stakeholders from across campus in multiple research disciplines, discussed the status and challenges facing research core facilities at ECU. The Core Facilities Working Group examined research core facility administrative structure and conducted in-depth interviews with core administrators at 15 peer and neighboring universities. The Core Facilities Working Group determined that the current administrative structure for core facilities at ECU is not sufficient to support a growing research enterprise. The group agreed that core facilities are essential to support faculty research success and improve faculty recruitment and retention. These goals must be balanced, however, with improved fiscal sustainability of existing departmental core facilities and decreased departmental burden for their maintenance and improvement. The Core Facilities Working Group's key recommendations are:

1. Establish a university-wide Office of Integrated Core Facilities and Core Facilities Executive Council, whose goals are to:
   - Promote intra-university collaboration through consistent communication of university resources (both physical and intellectual across Academic Affairs and Health Sciences), recognizing that we build a stronger research infrastructure through open lines of communication and identification of common goals.
   - Improve management and fiscal sustainability of existing core facilities.
   - Align university resources to strategically improve research support across both campuses, consistent with both faculty visions and university missions.
   - Provide enhanced opportunities for faculty research success.
   - Decrease the departmental financial burdens for the maintenance and acquisition of research equipment.
   - Provide appropriate compensation and recognition of faculty intellectual support of core facilities.
   - Support the university mission by providing enhanced opportunities for student success.
2. Task the newly-created Office of Integrated Core Facilities to work with the Core Facilities Executive Council, ECU Financial Services, and current departmental core facilities to identify key areas of research excellence on campus suitable to become the first ECU Research Core Facilities.
3. Support the development of ECU Research Core Facilities via website advertisement, incentives for faculty leadership, assistance with paperwork to become cost and recharge centers, standardized reservation and billing systems, and staffing as needed by departments.
4. Encourage ECU departments/colleges/schools and faculty to establish new ECU Research Core Facilities and/or add equipment to existing ones, as appropriate.
5. Task the newly-created Office of Integrated Core Facilities and Core Facilities Executive Council to establish university guidelines for ECU Research Core Facilities, including annual evaluation (user base, usage, return-on-investment), upgrade requests, and decommissioning of equipment when necessary.
6. Establish Memorandums of Understanding within the University of North Carolina System to allow ECU researchers to use core facilities within the UNC System at "in-network" rates.

The Core Facilities Working Group recognizes that establishment of a Core Facility structure at ECU will require time and significant communication and collaboration across diverse research disciplines. We recommend that a plan of action be put in place to begin this important process before July 1, 2019.

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A Core Facilities Working Group (henceforth referred to as "the Cores Group") was convened in October 2018. The Core Group had broad representation of faculty, staff, and research administrators from across both campuses. The members were:

- Russ Price, Associate Dean for Research, Brody School of Medicine (SOM) (Co-Chair)
- Elizabeth Ables, Assistant Professor, Dept. of Biology, Harriot College of Arts and Sciences (HCAS) (Co-Chair)
- Jim Aloor, Operations Manager, East Carolina Diabetes and Obesity Institute (ECDOI)
- Regina DeWitt, Associate Professor, Dept. of Physics, HCAS
- Kym Gowdy, Assistant Professor, Dept. of Pharmacology & Toxicology, SOM
- Kim Kew, Associate Professor, Dept. of Biochemistry and Molecular Biology, SOM
- Cindy Kukoly, Research Specialist, Dept. of Internal Medicine, SOM
- Angela Lamson, Associate Dean for Research, Health and Human Performance (HHP)
- Mark Mannie, Professor, Dept. of Microbiology & Immunology, SOM
- Chad Spruill, Director of Laboratory Operations, College of Engineering and Technology (CET)
- Anne Spuches, Associate Professor, Dept. of Chemistry, HCAS
- Kathy Verbanac, Assistant Vice Chancellor for Health Sciences, REDE
- Shannon Wallet, Interim Chair, Dept. Foundational Sciences, School of Dental Medicine (SoDM)

also in attendance at Cores Group meetings:

- Tereasa Hopkins, Cost Analyst, Financial Services
- Vincent Falvo, University Controller, Financial Services

Charge:

The Cores Group received its charge from Vice Chancellor Golden on September 4, 2018. We were tasked with:

- Proposing an approach to cataloging and creating a central repository of core facilities at ECU, including short write-ups and photos for use in proposals.
- Providing recommendations to annually identify and prioritize core facility upgrade requests, establish new core facilities at ECU, and decommission existing core facilities.
- Providing recommendations on how to track the utilization and annual return-on-investment of established core facilities.
- Providing recommendations on how ECU researchers can use core facilities at other institutions and the potential of receiving discounted user-rates. This includes identifying advantages and disadvantages as well as suggestions on how best to catalog and communicate opportunities to ECU researchers.

The Cores Group would like to thank Vice Chancellor Golden for the opportunity to gather, discuss, and share our recommendations regarding ECU core facilities. Research core facilities are critical to a growing research enterprise. Technological advances open doors for new lines of scientific inquiry; however, these gains can come at considerable expense. Research core facilities provide researchers with the opportunity to harness new technology and establish new research directions without the onus of independently purchasing and maintaining costly new equipment. By synergizing research interests in common technology, research core facilities can play a significant role in fostering research collaborations and supporting externally-funded research. Given the considerable investment of university resources to faculty recruitment and research support, it is essential that we carefully consider the future administration of research core facilities at ECU. This difficult endeavor will not be successful without considerable conversation between faculty and administration.

Working Group Meetings, Discussion, and Resources Used:

The Cores Group met formally six times from November 2018 - February 2019. Given the breadth of research and accompanying instrumentation in use across both ECU campuses, significant discussion revolved around the operational definition of a core facility. Because there is no official overlaying guideline or infrastructure at present, administration of the existing shared resource facilities is highly variable. For example, only five Research Service Centers have been officially recognized at ECU (including the Microbiology Freezer Program at SOM, the Translational Research Core at HHP, and the Clinical Services Core at ECDOI). At least 18 other shared resource facilities are in operation (primarily supported and staffed by individual departments) across campus. These have not been officially recognized as Research Service Centers (cost recharge centers) (though seven are currently under review by Financial Services).

With the help of Vinnie Falvo and Tereasa Hopkins (Financial Services), the Cores Group reviewed the federal definitions of "Core Facility" and "Research Service Center". Under Federal regulations, a Core Facility may operate largely under the same guidelines as a Research Service Center; however, the primary distinction is that Core Facilities may be fiscally supported by any combination of institutional, Federal, or external funding. Indeed, the very nature of shared instrumentation (which depreciates rapidly, is used by many researchers and students, requires extensive user training, and can be time- and labor-intensive to operate) necessitates financial support of at least 50% of costs. Another important distinction is that federal grants may not be charged fees by core facilities or research service centers unless a standard fee structure, equitable across all users, is enforced by the facility.

To clarify the operational definition of an ECU Research Core Facility, the Cores Group discussed the optimal characteristics of a research core. We identified the following as essential components of a well-run core:

- A scientist/group of scientists with extensive expertise with the equipment that will work with users to choose appropriate instruments for experimental approach, develop protocols, analyze data, troubleshoot problems, and lead grant-writing efforts for new technology.
- A group of well-maintained, cutting-edge equipment that is monitored for usage, reliability, and updated to keep in stride with modern technology.
- Staffing to maintain instrumentation and provide regular training for students, faculty, and staff.
- Compliance with Federal regulations for fee structure and charges for service.
- Communication with the user base (status of equipment, availability of new instrumentation, spotlights on data being generated, surveys for feedback, etc) and recruitment of new users.
- An influx of new ideas/techniques through seminars, hands on training, and outreach events.

The Cores Group prioritized the desired objectives of research core facilities specifically at ECU. Considerable regard was given to the diversity of scientific research across campus, the variety of different research roles (e.g., faculty, staff, students, and requirements for each), research culture across campus (especially, Academic Affairs versus Health Science), and current and future research resource needs. We outlined the following desired objectives:

- Align university resources to strategically improve research support across both campuses, consistent with both faculty visions and university missions.
- Support the university mission by providing enhanced opportunities for student success.
- Provide enhanced opportunities for faculty research success (in terms of external funding, extramural collaboration, and publications).
- Improve management and fiscal sustainability of existing core facilities.
- Promote intra-university collaboration through consistent communication of university resources (both physical and intellectual).
- Decrease the financial burden on departments/schools/colleges for maintenance of research equipment.
- Provide appropriate compensation and recognition of faculty intellectual support of core facilities.

The Cores Group then evaluated the administrative structure of core facilities at more than 15 neighboring or peer institutions. After screening core infrastructure via internet resources, the Cores Group communicated directly with Core Facility Directors and Directors of Research Resources at the University of NC at Chapel Hill, NC State, Virginia Commonwealth University, Emory University, and the University of Tennessee to discuss research service center administration. The Cores Group identified three primary administrative models: Department-Based, College-Based, and University-Based (**Figure 1**). In most cases, these appear to have grown organically at neighboring/peer institutions as the need for more complex and expensive research equipment (and the research enterprise itself) grew. Since funding for core facilities currently falls primarily on departments, ECU operates in Model 1. Neighboring facilities, including the Genomics Core, Imaging Core, and Flow Cytometry Core at the University of NC at Chapel Hill, function more as Model 2, as they fall under the purview of the UNC-CH School of Medicine. Peer and aspirational peer institutions NC State, Virginia Commonwealth University, and the University of Tennessee, are examples of Model 3. These universities recently established institution-wide core facilities under a single Director housed in the university's Office of Research. Although each model has benefits and drawbacks, the characteristics of Model 3 (**Figure 1**) aligned closely with the operational definition and desired outcomes of ECU core facilities prioritized by the Cores Group.

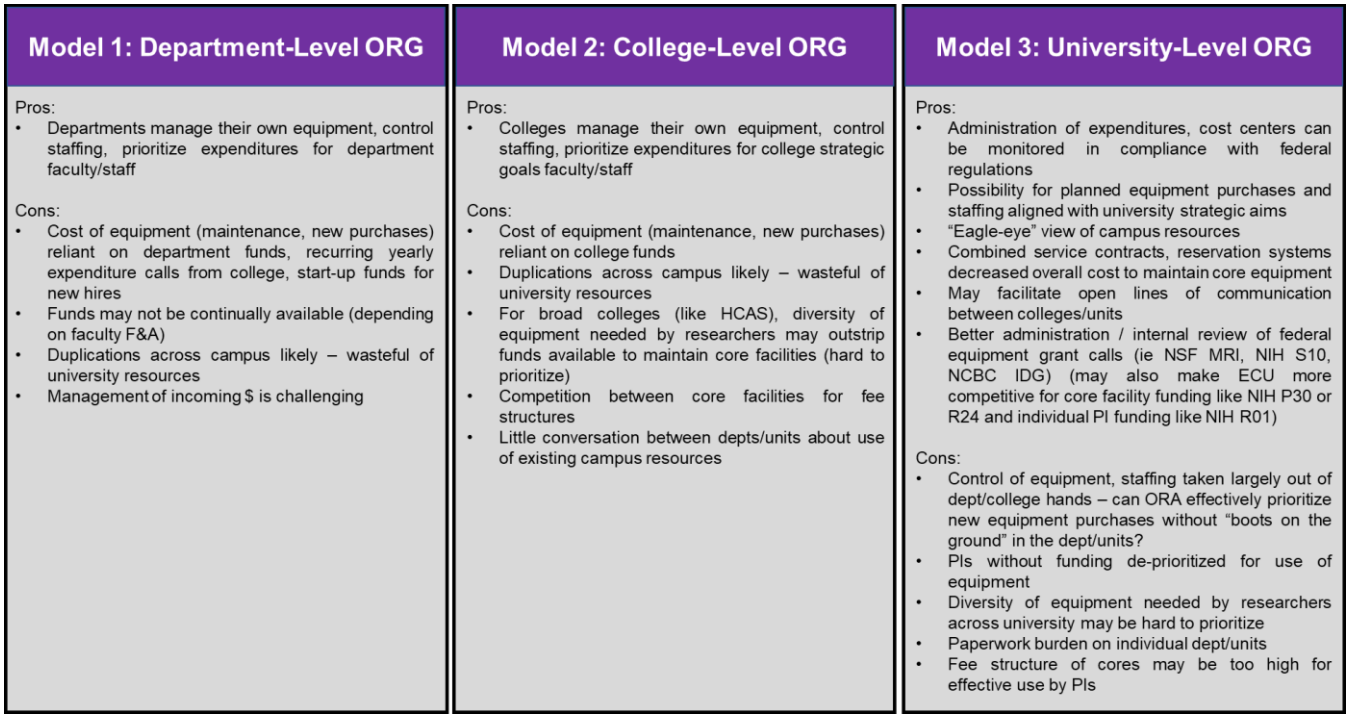

Figure 1. Administrative models of Research Service Centers ("Core Facilities") in use at ECU neighboring and peer institutions.

Working Group Response to Charge:

Armed with knowledge of the current landscape of research instrumentation at ECU, and a vision of what these could look like over the next 5-15 years, the Cores Group recommends the following strategies for improving research core facilities at ECU.

Creating an ECU Office of Integrated Core Facilities

Challenge: A focused and continuous effort will be required to successfully realize the four charges noted in the previous section. Currently, no singular administrative unit has responsibility for advancing these four charges, including the compilation, prioritization, assessment, and outreach for our core facilities. The lack of a focused administrative entity represents a major barrier that impedes developing an integrated structure and achieving economic and scientific efficiencies needed for our core facilities.

Recommendation: A new ECU Office of Integrated Core Facilities is considered by this committee to be the most judicious solution to meet this challenge. This Office will be comprised of a Director of Core Facilities and a Core Facilities Executive Council. The Director and the Executive Council will provide the working leadership and institutional assurance that scientifically-informed strategies are continuously optimized for advancement of our core facilities. The Director will be a successful PhD-level scientist with broad expertise in the primary technologies represented by our cores. The Director will have direct responsibility for fulfilling the four charges and providing continuity and leadership needed to advance our core facilities.

Director of Core Facilities: The Director will serve as the Chairperson and as a voting member of the Core Facilities Executive Council. The Director will fulfill Executive Council decisions and will have primary administrative responsibility for ensuring regulatory compliance, fiscal vitality, and research impact of our core facilities. The Director will have primary responsibility for fulfilling the four charges, including the following non-exclusive responsibilities:

- Ensure compliance with all federal, state, and university regulations.
- Construct continuously-updated compilations of all institutional core facilities, including all relevant instrumentation, services, personnel, and contact information.
- Ensure that core facilities are fully featured on a continually-updated ECU Core Facilities website to ensure visibility of instrumentation and services.
- Provide material support including technical descriptors to aid grant submissions.
- Actively build new core facilities or incorporate department-based/college-based facilities into an integrated core facilities structure to meet the current and emerging research needs of faculty.
- Actively survey departments, schools, colleges for instrumentation that could be incorporated into a core.
- Actively decommission or consolidate instrumentation/services/cores as needed to judiciously balance resources and needs.
- Actively manage the commitment of personnel, technical support, and resources to each of the individual core facilities.
- Provide an annual review to the Core Facilities Executive Council and REDE summarizing the research impact of each individual core together with trajectories and future needs.
- Provide an annual audit to the Core Facilities Executive Council and REDE to facilitate fiscal oversight of the instrumentation and service components for each individual core facility.
- Implement optimal strategies to sustain the economic vitality of our core facilities, which will include tracking the utilization and annual return-on-investment of our core facilities.
- Serve as Principal Investigator or otherwise facilitate grant applications to secure new instrumentation and services to keep ECU abreast of new technological advancements.
- Ensure that each individual core is supported by an active advisory committee comprised of internal and/ or external scientists with deep expertise in the given technology and a dedicated commitment to the core.
- Negotiate user access or reciprocal user arrangements so that ECU scientists have access to core facilities at other institutions with equitable user-rates, communicated to ECU scientists via web-based services.
- Ensure that the core facilities fulfill an educational mission by providing expert theoretical and technical consultation as well as individualized training opportunities for faculty, staff, and students.
- Facilitate outreach efforts to recruit new users inside and outside of ECU via seminar programs and classes.
- Provide support to directors of individual cores for advanced training opportunities to keep ECU on the cusp of novel, cutting-edge technology.

- Ensure that core facilities provide high quality service, including transparent and equitable fee structures for service, unbiased priority/timeliness of service, and feedback surveys to register user satisfaction.
- Create a responsive feedback system to identify systemic patterns of service-related deficiencies associated with individual cores.

Core Facilities Executive Council: The Council will comprise the central decision-making body and will mediate the oversight responsibility of the Office of Integrated Core Facilities. The Council will be comprised of the following members:

- The Director of Core Facilities will serve as Chair and as a voting member of the Council.
- Faculty directors of the individual cores will serve as voting members.
- One Associate Dean of Research from each campus (AA & HS) will serve as a voting member.
- Users and/or core facility staff may serve as voting or non-voting members.
- A liaison member of the Core Facilities External Review Committee (see below) who may hold voting or nonvoting status.
- Ex-officio members from Financial Services and REDE may be recruited to serve in a non-voting capacity.

The Core Facilities Executive Council will have the following responsibilities:

- Inform and facilitate the flow of information among administrative leaders, faculty, and scientists to optimize operation of our core facilities.
- Provide a deep foundation of technical expertise and will work to build consensus regarding optimal strategies for advancement of our core facilities.
- Inform and assist the work of the Director.
- Facilitate the synthesis of annual reports, including annual financial audit and performance review of each core, for the Director of Core Facilities, University leadership, and the External Advisory Committee.

Core Facilities External Review Committee: The membership for this External Advisory Committee will be recruited by the Director and Core Facilities Executive Council from extramural institutions, representing strategic scientific leadership from neighboring universities. This Committee will comprise a body with deep expertise in current technologies and/or future technologies relevant to our current and extrapolated research needs. This Committee will advise on the status, the future prospective, and potential collaborative synergies to help inform the trajectory of our cores. The Committee will review the annual financial audit and the annual performance review for each core to help synthesize their advice to the Council and REDE.

Structure of the Individual Core Facilities: Each individual core of the Integrated Core Facilities will be structured according to the balanced consideration of resources and impact, as adjudicated by the Director and Council. Each core will be led by a faculty-level Core Director who will be assisted by a Core Facility Advisory Committee. As needed, Core Directors should be afforded appropriate support, which may include funding for the core, for technical staff, and for participation in training/ conferences so that the directors may keep ECU on the cusp of novel, cutting-edge technology. Support may also involve release time from teaching and/or other administrative duties so that the Director has the opportunity and flexibility to build a successful independent research program. The Core Director, in conjunction with the committee, will ensure efficient operation and regulatory compliance of the facility, including documentation of all feedback required by the Director of Core Facilities. The Core Director will be expected to serve as lead PI on instrumentation/ service grant applications and successfully advance the technical capability of the core.

In summary, the committee recommends a new Integrated Core Facilities structure under the leadership of a Director of Core Facilities. This structure will incorporate a Core Facilities Executive Council and a Core Facilities External Review Committee, with oversight of the Individual Core Directors and respective Individual Core Advisory Committees. An Integrated Core Facilities structure will offer oversight at an institutional level to provide optimal alignment of university resources and mission.

Creating and Cataloging a Central Repository of Core Facilities at ECU

Challenge: Because most equipment currently in use by core facilities at ECU was purchased (and maintained) by college/school/department funds, faculty (grant) funds, and/or student laboratory fees, priority usage on most equipment is given to the purchasing PI(s) or the department. In some cases, particularly where equipment is used in support of student learning in course-based laboratories, demand on the equipment is high and/or seasonal. Moreover, many individual pieces of equipment are housed in research areas that require specific authorization for entry. Rules for entry into a lab space are governed by appropriate departmental and Environmental Health and Safety regulations and are in place to ensure the safety of both the personnel using the equipment and the equipment itself. Considering these issues, and in the absence of overarching ECU infrastructure for cores, cataloging equipment has been the responsibility of individual cores and/or departments. Although advertising core facilities to internal and external users is essential to maintain core facilities, creating a central repository for core equipment is a daunting task. Departments are wary of opening equipment to outside users without protections for their own faculty and students, who need the instrumentation to succeed.

Recommendation: As outlined above, the optimal characteristics of an ECU Research Core Facility include both the equipment and the personnel necessary to provide deep expertise in the use, analysis, and evaluation of data obtained from a particular piece of equipment. Thus, it is the recommendation of the Cores Group that creating a Central Repository be contingent on building official research service centers. Financial Services (Tereasa Hopkins) has already begun the difficult process of identifying units with the potential to become research service centers. Units undergo a lengthy paperwork process to establish fee structures for equipment, develop a business plan, and identify equipment and ECU employees who provide services within the core. Although some core facilities have already started this process, other departmental cores do not have an official administrative structure and are not, at present, in a position to initiate an official research service center.

The Cores Group recommends that establishing ECU Research Core Facilities and developing a universal website dedicated to advertising available resources should be the highest priority of the new ECU Office of Integrated Core Facilities. This goal alone will require significant time investment of the Director of Core Facilities and significant monetary investment on the part of the university and should be expected to take time to develop correctly. The Director of Core Facilities and the Core Facilities Executive Council will need to work together with Departments, Schools, and Colleges across the university to develop mutually beneficial arrangements to support and advertise departmental equipment. The Director of Core Facilities should prioritize support of existing core facilities, identify ways to pool smaller facilities, and recruit Departments or PIs to contribute their equipment into core facilities. This will require careful examination, in consultation with Departments, of the usage, user base, and potential for growth of existing cores. The ECU Office of Integrated Core Facilities should consider offering extensive support to encourage department buy-in, including help with website advertising, incentive programs to initiate cost center recognition, stipends for faculty management of core facilities, and/or off-sets for service contracts or maintenance fees. We recommend that equipment only be cataloged and advertised once it is part of an ECU Research Core Facility, such that administrative support and user access for equipment has been vetted and Departments/PIs have consented to provide intellectual support for additional users. We also recommend adding a disclaimer under all advertised equipment stating that permission to access core facility space and use of equipment are subject to specific guidelines (training, safety, reservation systems, prioritization, etc.) and user fees.

As a first step towards achieving a central repository of core facilities (i.e., a unified ECU Integrated Core Facilities), the Office of Integrated Core Facilities should identify areas of research excellence on campus. Possibilities could include Mass Spectrometry, Cellular Imaging, Flow Cytometry, and Translational Research, as these are high-usage Departmental core facilities that also serve a broad user base. The Director of Core Facilities and Facilities Executive Council should work with Departments/Colleges to identify ways to group pieces of equipment into common spaces and under supervision of common managerial staff (i.e., faculty director and operations manager) with appropriate considerations. It should be noted that while proximity of instrumentation in a common space is optimal for a well-functioning core facility, instrumentation does not have to be co-located to be grouped into a core facility. This may make it more feasible to balance the needs of faculty (particularly if equipment is purchased using faculty start-up funds) and the services provided by the core facility. Additional considerations are:

- Monetary support of the core: who provides financial support, what does the budget look like, how is it maintained over time. Support may include (but not be limited to) research technical staff lines, opportunities for small pools of Research Initiation Grant-type internal awards (to cover user fees on equipment), and stipends for core facility faculty director position(s).
- Centralized campus spaces, with easy (but restricted) university-wide access for students, faculty, and staff and opportunity for growth.
- Research facilities needed in close proximity to core facilities to support users from other buildings (also considering concentration of user base, necessity for equipment to be near other equipment, etc.).
- Need for researchers to be associated with one another and with core facilities, to maximize productivity and leverage maximal scientific expertise.

Once a few areas of research excellence are established as ECU Research Core Facilities, additional equipment/resources can be added over the next 5-10 years. The first areas of research excellence would thus serve as role models, to encourage other core facilities to follow suit.

Identifying and prioritizing core facility upgrade requests, establishing new core facilities, and decommissioning existing core facilities at ECU

Challenge: Research core facilities must evolve with new technical advances. The purchase of new or replacement instrumentation, as well as the maintenance or decommissioning of existing equipment when warranted, is critical for sustaining research at ECU. A centralized core facility structure currently does not exist to field these requests, and this results in duplicate instrumentation across campuses, essential equipment in need of upgrade or replacement, and wasted university resources. This necessitates the identification of core facility organizational structure to address these issues. A major challenge lies in gaining faculty and departmental support for a university-level core facility structure. If the departments are solely responsible for financially backing the cores, then REDE should have little say in whether core facilities should purchase new equipment or decommission old equipment. This can put an unnecessary financial burden on departments or colleges. However, if departments buy-in to a university-level structure, then resources will be centralized allowing for strategic support, review, and decommissioning of equipment or an entire core.

Recommendation: Ideally, the Director of Core Facilities and the Core Facilities Executive Council, in collaboration with Departments hosting the equipment and Academic Council, would take the lead on reviewing requests for new equipment for ECU Research Core Facilities, identifying the need for new cores and/or core equipment, and decommissioning older equipment or facilities. To accomplish this, the Director of Core Facilities should solicit both subjective and objective data from each ECU Research Core Facility regarding user satisfaction, sustainability of revenues/expenses, number of unique users, grant submissions, publication citations, etc. to track facility use and research contributions. This may take the form of an annual report obtained from each core director or generated from other means such as surveys/feedback or data collected from InfoED/RAMSeS.

Identifying and prioritizing core facility upgrade requests. Director of Core Facilities and the Core Facilities Executive Council will review requests for state one-time funding for core facility upgrades/additions, Federal limited-submission equipment grants (i.e., NSF MRI), core facility cost recovery (to break-even when user fees don't cover costs), and equipment requests associated with new faculty hire startup packages. They will review preliminary proposals prepared by core directors or faculty for new equipment requests and choose suitable requests based on how instrumentation expands research capabilities of faculty members at ECU and how the resulting research aligns with the University's mission. The director of cores and the advisory committee will also review data collected from core directors to prioritize requests for instrument upgrades.

Establishing new core facilities or decommissioning existing cores. The changing research landscape and shifting University research priorities will require the establishment of new core facilities and the decommissioning of existing cores. Again, the Director of Core Facilities and the Core Facilities Executive

Council can readily achieve this by reviewing annual reports submitted by each core facility. A strategic plan should be put in place such that the Core Facilities Executive Council reviews all ECU Research Core Facilities annually to determine if they fit the current research goals and priorities of the University and faculty. The new director and council can put into place metrics such as those listed above when making these recommendations. Equipment in ECU Research Core Facilities identified for decommissioning should be offered back to the Departments. If a Department is willing to assume responsibility for the continued maintenance of the equipment, then that equipment becomes the purview of the Department to use as they wish for education or training purposes. If the equipment is not desired by a Department, it should be sent to surplus, stored, traded in, transferred, or offered for disposal, per University policies.

Tracking the Utilization and Annual Return-on-Investment (ROI) of Core Facilities

Challenge: Core facilities frequently do not generate sufficient income from recovered fees to pay the salary and benefits of the respective personnel (i.e., Core Director and operational staff) plus operational and maintenance expenses. Core Directors at multiple peer and neighboring universities indicated that more than 50% of their operational expenses were provided by the institutions or from extramural grants/funds. The challenge is how do the Core Facilities Director, Core Facilities Executive Council, and other ECU constituents evaluate the full institutional value and ROI of a Core.

Recommendation: The purpose of university-supported core equipment is to provide faculty, staff, and students with access to resources they otherwise might not have. The benefits to institutional constituents are the ability to submit competitive research proposals for major awards, to conduct cutting-edge research that brings recognition to ECU, and to maximize the educational opportunities to students and enhance enrollment. ROI on Core investments should not be judged by net revenue alone. Rather, ROI should be evaluated using a set of subjective and objective measures and outcomes that document the true value to ECU and its faculty. As part of the process to establish an ECU Research Core Facility, a cost analysis is performed to determine fee-for-service rates; a similar process occurs each year when cores seek to renew its status. These annual data will help provide some information about the "financial health" of the core; however, financial data should not be the only factor when determining a core's institutional value. Data that should be tracked and included in a core's annual report include:

- Core operating costs and generated revenue.
- Users and their Schools/Colleges/Centers/Institutes.
- User-reported publications containing data that are formally attributed to the core via acknowledgement. Data should include number of trainees included as authors (i.e., high school students, undergraduate students, graduate students, post-doctoral fellows and clinical residents/fellows).
- User-reported presentations (i.e., oral, poster) containing core-derived data at local, regional, national and international meetings. The data should include number of trainees included as project participants (i.e., high school students, undergraduate students, graduate students, post-doctoral fellows and clinical residents/fellows).
- Grants that include work performed by the core (i.e., services performed by core staff, including sample preparation, instrumentation operation, user training, or data analysis).
- Proposals on which the Core Director participated in the proposal development process.
- Results of user satisfaction surveys.

Creating Mechanisms to Establish Memorandums of Understanding within the University of North Carolina System to Increase Accessibility and Collaboration Among Core Facilities

Challenge: Although the research enterprise at ECU is growing rapidly, we have not yet achieved a level of grant support that makes it possible to establish core facilities covering all types of equipment needed by ECU faculty and staff. Moreover, it will not always be fiscally sustainable to maintain equipment that is used infrequently or is excessively costly to maintain. The proximity to the Research Triangle and the availability of a wide variety of equipment within the UNC System of Higher Education thus stand out as viable alternatives for ECU researchers to access equipment they need. The Cores Group found, however, that many ECU researchers have attempted to access equipment at neighboring institutions, only to find that the costs were higher than for "in-house" researchers or that samples were de-prioritized in favor of local researchers. This was considered an impediment to continued research growth at ECU.

Recommendation: The Cores Group proposes that formal Memorandums of Understanding be established between ECU and neighboring institutions (in particular, NC State, University of NC at Chapel Hill, University of NC at Wilmington, and University of NC at Charlotte) allowing ECU researchers to utilize core facilities at UNC System schools at "in-house" rates. It is worthwhile to note here that NC State's Office of Research and Innovation recently established five university Shared Core Research Facilities, each of which already charge ECU researchers the same rates that NCSU researchers pay. Establishing formal ties with NC State may be the first place to start in this endeavor. In addition, the Cores Group recommends creating a centralized website on the ECU Office of Research, Economic Development, and Engagement main page that would advertise ECU Research Core Facilities to outside researchers. In particular, this would benefit our neighboring schools (Elizabeth City State University, University of NC at Pembroke, University of NC at Wilmington, and Fayetteville State University) by opening our resources in-kind.

The Director of Core Facilities, the Core Facilities Executive Council, and the individual Faculty Directors of ECU Research Core Facilities can also promote collaboration between core facilities by prioritizing and providing opportunities for professional development for core facility faculty, staff, and student workers. Within research specialties, there are regional, local, and national discussion networks and professional societies that meet regularly to promote continued education and research about the theory and applications of specific instrumentation. This is a particular advantage of our location close to central NC, where the NC Biotechnology Center frequently hosts intellectual exchange groups to promote continued education. For example, the Triangle Area Mass Spectrometry Group meets once a month and includes opportunities for trainee travel awards, research awards, and presentations. The American Society for Cell Biology also hosts an annual regional meeting that highlights microscopy resources and research and could be an excellent venue to promote an ECU Microscopy Research Core Facility. In addition to attending meetings, core facility faculty directors should be encouraged to promote their facility through departmental seminars, lunch and learn series, and regional meetings hosted at ECU such that faculty at ECU and throughout the region can learn what equipment and expertise are available and who to contact.

While it may not always be feasible for core facilities at neighboring institutions to prioritize samples from ECU, establishing a common price structure across the UNC System will dramatically benefit ECU researchers. Most importantly, it reduces the amount of time that ECU researchers frequently spend finding suitable equipment for their research through external or commercial sources. By keeping research dollars in UNC system core facilities, we also promote fiscal accountability within the UNC system.