**SPECIFIC AIMS (ADMINISTRATIVE CORE)**

Biomedical research in universities spans multiple academic units and research centers/institutes, sometimes resulting in duplication of administrative resources and/or a failure to take advantage of interdisciplinary collaborative opportunities. The University of New Hampshire (UNH) is poised to overcome these traditional obstacles due to recognition by its leadership of the need to: (a) support and promote areas of research excellence, (b) provide programs for faculty development that cross disciplinary and academic unit boundaries, and (c) develop assessment tools to evaluate program effectiveness. What is currently missing at UNH is a coherent administrative structure to oversee and coordinate biomedical research initiatives, including: (1) strategic recruitment and hiring of biomedical researchers across traditional academic boundaries, (2) professional development and mentoring opportunities for junior investigators, (3) institutional support for core research facilities (*see Research Core*), and (4) an assessment plan to evaluate the effectiveness of programs once implemented.

The long-range goal is to leverage the formation of a Genome-Enabled Biomedical Research Institute (GEBRI) to create long-lasting improvements in the research environment at UNH that enhance participation in genome-enabled biomedical research at UNH itself and with its academic partners regionally. The objective of this application is to implement an administrative core structure at UNH that successfully supports the growth in the number of NIH-funded independent investigator projects in the area of genome-enabled biomedical science, coordinates resource sharing, promotes transfer of scientific expertise, and fosters scientific communication. We propose that this investment in an effective administrative infrastructure will greatly facilitate and expand current efforts to enhance the quality and quantity of biomedical research at UNH (and regionally), as well as simultaneously support the professional development of outstanding, early-career biomedical researchers.

The Specific Aims of the Administrative Core are to:

**(1) Create a sustainable administrative structure to effectively oversee and coordinate the activities sponsored by the GEBRI.** To effectively implement the GEBRI, the project directors will establish advisory and steering committees, provide oversight of the mentoring relationships for the junior investigators, and enhance the network of academic partners at other regional institutions.

**(2)** **Implement an intensive, multi-step career development program that prepares early-career researchers to develop independent, externally funded biomedical research programs.** To accelerate the pace of career advancement of the junior investigators, the PIs will actively participate in two ongoing UNH faculty mentoring programs, and integrate these programs with GEBRI-specific mentoring relationships and multidisciplinary training experiences.

**(3) Establish a comprehensive evaluation process of junior investigators’ progress and of the overall effectiveness of the GEBRI**. To determine the effectiveness in meeting the aims of the program, a Steering Committee will conduct formative and summative evaluations of the junior investigators (e.g., achievement of agreed-upon milestones), and an Internal Advisory Committee (IAC) will conduct evaluations of the Steering Committee (e.g., implementation and effectiveness of program administration, impact of mentoring on professional development of mentees, effectiveness of communications and development of collaborative relationships with academic partners).

The expected outcome upon completion of these aims will be the establishment of a sustainable administrative structure at UNH that supports the growth of the biomedical research infrastructure within UNH and regionally. The impact and legacy of this program will be an increase in the quality and quantity of biomedical research at UNH and in the region, better engagement of junior faculty in career-enhancing, mentor-based relationships, and the creation of a vibrant collaborative biomedical research environment for UNH and for its academic partners in the region.

**SIGNIFICANCE (ADMINISTRATIVE CORE)**

The University of New Hampshire (UNH) is focused on providing high-quality undergraduate education while offering a small number of excellent graduate programs. The Carnegie Foundation for the Advancement of Teaching classifies UNH as a “Research University/High Research Activity.” UNH is also distinguished as a land-grant, sea-grant, and space-grant institution. Within the College of Life Sciences and Agriculture (COLSA) and the College of Engineering and Physical Sciences (CEPS), there are numerous research-active faculty who have historically focused on fundamental biological problems and/or advances in engineering without explicitly linking their research to its potential relevance to human health and disease. Both colleges have recently invested in hiring faculty whose research is in genome-enabled biology (COLSA) and bioengineering (CEPS), most of whom are excellent candidates for developing strong biomedical research programs (including the four junior investigators in this application). Recognizing the need to enhance UNH’s NIH grants portfolio, the Senior Vice Provost for Research instituted a university-wide “UP-2-NIH” program two years ago to specifically enable UNH faculty poised to re-direct and/or enhance their efforts to secure NIH funding for biomedical research programs. This COBRE application will provide the administrative mechanisms needed to greatly intensify these efforts to enhance the number and quality of NIH-funded research programs at UNH.The career-development and assessment programs offered to the junior investigators in GEBRI whose multidisciplinary research programs center around the theme of “genome-enabled biology” can be scaled up in the future to include other biomedical research investigators at UNH and in the region.

*Implementation of the GEBRI at UNH is significant because it is the next important step in enhancing a strong biomedical research climate at UNH and with its academic partners.*

Once the proposed programs/activities are implemented, several benefits will accrue: (1) a community of inter-connected, genomics-enabled biomedical researchers will be created, one that crosses traditional academic boundaries of department, college, and even institution; (2) a greater number of NIH-funded, sustainable biomedical research programs, an outcome which will emanate from the administrative structure and purposefully designed mentoring programs that are implemented; (3) quantitative measures of the effectiveness of the GEBRI that will provide insight into what is working and how we can improve the programs/activities over the project period.

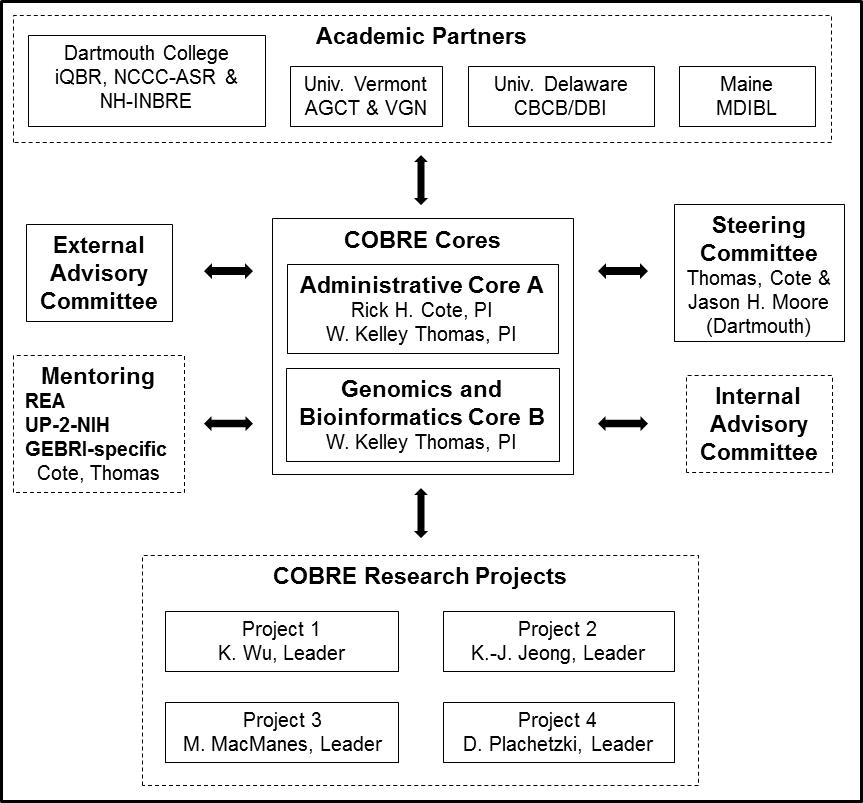
**INNOVATION (ADMINISTRATIVE CORE)**

There are several possible reasons why NIH funding at UNH has not achieved “critical mass” in comparison to external funding awarded to UNH by federal agencies (e.g., NSF, NASA, NOAA), such as (1) many biomedical researchers are scattered in multiple departments in multiple colleges on the UNH campus; (2) prior to creating UP-2-NIH, UNH lacked training workshops and mentoring opportunities specifically geared to the needs of biomedical researchers, and (3) failure by previous UNH leadership to appreciate that a vibrant biomedical research environment can exist without an affiliated medical school. Several innovative aspects of the GEBRI will overcome these historical inhibitors to growth of biomedical research at UNH.

The innovativeness of this work is that GERBI:

* Provides a three-tiered professional development sequence that seamlessly and sequentially integrates institutional and GEBRI-specific programs;
* Creates a genome-enabled biomedical research community at UNH that transcends departmental and college “silos” and is self-sustaining;
* Utilizes a comprehensive evaluation plan that not only assesses the performance of the junior investigators, but also provide annual evaluations of the effectiveness of the Steering Committee and of the GEBRI-specific mentoring program.

Significantly, GERBI will be the umbrella that unites, catalyzes, and sustains a strong and productive biomedical research program at UNH. The recent positive changes in UNH’s institutional climate (*see Significance*) provide a very timely opportunity for the GEBRI to have a profound and lasting impact on increasing the number of NIH-funded programs at UNH, training the next generation of genome-enabled biomedical researchers, and enabling more researchers at UNH and in the region to understand and use genomic and bioinformatic approaches to address important issues in human health and disease.

**APPROACH (ADMINISTRATIVE CORE)**

**Aim 1: Create a sustainable administrative structure to effectively oversee and coordinate the activities sponsored by the GEBRI.** To effectively implement the GEBRI, the PIs will establish advisory and steering committees, provide oversight of the mentoring relationships for the junior investigators, and develop the network of academic partners at other regional institutions. (*See Organizational Chart*.)

***Introduction.*** Implementation of the GEBRI requires a well-designed plan, including an administrative structure that oversees all program operations, supports the leadership team, provides quality mentoring for the junior investigators, and facilitates communication and outreach to external stakeholders. The objective of this aim is to create an administrative structure that at its core consists of a Steering Committee, an Internal Advisory Committee, and an External Advisory Committee, but which also integrates and oversees the activities of the Research Core, the individual junior investigators’ research projects, and interactions with Academic Partners and external audiences, all with the support of a dedicated Program Manager.

***Justification and Feasibility.*** As shown in the accompanying diagram, we propose an administrative structure led by a Steering Committee consisting of the two PIs and an experienced administrator of active COBRE programs at Dartmouth College (Dr. Jason Moore). An Internal Advisory Committee (IAC) consisting of key academic administrators and research administrators at UNH (*see below*) will provide oversight and periodic formative evaluations of the program and the Steering Committee. An External Advisory Committee (EAC) will also be assembled prior to the start of the grant to carry out assessment of the GEBRI’s scientific progress and to advise the Steering Committee on scientific matters. Together, these three administrative components will become the foundation for long-term improvements in the biomedical research infrastructure that will become self-sustaining during the five-year project period. The composition and detailed functions and responsibilities of each administrative component are described below.

***Design.*** The administrative core consists of three major components: Steering Committee, Internal Advisory Committee, and External Advisory Committee, as well as a Program Manager to support the administrative functions of the GEBRI. Scientific aspects. The GEBRI Steering Committee will monitor the junior investigators and their lab staff/ personnel to ensure adequate yearly progress. PIs Thomas and Cote will participate in monthly science meetings and brainstorming sessions to discuss results and problems encountered with the investigators. It is anticipated that these meetings will increase research productivity and enhance collaborations amongst the junior investigators. The investigators will provide written progress reports and future plans every 6 months that the Steering Committee will communicate to the EAC. The EAC will discuss the reports with the PIs and recommend changes. To remain a part of the Center, the investigators must meet agreed-upon milestones (*see Aim 3*), as documented by written progress reports. If an investigator fails to demonstrate adequate progress, remedial steps will be suggested by the EAC, in consultation with the PIs. If the EAC recommends removal of the investigator, approval will be sought from NIGMS prior to any action. The IAC will provide additional oversight and input to the Steering Committee, and will serve the important function of helping ensure the long-term institutional sustainability of the GEBRI (e.g., REA and UP-2-NIH programs, cost-sharing agreements, etc.). Fiscal/administrative aspects: PI Cote is responsible for the overall administrative and financial management of the GEBRI, and will directly supervise the Program Manager. PI Thomas has responsibility for management of the Genomics and Bioinformatics core and directly supervises its staff. The Program Manager will be responsible for financial matters, including budgets, personnel activities, and financial reporting to the Steering Committee and junior investigators. The junior investigators will be responsible for managing the budgets for their individual research projects. The External Advisory Committee will review the fiscal aspects of the GEBRI with the Steering Committee during the biannual meetings. Recommendations of the EAC will be implemented and reports forwarded to NIGMS.

***Steering Committee.*** The Steering Committee is responsible for ongoing leadership of the GEBRI’s overall operations for the proposed project period. Specifically, the Steering Committee will meet weekly to oversee the program, consult with the junior investigators and other biomedical researchers at UNH and at partnering academic institutions, and supervise the GEBRI’s administrative and research staff. PIs Cote and Thomas are committing respectively 2 and 3 months of effort per year exclusively to managing the GEBRI’s administrative and scientific aspects, in recognition that this type of biomedical infrastructure currently does not exist at UNH and will require sustained effort to create and maintain.

Rick H. Cote, Ph.D. is a highly skilled and effective academic administrator in his role as department chair (for the past six years) of UNH’s Molecular, Cellular, and Biomedical Sciences (MCBS) department, the academic unit with the highest concentration of biomedical researchers at UNH. MCBS consists of 44 faculty, 4 professional instructional staff, 4 administrative assistants, 4 undergraduate degrees (enrolling >900 students) and several graduate programs (>60 graduate students). Cote’s administrative accomplishments include chairing the committee that implemented COLSA’s reorganization in 2008, leading to the formation of MCBS as the primary locus for biomedical research at UNH. He guided the design of a new undergraduate curriculum in Biomedical Sciences that quickly became COLSA’s most popular baccalaureate degree program. Cote, PI Thomas, and another MCBS faculty member (Dr. Vaughn Cooper) have recently led the creation of a new multi-disciplinary doctoral program in Molecular and Evolutionary Systems Biology whose thematic focus aligns extremely closely with the GEBRI scientific mission. Cote is a leading biomedical researcher in his own right, currently in his 25th year of R01 funding from the National Eye Institute, recognized internationally as an expert on cyclic nucleotide phosphodiesterases (PDE) with a focus on the structure, function, regulation, and molecular evolution of this enzyme family. He serves as the Faculty Director of the UP-2-NIH faculty mentoring program, and will continue in this capacity in order to integrate the GEBRI mentoring plan with this UNH-wide program. Cote will have primary responsibility for oversight of the GEBRI’s Administrative Core, in addition to his mentoring duties.

W. Kelley Thomas, Ph.D. is a recipient of the UNH Excellence in Research Award for his contributions to advancing genome biology across diverse disciplines. As Director of the Hubbard Center for Genome Sciences (HCGS), Thomas has a long history of managing service-based genomics and bioinformatics facilities as well as providing expertise in consulting, training, and curriculum development related to genome science. He has experience coordinating large-scale multi-investigator projects, including the NSF Tree of Life project. He recently was the PI on a successful NSF Major Research Instrumentation proposal to acquire a next-generation sequencing instrument in support of numerous research projects, and he is the PI of a research coordination project in metagenomics. Thomas serves as a Director of the NH-INBRE Bioinformatics Core (along with Jason Moore, the third member of our Steering Committee; *see below*) which supports numerous investigators from primarily undergraduate institutions in the Northeast region. Thomas has mentoring experience from his past and current participation in the UNH Research and Engagement Academy (*described in Aim 2)* and in the UP-2-NIH program (*see Aim 2*). Thomas has responsibility for GEBRI’s Genomics and Bioinformatics Research Core and the Administrative Core, along with his mentoring duties.

Jason H. Moore, Ph.D. is the Director of the Institute for Quantitative Biomedical Sciences (iQBS) at Dartmouth College, and a Fellow of the American Association for the Advancement of Science (AAAS). He is a leading expert on translational bioinformatics research with a long history of NIH funding, including being PI for the current Dartmouth COBRE on Computational Biology. His extensive administrative experience with COBRE programs at Dartmouth will accelerate establishment of an effective GEBRI at UNH. Moore’s expertise in computational biology is critical to successfully establishing effective linkages with the Dartmouth COBRE. Moore’s leadership role in establishing New Hampshire Net, the state’s computational infrastructure, underlies our collective ability to engage regional partners through NH-INBRE. The strong working relationship that exists between Moore and Thomas represents an exceptional opportunity to efficiently establish the GEBRI at UNH and to engage academic partners through the regional network with whom they both interact.

***Internal Advisory Committee (IAC).*** The responsibilities of the IAC are to: (1) provide institutional oversight of the GEBRI, (2) coordinate with the Steering Committee for providing mentoring opportunities (Research and Engagement Academy, UP-2-NIH, etc.), (3) coordinate future faculty hires in COLSA and CEPS whose research has a biomedical focus, (4) support opportunities to improve the biomedical research infrastructure (e.g., University Instrumentation Center, submission of Major Research Instrumentation proposals), (5) meet quarterly to assess program effectiveness and timelines/milestones, and (6) conduct formal annual evaluations of Steering Committee effectiveness in meeting the specific aims of the GEBRI’s administrative and research cores.

The following IAC members are academic and research administrators at UNH with leadership roles and a shared institutional aspiration to develop and grow a strong UNH biomedical research infrastructure.

Jan Nisbet, Ph.D., Senior Vice Provost for Research, provides leadership and support in advancing excellence in research at UNH. As UNH’s chief research officer, she recognizes the need and opportunities for creating a stronger biomedical research environment at UNH by providing resources for UP-2-NIH program (designed and implemented in collaboration with PI Cote and others). Nisbit has committed to support an additional tenure-track faculty position in bioinformatics to join the GEBRI junior investigators. Nisbet oversees the UNH’s shared instrumentation facilities, and her institutional investment in the biomedical research infrastructure and support of hiring new faculty in the area of biomedical research helps ensure the GEBRI’s success.

Julie E. Williams, Ph.D., Senior Vice Provost for Engagement and Academic Outreach, is the architect of the Research and Engagement Academy, the foundation of the three-tiered mentoring program. (*See Aim 2*)*.* In addition to nurturing a community of engaged researchers, Williams offers expertise in assessment and tracking faculty development.

Jon M. Wraith, Ph.D., Dean of COLSA, recently approved the hiring of, and provided start-up support for, four assistant professors whose research is in genome-enabled biology (two of whom are junior investigators in this COBRE application). Wraith has committed to support an additional tenure-track faculty position in bioinformatics to join the GEBRI junior investigators. In addition, Wraith has expressed his intention to support the long-term sustainability of the GEBRI with targeted hiring of additional faculty in genome-enabled biology to replace the current faculty when they success in the final milestone of obtaining NIH (or equivalent) funding.

Samuel B. Mukasa, Ph.D., Dean of CEPS, is committed to growing bioengineering research as evidenced by the recent hires of two Chemical Engineering Department faculty who are junior investigators in this COBRE application. The GEBRI is strengthened by the multi-disciplinary approaches that incorporate a genome-enabled biological perspective in /approach to biomedical engineering research programs.

Kathryn B. Cataneo, MBA, Director of Research Development and Communications, is the Administrative Director of the UP-2-NIH program, the second component of our three-tiered mentoring program. In collaboration with Cote, Cataneo provides leadership for the programming of the UP-2-NIH, as well as developing assessments of the program’s effectiveness. Cataneo is also a member of the leadership team for the Research & Engagement Academy and UNH Writing Academy, and is the Administrative Director of UNH’s annual NSF Career and Department of Energy Early Research Career programs to stimulate competitive applications to those agencies.

Scott Valcourt, Director of UNH Information Technology Project Management, has served as PI on several cyberinfrastructure grants to the region that have greatly improved communications and data transfer for bioinformatics projects. He brings expertise in videoconferencing that will enhance our ability to effectively communicate among Steering Committee and advisory committee members, as well as with academic partners in the region. Valcourt’s most recent grant is from NSF’s Campus Cyber-infrastructure Networking Infrastructure and Engineering Program to establish a science DMZ at UNH. The Hubbard Center for Genome Studies is one of the centers to benefit from this grant and will experience data transfer speeds at 10 times the current speed.

***External Advisory Committee (EAC).*** EAC responsibilities are to (1) oversee and guide the Steering Committee in developing and implementing this application’s specific aims; (2) critique the performance of the administrative and research cores and the scientific progress of the junior investigators; (3) share their scientific expertise in genomics and bioinformatics; (4) conduct annual, written formative evaluations and a final summative evaluation of the GEBRI’s development and the progress of the junior investigators toward independent status, and (5) review and recommend (to NIGMS) candidate investigators to replace those who “graduate” or fail to demonstrate satisfactory performance. The EAC will meet semi-annually, and prepare for the Steering Committee a written summary of the issues discussed, recommendations made, and actions to be taken.

EAC composition will be critical to the sustained success of GEBRI. EAC members will be familiar with the GEBRI mission, have extensive expertise in genomics and bioinformatics, and have the administrative experience to provide critiques of the scientific progress of the junior investigators and of the Steering Committee’s effectiveness in administering the GEBRI Cores. The GEBRI is firmly committed to enabling partnerships and resource-sharing mechanisms to enhance scientific exchange, as well as providing state-of-the-art infrastructure to the academic partners. For this reason, regional scientific leaders familiar with genomics and bioinformatics infrastructure (as well as with each junior investigator’s research interests) would be exceptionally well suited to serve as EAC members. The high density of regional IDeA states (NH, ME, RI, VT, DE) with which we partner offers a deep pool of scientific experts with knowledge of regional biomedical research infrastructure. Among other COBREs outside the Northeast, the Institute for Bioinformatics and Evolutionary Studies (IBEST; University of Idaho) is similar in scientific theme and administration to UNH’s GEBRI and could play an important role in advising us about the entire scope of our program—scientific and administrative. Finally, the scientific backgrounds and expertise of two of our junior investigators in bioengineering bring an exciting multidisciplinary element to our GEBRI. Thus, the effectiveness of the EAC to advise and oversee the program would be greatly enhanced by including scientist(s) who are highly knowledgeable of the biomedical engineering discipline; we are aware of highly successful individuals at the Massachusetts Institute of Technology and at the University of Delaware.

***GEBRI Program Manager***. To provide administrative and operational support for the GEBRI, a dedicated full-time Program Manager is needed. Working under the general supervision of the Steering Committee (with daily reporting to PIs Cote and Thomas), the Program Manager’s duties are to manage and oversee the fiscal, operational, administrative, and communications aspects of the program. Specifically, the Program Manager will schedule regular GEBRI meetings and record meeting content; facilitate scheduling of mentor-faculty meetings and committee meetings; prepare and disseminate periodic progress reports; administer web sites and use social media to advertise the ongoing programs, events and accomplishments of the GEBRI; serve as liaison between the program and other internal/external organizations; prepare and administer periodic assessments.

***Expected Outcomes.*** Upon completion of Specific Aim 1, we will have established a stable, sustainable administrative core that supports the career development of the junior investigators participating in the program, and more broadly enhances the biomedical research infrastructure within UNH and with its regional academic partners. We anticipate that the four junior investigators originally participating in GEBRI will have successfully obtained external funding from NIH or other federal agencies, and that a second group of junior investigators will be mid-way through the process of applying for and obtaining research project grants. Through the participation of the PIs in the two university-sponsored mentoring programs mentioned above, GEBRI’s influence will extend to additional biomedical researchers at UNH and in the region. Finally, the establishment of the GEBRI administrative core will greatly strengthen communication of scientific knowledge and the sharing of genomics and bioinformatics resources with its regional partners and the public.

**Aim 2: Implement an intensive, multi-step career development program that prepares early-career researchers to develop independent, externally funded biomedical research programs.** To accelerate the pace of career advancement of the junior investigators, the PIs will actively leverage and participate in two ongoing UNH faculty mentoring programs, and integrate these programs with GEBRI-specific mentoring relationships and multidisciplinary training experiences.

***Introduction.*** A second major GEBRI objective is to promote the ability of investigators to successfully compete for independent research grants through NIH or other peer-reviewed funding agencies. In this difficult climate for securing adequate funding for health-related research, it is incumbent on academic institutions and those faculty members who have a strong track record of peer-reviewed, external funding to provide structured as well as personalized mentoring opportunities that enhance the ability of junior investigators to be competitive for external grant support.

One significant and innovative aspect of the GEBRI mentoring plan is its reliance on and direct involvement with two already established, effective faculty mentoring programs at UNH (i.e., Research and Engagement Academy (REA), UP-2-NIH program) to augment specific one-on-one research mentoring relationships focused on the advancement of individual research programs. The novel three-stage mentoring approach includes broad mentorship (REA), NIH-specific mentorship (UP-2-NIH), and specialized GEBRI-specific mentorship designed to develop each individual’s research program in a multi-disciplinary context.



***Justification and Feasibility.*** The timeline above summarizes the GEBRI’s three-phase mentoring plan. All four of this COBRE application’s junior investigators have completed or are currently (“Year 0”) enrolled in the REA, and will enroll in UP-2-NIH in the Fall of 2014 (“Year 1”). Both programs include a well-organized set of workshops, writing projects, and mentored experiences in which both GEBRI PIs participate as mentors; Cote also serves as the Faculty Director for UP-2-NIH. With two of the three stages of the mentoring experience for the junior investigators are already established, GEBRI will provide the research mentoring that commences with the beginning of the grant period and continues until the researchers obtain a research project grant and “graduate” from the program, (presumably in Year 3). This then allows the GEBRI to recruit new junior investigators to initiate the three-stage mentoring process again. [Note that this generic timeline does not explicitly include the proposed new faculty hire in bioinformatics who would start in Year 2 of the project period; since each program operates annually, new faculty can be enrolled in the three-stage mentoring sequence at any time.] Recruitment of new investigators at UNH will leverage the REA and UP-2-NIH programs. However, we will also actively seek appropriate new faculty from regional IDeA state partner institutions and research facilities. This progressive, three-stage mentoring sequence will offer the four GEBRI junior investigators a structured, supervised environment in which to develop competitive research project proposals that, when funded, will transition them to “independent investigator” status and allow new faculty to join the GEBRI.

***Preliminary results.*** The four research projects included in this COBRE application represent successful completion of the first milestone resulting from participation of the junior investigators in the AY13-14 REA.

***Design.*** The design of the three-stage career development program for junior investigators consists of three components: the UNH REA, UP-2-NIH, and GEBRI-specific mentoring.

***Research and Engagement Academy (REA).*** The REA’s mission is to advance and support the scholarly careers and success of faculty members by strengthening the quality and quantity of grant proposals submitted to external sponsors. REA has been offered by the Office of the Senior Vice Provost for Engagement and Academic Outreach (Dr. Julie Williams; *see letter of support*) and has supported 63 UNH faculty since 2011. Of the seven faculty whose research is in the area of the life sciences who participated in REA in the first two years, all seven have applied for grants, and five have been awarded peer-reviewed external funding. This attests to the positive benefits this first stage of our mentoring program can have for the junior investigators.

REA admission is contingent on a commitment by participating faculty to attend seven half-day workshops; work closely with an assigned “scholarly coach”; complete assigned activities (e.g., interaction with sponsor program officers); and write and submit a grant proposal to a peer-reviewed sponsor. The scholarly coaches’ responsibilities are to serve as mentors for two REA participants, meet monthly with each mentee, provide assistance in identifying the sponsor to target with a grant proposal, establish a timeline for proposal completion, critique the proposal, and serve on an REA workshop discussion panel. As part of their comprehensive mentoring responsibilities (*see below*), Cote and Thomas will serve as scholarly coaches for the GEBRI junior investigators.

*Note:* one of the junior investigators (Wu) has previously completed the REA, while the other three investigators are participating in the Spring 2014 REA program with PI Thomas serving as the scholarly coach for all three. The project proposals written for this COBRE application represent completion of a major milestone of the REA program.

***UP-2-NIH.*** Although many UNH faculty have research programs in health, biomedical and behavioral sciences, their success in competing for extramural funding from NIH has been limited. In FY12 NIH funding represented only $1.5M of UNH’s total $118M funding profile that year, while Dartmouth College’s non-medical school components received $11.5M from NIH. Other state universities without medical schools were able to obtain significantly more NIH funding in 2012 than UNH. For example, the University of Rhode Island received $14.3M, the University of Massachusetts at Amherst received $19.4M, and the University of Delaware received $21.6M (NIH Research Portfolio Online, 2013). To address UNH’s relative lack of experience in securing NIH awards, the Senior Vice Provost for Research (Dr. Jan Nisbet; *see letter of support*), Cote (Faculty Director of UP-2-NIH), Kathryn Cataneo (Director of Research Development and Communications and UP-2-NIH Administrative Director), and UNH faculty with NIH experience together developed and offered the UP-2-NIH program starting in academic year 2012-13. In that year, 7 of the 9 faculty participants submitted applications to federal sponsors; 2 of these received NIH awards and 2 others received independent investigator awards from NSF, while 3 are planning submissions to NIH in June or October. Of the 10 faculty in the 2013-14 cohort, 6 have already submitted applications to NIH and the other 4 plan to submit either in June or October.

The UP-2-NIH curriculum consists of 6 monthly 3-hour seminars that cover an introduction to NIH as an organization; locating information through NIH’s reporting tools; how to write various sections of the NIH application; understanding the NIH peer-review process and participating in a local mock review experience; application timeline and milestone planning; responsible research conduct; working with human subjects/ animals/ hazardous materials; developing the budget, biosketch, facilities/resources, and other such documents; the basics of excellent writing; and the nuts and bolts of application submission. The seminars are taught by both experienced external guest speakers and by UNH faculty and staff. In addition, participants attend 4 monthly 2-hour writing workshops in which they critique each other’s emerging NIH applications. The workshops are facilitated by NIH-funded UNH faculty, who also critique the application drafts. Each UP-2-NIH faculty member works with a discipline-specific NIH-funded mentor, either from UNH or from another institution. Mentors are expected to meet/talk with mentees at least monthly during the academic year, and to provide ongoing support at various stages of application preparation.

For the four GEBRI faculty participating in 2014-15 UP-2-NIH, Cote and Thomas (both experienced mentors in this program) will serve as their mentors, providing seamless, consistent guidance as supervision from REA through Up-to-NIH, and then to the GEBRI research project mentoring experience (*see below*).

***GEBRI-specific Mentoring***. Building on the first two stages of mentoring, GEBRI-specific mentoring by PIs Cote and Thomas will provide junior investigators with individually tailored guidance as they hopefully transition to externally funded, independent investigator status in their third year in the program. The major components of this final mentoring experience include: (1) weekly individual meetings with Cote and/or Thomas to discuss progress and to brainstorm overcoming obstacles; (2) monthly group meetings of all junior investigators that provide peer mentoring/support, and that take advantage of the multidisciplinary perspectives they bring to the group; (3) establishing concrete, achievable short-term objectives which when completed lead to peer-reviewed publications, presentations at scientific conferences, and other milestones.

A positive attribute of the GEBRI-specific mentoring plan is its flexibility to accommodate individual needs that could not be anticipated at the outset. In such instances, PIs Thomas and Cote will recommend (subject to approval of the EAC) individualized plans (e.g., visiting potential collaborators’ laboratories, attending a training workshop to develop competency in a particular skill if not available in the GEBRI or through our regional partners).

Detailed milestones for the GEBRI-specific mentoring phase, and the timeline for milestone completion, are presented in the Table in Aim 3A on formative evaluation of junior investigators.

In addition to the strong mentoring relationships each junior investigator develops with the GEBRI PIs, the junior investigators will be directed to establish at least one new, collaborative relationship with an established investigator (“scientific consultant”) with deep expertise in the same area as the junior investigator’s area. This not only provides an additional expert perspective for the research project, it also develops the skill of forging meaningful scientific relationships within one’s discipline (“networking”).

The most important outcome from this GEBRI-specific mentoring stage will be the submission of a research project grant application to NIH (or other peer-reviewed agency) that results in a grant award. In many cases, the initial submission (prepared within the structure of the UP-2-NIH program) will not be competitive for an award. Thus, a major focus of the GEBRI-specific mentoring stage is to identify deficiencies in the original submission (e.g., need for preliminary data, poor grantsmanship, unfocused objectives, etc.), systematically address these problems, and prepare a revised, more competitive application.

Additional mentoring resources. The UNH Writing Academy is a faculty development program offered by the Office of the Senior Vice Provost for Engagement and Academic Outreach. It is designed to help advance the scholarly careers of faculty at UNH and enhance the intellectual climate at UNH. This Academy supports faculty in developing their writing abilities to enhance preparation of grant proposals and of research manuscripts for peer-reviewed publications.

***Expected Outcomes.*** Having completed the REA by the start of the proposed project period (with the research project proposal contained in the COBRE application serving as the final outcome from the REA), we expect all four GEBRI junior investigators to have enrolled and begun participating in the year-long UP-2-NIH program starting in Fall 2014. This will culminate with submission of research project grant applications no later than 2015. In those instances where the application is not funded, the junior investigators will revise their application under the guidance of the PIs GEBRI mentoring program (*see below*), submit the revised application in early 2016, and presumably obtain external funding at the conclusion of their third year of the GEBRI mentoring process (s*ee timeline above*). As faculty “graduate” upon receiving a grant award, new faculty will enter the program (subject to the review and approval process described elsewhere). By the end of the 5-year project period, we expect that four faculty will have obtained NIH R01 awards (or similar peer-reviewed external funding), and their replacements will be midway through the second cycle of the mentoring process.

**Aim 3: Establish a comprehensive evaluation process of junior investigators’ progress and of the overall effectiveness of the GEBRI.** To determine the effectiveness in meeting the aims of the program, the Steering Committee will conduct evaluations of the junior investigators (e.g., achievement of agreed-upon milestones). In addition, the IAC will conduct evaluations of the Steering Committee (e.g., implementation and effectiveness of program administration, impact of mentoring on mentee professional development, effectiveness of communications and development of collaborative relationships with academic partners).

***Introduction.*** Achievement of the two overarching COBRE objectives (to improve the biomedical research infrastructure and to enhance the competitiveness of investigators for external funding) requires a comprehensive plan for assessing the performance and effectiveness of the GEBRI in achieving these objectives. In addition to assessments of progress of the junior investigators (as stipulated in the COBRE program announcement), we will also evaluate the effectiveness of the major administrative elements of the GEBRI. In so doing, programmatic strengths can be highlighted and deficiencies in the operations and organization of the GEBRI can be remedied early on to optimize completion of the objectives.

***Justification and Feasibility.*** Formative and summative assessments of GEBRI are critical for program administration, both for documenting “return on investment” as well as being able to dynamically respond during the project period to identified strengths and weaknesses in program design to maximize desired outcomes. Comprehensive and ongoing assessments are often overlooked by program leaders whose efforts are appropriately directed to administering day-to-day program operations and providing services to clients/stakeholders. One important responsibility of the Program Manager is to collect data on all of the metrics/milestones described in sections 3a, 3b, and 3c below, and to design and administer surveys and other evaluation tools on behalf of the Steering Committee and the IAC. The Steering Committee [Cote (as an experienced academic administrator), Thomas (as Director of the HCGS and a Director of NH-INBRE), and Moore (as PI for awarded COBREs)] have experience with, and appreciate the importance of, formative and summative assessments. Furthermore, the UNH Center for Excellence in Teaching and Learning is a local resource to assist the Steering Committee in developing assessment tools uniquely designed for evaluating the GEBRI.

***Design.*** We will establish two different formative evaluation strategies, one for junior investigators and the other for the Steering Committee. In addition, we will use the assessment information collected during the entire project period to perform a summative evaluation that comprehensively reviews the extent to which the mission of GEBRI in its first five years is accomplished.

At the outset of the project, we will conduct a baseline survey to serve as a reference point. This initial survey will assess the current biomedical research infrastructure/climate at UNH, the competencies each junior investigator possesses that relate to the objective of achieving the status of independent investigator, individual challenges each junior investigator faces, and the current status of mentor-mentee relationships for each investigator (Marinac and Gerkovich, 2012). For this initial assessment and the final summative assessment, we will identify and enlist the participation of a comparator group, consisting of COLSA and CEPS faculty at a similar stage in professional career development but who are not participating in structured mentoring programs. This initial evaluation will use the same metrics as described below for Aims 3a and 3b that constitute our comprehensive approach to formative program evaluation.

Data to be collected and compiled by the Program Manager will include: (1) online surveys that will have both quantitative and subjective questions; (2) institutional data from UNH Sponsored Programs Administration on grant submissions/awards ; (3) bibliographic and citation databases; (4) web analytics (e.g., site visits) of content created for the GEBRI web site, and; (5) other information provided by GEBRI participants typically contained in annual activity reports (conferences attended, presentations, outreach/engagement activities, etc.).

***3A. Formative, annual evaluations of junior investigators.*** The primary milestone for junior investigators is attainment of their individual research project grant and independent investigator status, resulting in “graduation” from the GEBRI mentoring activities. Intermediate milestones and expectations are listed in the accompanying table. These metrics satisfy the criteria of the SMART test: specific, measureable, attainable, realistic, and timely. Note that we expect “graduates” to remain engaged as active participants in the overall GEBRI, and take on peer mentoring of newly-enrolled junior investigators recruited into GEBRI.

***3B. Formative, annual evaluations of Steering Committee.*** Under EAC direction, the Program Manager will conduct annual evaluations of the Steering Committee, with the results being conveyed to the EAC for analysis, interpretation, and feedback to the Steering Committee and the IAC.

Annual evaluations of the Steering Committee will consist of two components: (1) evaluation of overall GEBRI management, (2) evaluation of GEBRI-specific mentoring by PIs Cote and Thomas. Survey recipients will include the junior investigators (Parts 1 & 2), REA and UP-2-NIH program leaders (Parts 1 & 2), administrative and research staff supporting the GEBRI Cores (Part 1), academic partners and GEBRI collaborators at UNH and in the region (Part1), and department chairs of junior investigators (Part 2).

Although the EAC will have responsibility for survey design, respondent anonymity, and interpretation of the data collected, we recommend the following approaches for evaluation of the effectiveness of the members of the Steering Committee: (1) for evaluation of the management of the GEBRI, questionnaires currently used by UNH Human Resources to assess the effectiveness of academic administrators will be used (and modified as needed). (2) For evaluating faculty mentoring effectiveness, assessment tools are available that are specifically designed for faculty mentoring in academic/medical settings (Berk *et al.*, 2005;Dilmore *et al.*, 2010).

***3C. Summative evaluation of GEBRI.*** In the absence of established standards for performance of a COBRE program, we will rely on the baseline evaluation conducted at the beginning of the project period to assess the *change* in the desired outcomes, namely enhancement of the biomedical research infrastructure and advancement of the careers of junior investigators participating in the GEBRI. As such, we will aggregate the data collected for all of the annual (formative) evaluations of both the junior investigators and the Steering Committee (Parts 1 and 2). We will also survey the comparator group (i.e., faculty who had not participated in GEBRI; see above) to help determine whether the changes in outcomes for the GEBRI junior investigators can be attributed to enrollment in GEBRI (as distinct from a non-program influence).

***Expected Outcomes.*** Upon implementation of the evaluation process, we will have a detailed set of specific, quantifiable, realistic milestones to provide regular, detailed feedback to the junior investigators on their progress to achieve the goal of obtaining a research project grant. We will also have established a mechanism for periodic evaluation of Steering Committee effectiveness in order to make any necessary mid-course changes to the GEBRI administration or to the junior investigator mentoring program. Finally, we will have established a process for collecting data that will permit a detailed final evaluation of GEBRI’s overall effectiveness in achieving its stated aims.

**Future directions.** At the conclusion of the five-year program, we will have accomplished the following: (1) established a stable, sustainable administrative structure for promoting biomedical research centered on GEBRI, with established partners within UNH and with our academic partners; (2) successfully mentored the initial four junior investigators as judged by their awards of funded NIH proposals, and recruited a second set of junior investigators who are mid-way through the mentoring process; (3) submitted a summative evaluation of the achievements of the program and its junior investigators, documentation of specific areas where the program succeeded or failed to achieve its stated goals, and a plan of action to further develop the biomedical research infrastructure at UNH and in the region.

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