

TO: The Board of Regents Addendum IX-A-7
Academic Affairs

MEETING DATE: March 29, 2019

SUBJECT: Creation of the Science, Technology, Engineering and Mathematics Teaching, Research, And Inquiry-based Learning (STEM TRAIL) Center administered by the Colleges of Arts and Sciences, Education, and Information Science and Technology at the University of Nebraska at Omaha (UNO)

RECOMMENDED ACTION: Approval is requested to create the STEM TRAIL Center administered by the Colleges of Arts and Sciences, Education, and Information Science and Technology at UNO

PREVIOUS ACTION: None

EXPLANATION: Nationally, the demand for STEM professionals is increasing exponentially, yet workforce needs are unmet. This demand can be partially remedied by improving the educational pathways for students in STEM fields. UNO is aggressively addressing this problem using multidisciplinary approaches. The proposed STEM TRAIL Center will capitalize on this work and provide the necessary organizational structure, vision, and direction to expand UNO's STEM teaching, research and outreach programs. The new center also will increase UNO's competitiveness for extramural support.

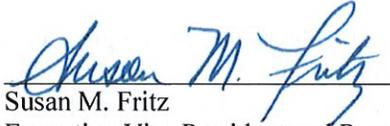
This proposal has been reviewed by the Council of Academic Officers; it also has been reviewed and recommended for approval by the Academic Affairs Committee.

PROGRAM COST: \$251,000 for Year 1; \$1,330,000 over five years

SOURCE OF FUNDS: Colleges of Arts and Sciences, Business Administration, and Education; \$4.9 million grant funding

SPONSORS: B.J. Reed
Senior Vice Chancellor for Academic Affairs

Jeffrey P. Gold, Chancellor
University of Nebraska at Omaha

RECOMMENDED: 
Susan M. Fritz
Executive Vice President and Provost

DATE: February 7, 2019

STEM Teaching, Research, And Inquiry-based Learning (STEM TRAIL) Center

Descriptive Information for the STEM Center Concept

- **Name of institution proposing the Center or Institute:** The University of Nebraska at Omaha
- **Name of the programs involved:** STEM is a recognized academic priority at UNO. As such, UNO offers myriad of instructional undergraduate and graduate programs in STEM fields, including (but not limited to) Bioinformatics, Biology, Chemistry, Geography, Geology, Mathematics, Physics, Biomechanics, Biomedical Informatics, Computer Science, Computer Science Education, Cybersecurity, IT Innovation, Management Information Systems.
- **Other programs offered in this field by this institution:** STEM Leadership Team lead extensive co-curricular programming aimed at engaging K-12 students in STEM fields.
- **Administrative unit for the Center or Institute:** Colleges of Arts and Sciences, Education, and Information Science & Technology
- **Physical location, if applicable:** TBD
- **Proposed date (term/year) the Center or Institute will be initiated:** Upon approval

1. Purpose and Context for the Center or Institute

As a national priority, science, technology, engineering and mathematics (STEM) education is, at its essence, an interdisciplinary approach to teaching, research, and outreach (Congressional Research Office 2002; NSF 2017) that engages students in learning cross-discipline concepts and practices—such as the scientific method, engineering design, mathematical modeling, and computational thinking—using innovative, hands-on pedagogical strategies. By integrating such strategies—including inquiry-based learning (IBL) and genuine scientific research experiences—into our nation’s formal and informal education programs, we will prepare our students and citizens to become highly skilled professionals that can effectively create, manage, and sustain the essential technological innovations of the 21st century. UNO has a proud history of contributing to this national call for innovative STEM programming by identifying STEM as a campus priority and implementing a plan to attract key STEM leaders. It is within this context that we propose taking the next steps toward solidifying UNO’s status as a national leader in STEM by designating an interdisciplinary STEM Teaching, Research, and Inquiry-based Learning (STEM TRAIL) Center.

Our growing metropolitan university has already created a synergistic environment for advancing STEM in the region, thanks in part to UNO’s innovative structure for interdisciplinary STEM leadership, in which community chairs have been appointed to promote collaborative STEM initiatives, working closely with campus deans, department chairs, and community partners. These collaborative efforts have led to many successes, including achievements such as new interdisciplinary STEM courses and certificates offered jointly across UNO colleges, shared pathways for STEM disciplinary degrees and teacher certification, significant external funding for collaborative STEM initiatives, numerous discipline-based education

research (DBER) publications, innovative STEM outreach endeavors and events, community-wide leadership for the Omaha STEM Ecosystem (a consortium of 90 community partners co-led by UNO and the Omaha Dooly Zoo and Aquarium), and most importantly, an evolving interdisciplinary vision for STEM on the UNO campus. It is now time for UNO STEM to further evolve into a national model, using a Center-based strategy for engaging students in effective STEM pathways or “educational trails” into their careers by designating and supporting the STEM TRAIL Center.

National initiatives for advancing STEM have uniformly identified student engagement in research-related activities as the key educational innovation for preparing the next generation of professionals. George D. Kuh’s high-impact practices for universities include the meaningful integration of research as a focused pedagogy for engaging students in the undergraduate classroom (Kuh 2008). Moreover, national societies are dedicated to the advancement and training of students in STEM via the apprenticeship style of research experiences (e.g., Council of Undergraduate Research, SigmaXi) and working on complex problems in interdisciplinary teams (Kuh 2008). Finally, recent calls from the National Science Foundation (NSF) and the Carl Wieman Science Education Initiative at the University of British Columbia (Deslauriers, Schelew, & Wieman 2011) further recommend that innovative engagement experiences, such as research in undergraduate classrooms, be available to *all* students, inclusive of those enrolled in large freshman courses in STEM and those at higher levels including those at the very highest levels of potential. Consequently, the novel pedagogy of “course-based undergraduate research experiences (CUREs)” was born and will also be a fundamental core element of the UNO STEM TRAIL Center.

Integrating research into the classroom not only enhances student learning and skills in STEM, but it also augments student ability to communicate, conjecture, and debate (Elgin *et al.* 2016; Price 2001; Schmid 1992; Beard & Booke 2016). Copious articles in the cognitive and learning sciences, inclusive of the scholarship of teaching and learning and DBER, document the importance of mentored research experiences for students. The benefits of these experiences are captured robustly via the CURE and SURE surveys that were developed by David Lopatto (Grinnell College) and are utilized around the world. Taken together, these examples illustrate that the importance of undergraduate research experiences—both in the classroom and outside of the classroom—cannot be understated. Consequently, the UNO STEM team increasingly uses research experiences—for undergraduates, graduate students, and in-service teachers alike—as a pedagogical tool to convey content, increase learner confidence, and empower students to be able to meet the demands of the 21st century job market (Cutucache *et al.*, 2018). Further, this direction is highly consistent with other campus initiatives, such as the new Research Strategic Plan being led by UNO’s Interim Vice Chancellor for Research and Creative Activity, in which increased student involvement in research and the opportunities for interdisciplinary STEM efforts are mentioned as key opportunities for continued growth in research on the UNO campus. It is also very consistent with new campus directions that will strive to recruit, educate, and graduate some of the very best STEM students in the country.

In addition, the UNO STEM team has expanded the use of inquiry-based learning (IBL) in the STEM disciplines over the last five years. Grants, workshops, and publications from the STEM team clearly highlight the importance, transferability, and impact of offering IBL courses. Interdisciplinary, cross-college teaching also has become more prevalent, and IBL is already an emerging core effort in UNO STEM. For example, UNO faculty from computer science and mathematics are partnering to offer a new inquiry-based course, MATH 1120: Introduction to Mathematical and Computational Thinking, using Bricklayer (an open-source, online educational ecosystem developed at UNO). Another cross-campus partnership, among computational biologists, cancer biologists, and mathematicians, is integrating inquiry into the classroom via their work on the dynamic modeling of diseases, biological phenomenon, cancer, and the immune response. The integration of bioinformatics into life sciences education serves as yet another example of a

cross-college faculty initiative (that also includes partners external to UNO) focused on providing high-quality, inquiry-based experiences for students in the classroom.

UNO's successes in STEM are a direct result of the deliberate and focused implementation over the past five years of the 2013 STEM Strategic Plan, which was developed in support of the campus-wide STEM priority, in close collaboration with UNO deans and departments. The STEM TRAIL Center will build upon this earlier STEM momentum to further establish our national reputation, propagate our proven best practices on a national stage, position ourselves to compete for new types of extramural funding, and to serve as a contractual entity to assist other universities and stakeholders in the design, assessment, and implementation of STEM-related teaching, research, and outreach projects.

Administrative oversight of the proposed Center would be with the Deans of the Colleges of Arts and Sciences, Education, and Information Science and Technology. The three deans will rotate annually in taking oversight over the proposed Center. This will allow the Center Director to report to one dean which will facilitate the organizational structure.

2. Need, Demand, and Opportunity for STEM Center Organizational Unit

Based on expansion of the 2013 STEM Strategic Plan (STEM Strategic Plan, Phase II: 2018–2023), a 2015 STEM Priority Report, a 2018 Qualtrics survey of STEM faculty and staff, market research analysis, organizational conversations with national entities (such as the Council of Undergraduate Research), and various structured brainstorming meetings among members of the STEM Leadership Team and campus collaborators, we believe the most effective infrastructure to advance STEM on the UNO campus is a formalized STEM Center.

Over the last five years, UNO has recruited and strongly supported a STEM Leadership Team using an innovative and effective community chair model. This cross-college interdisciplinary leadership team has established a productive record of program development, extramural funding, and educational best practices that has radiated through academic units across campus and into partner organizations across the Omaha metropolitan area. In 2016, the UNO STEM Leadership Team and Omaha Citywide STEM Ecosystem received national recognition for their efforts, earning UNO an exemplary designation for the W.K. Kellogg Foundation's Community Engagement Scholarship Award. Building on this foundation, UNO is prepared to move to the next level in propagating successful collaborative models in STEM education.

The STEM TRAIL Center will provide the appropriate administrative infrastructure needed for UNO to capitalize on its successes and further grow its STEM Initiatives. UNO is a decentralized institution with STEM-related engagement activities happening throughout campus, predominantly as led by three colleges but engaging faculty and staff across the campus. The STEM Community Chairs are funded by donor endowments, and most faculty leading STEM-related initiatives are supported by extramural grants, in addition to funds provided within a supportive college environment. The administrative support infrastructure for many campus-wide elements of the STEM priority such as Outreach, however, is currently limited to one campus-wide FTE position funded by the University for a STEM Outreach Coordinator. Individual colleges certainly work hard to fund and staff STEM outreach positions that are appropriately specific to the given college. While this academic structure has been sufficient and useful for our interdisciplinary efforts to date, it does not allow for continued shared growth as we become an increasingly visible national model competing for external funding at the highest levels of national achievement. Growing interdisciplinary STEM initiatives across colleges will take additional cross-college organization. The creation of a STEM center will allow UNO to take a more unified and strategic approach in STEM outreach, grant development, and programming.

Furthermore, the current support model can inadvertently penalize highly productive faculty and their units and colleges—for example, the more successful faculty are in securing extramural funding for DBER, the more they must add post-award administrative roles to their list of duties, at times stressing their departmental and college support infrastructures, particularly when their unit may have only a partial role in the wider STEM initiative. When faculty and departments take on this interdisciplinary work, which could be completed more efficiently and effectively by a shared staff assistant, it ends up costing an individual college money, and costs may be disproportionate for a particular unit. Finally, while each STEM faculty member is appropriately housed within a single academic department, STEM initiatives are inherently interdisciplinary and often fall outside the purview of any individual department. The administrative paperwork accompanying cross-campus STEM projects puts increasing stress on departmental staff assistants. Designating a STEM Center would make it possible to increasingly use a pooled staff model, that could perhaps work more efficiently with departments and colleges to maximize F&A return to units, while also funding a shared percentage of STEM administrative support, equipment purchases, consistent/sustainable personnel hires, and graduate student support for STEM initiatives, thereby incentivizing faculty and synergizing their efforts to continue expanding extramural support for UNO STEM initiatives. The proposed STEM TRAIL Center is the most effective and appropriate organizational structure to advance this highly interdisciplinary work.

UNO has been immensely successful in securing donor and grant funding to support its STEM initiative, however we have reached a critical point. UNO – proudly collaborating with other Nebraska University campuses - has been considered a national leader in STEM education. To further achieve these long-term goals and expand competitiveness in securing donor funds and federal grants, a unified organizational structure is essential.

While nationally the demand for STEM professionals is increasing exponentially, the workforce needs face serious deficits that can only be remedied by improving the educational pathways for students in STEM fields. UNO is already aggressively addressing this problem to targeted outreach and programming. The proposed STEM TRAIL Center will be uniquely positioned to capitalize on this work and will provide the necessary organizational structure, vision, and direction necessary for taking UNO STEM to the next level nationally.

3. Adequacy of Resources

The most difficult resource to gather—effective and committed leaders—is already in place due to past UNO support and vision, and the enthusiastic participation of faculty, staff, and administrators. While much good has been accomplished and will continue to flow from these STEM leaders who attend STEM Leadership Team meetings—now numbering 62 faculty members, along with supportive staff and administrators—continued progress requires the organizational structure and funding possibilities of a designated Center. Most importantly, we believe that establishing the proposed Center will help launch a new trajectory for STEM, allowing UNO to recruit additional personnel and provide the physical resources necessary to capitalize on existing synergistic STEM initiatives across the region and elevate the University of Nebraska to a place of national eminence in STEM.

Administrative Expenses

Anticipated **administrative expenses** for the STEM TRAIL Center include the following:

- Executive Director— oversight of the Center will result in the following workload release: 25% in year 1, 50% in year 3, and 75% in year 5.
- Associate Director 25% of workload will go to oversight of the Center

- Co-Assistant Directors—15% of workload will go to operations of the Center
- Research Technician will be hired in year 1. The search for this position is ongoing and this position will be grant-funded from year 1-3.
- Grant Coordinator will be hired in year 1. The search for this position is ongoing and this position will be grant-funded from year 1-3.

Physical Facilities

Currently, the STEM offices, activities, programming, and personnel are disseminated throughout the UNO campus. While this is not ideal, the creation of the UNO STEM TRAIL Center as an organizational unit does not depend on a centralized physical location. The proposed STEM Center can operate whilst activities, offices, and personnel are at their current location. It is preferred to rent or renovate a space to centralize the operations of the STEM TRAIL center. This expense is anticipated at around \$36,000 annually. The long-term vision of the UNO STEM Leadership team is however to work towards a physical facilitate dedicated to STEM. The creation of the STEM TRAIL Center as an organizational unit will facilitate achieving this long-term vision as it will make UNO more competitive for external funding, while capitalizing on existing efforts and positioning Nebraska as a national leader in STEM pathways.

Instructional Equipment and Informational Resources

Instruction within the STEM TRAIL Center will be particularly devoted to model courses utilizing inquiry-based learning and research experiences at the undergraduate and graduate levels. Some innovative courses might have specially designed sections for important populations of students, such as targeting high-achieving students, dual enrollment students, or students enrolled in high school bridge courses.

We also believe that serving exceptionally academically talented STEM students in special sections will allow us to pilot innovative student engagement strategies, such as mentored student research experiences, that can then be translated to other sections, informing student involvement across all STEM areas and student populations.

\$20,000 per year is budgeted for general operating expenses.

4. Organizational Structure and Administration

The recommended administrative structure of the STEM TRAIL Center includes an Executive Director, Associate Director, and Assistant Directors (Community Chairs) working in collaboration with a steering committee and subcommittees to direct and oversee Center operations, including various offices in the Center (e.g. the STEM Outreach office and the office of the NE SciLEAD Consortium), although each Office will have a specific Director with at least 25% appointment to that Office. The acting Executive Director and Associate Director will be the Community Chairs of Science and STEM Education, respectively, on an interim basis until a permanent Director can be hired via a formal search process.

Administrative oversight of the proposed Center would be with the Deans of the Colleges of Arts and Sciences, Education, and Information Science and Technology. The three deans will rotate annually in taking oversight over the proposed Center. This will allow the Center Director to report to one dean which will facilitate the organizational structure, while also meeting at least quarterly with the three Deans involved in focused planning meetings.

Steering Committee and Subcommittees

A Deans-appointed Steering Committee will serve as the principal decision-making body within the Center and will include subcommittee leadership to oversee specific focus areas of the Center (see below), but ultimately all decisions of the Center would rest with the Director as the final decision maker for internal oversight of the Center. The Directors will co-chair the Center's Steering Committee. Other members will include chairs of the subcommittees and representation from the offices within the Center. The Directors will convene meetings at least once monthly and more often as needed. **The Directors will hold monthly meetings with the supervising deans, to particularly ensure that Center initiatives are also closely aligned with college missions and initiatives.** Finally, bylaws will be drafted to establish the responsibilities of the committee. Anticipated subcommittees of the Steering Committee could include the following:

- **Interdisciplinary Research as a Pedagogy in Teaching**—Chaired by a faculty member from a STEM discipline who engages in active learning or student-centered learning environments in his/her classroom and has demonstrated success in attaining (or has the potential to attain) extramural funding in this area.
- **Interdisciplinary Strategies as a Catalyst for Research**—Chaired by a faculty member from a STEM discipline who has an active research group/laboratory (active to include publishing approximately 1–2 times/year on an ongoing basis), has a history of mentoring students, and has demonstrated success in attaining (or has the potential to attain) extramural funding in this area.
- **Interdisciplinary STEM Outreach**—Chaired by a STEM Outreach Coordinator who will also serve as the Director of the STEM Outreach office.
- **Pre-tenure Sponsor Advisory Team**—Chaired by a faculty member at the Associate or Full Professor level who has maintained a research-productive vitae. The advisory team for pre-tenure faculty in STEM areas will be composed of research-productive, tenured professors at the Associate or Full Professor level who will advise pre-tenured faculty in STEM areas on their portfolios, serve as additional editors and reviewers for grant proposals, and provide twice-annual grant writing workshops.

5. Partnerships with Businesses and the Citywide STEM Ecosystem

The proposed STEM TRAIL Center will engage in collaborative partnerships with both business and community organizations, synergistic with UNO's leadership role in the **Omaha Citywide STEM Ecosystem**. There are more than 80 organizations and 700 representatives participating in the STEM Ecosystem, many of which already collaborate directly with UNO on STEM initiatives, including the Metropolitan Omaha Education Consortium (representing twelve school districts in the Omaha-Council Bluffs metropolitan area, two educational service units, Metropolitan Community College, and Iowa Western Community College), Omaha's Henry Doorly Zoo and Aquarium, Nebraska Department of Education, Nebraska Children and Families Foundation, the Applied Information Management Institute, Beyond School Bells, Streck, UNeMed, Collective for Youth, the Sherwood Foundation, and many more. Further, the proposed STEM TRAIL Center will become a **unified entity and point-of-contact** for other external organizations to initiative partnerships with UNO. These partnerships will particularly help to bring STEM professionals already in the workforce into UNO STEM initiatives, helping to educate the future STEM workforce.

6. Collaborations with Higher Education Institutions and Agencies External to the University

In addition to collaborating with colleagues across Nebraska—including faculty at the University of Nebraska Medical Center, University of Nebraska-Lincoln, University of Nebraska at Kearney, as well as at Metropolitan Community College, Nebraska Wesleyan University, Doane College, Creighton University, and other institutions across the state—UNO STEM faculty collaborate with many other higher education institutions across the country and world, as reflected in the publications and grants of UNO STEM faculty. For example, as the lead institution for the Network for Integrating Bioinformatics into Undergraduate Education (NIBLSE, an NSF-funded Research Coordination Network for Undergraduate Biology Education), UNO facilitates communication and collaboration among a network of institutions across the country. Furthermore, UNO STEM faculty are active in national professional organizations, such as the Council on Undergraduate Research. Finally, STEM Faculty routinely collaborate with international colleagues in countries ranked highly on PISA testing, including Finland, for additional initiatives.

Additional examples of existing collaborations follow on the next page.

- UNO/UNMC: uBEATS; biomedical research projects on leukemia & lymphoma (including IP development & licensing); biotech development & start-ups; Omaha STEM Ecosystem (UNO/UNMC/UNL & other partners)
- UNO/UneMed: disclosure of Intellectual Property and marketing (with Nebraska Business Development Center, NBDC)
- UNO/UNL: Noyce Math; Math teaching circles; NIH R25 STEM Pipeline (NE STEM 4U); Nebraska Robotics Expo, NSF EAGER telepresence robotics and virtual reality effort.
- UNO/UNK: Nebraska Research Initiatives shared Network Science grant; preparation of NSF ITEST proposal; Continued implementation of Beyond School Bells and Nebraska Children’s Foundation funding for NE STEM 4U pipeline
- UNO/Doane: biology-education research (discipline-based education research); undergraduate research in STEM; NSF S-STEM advisory team

The creation of the proposed STEM Trail Center will allow UNO to capitalize on existing higher education collaborations and will facilitate growth.

7. Constituencies to be Served

In fall 2017, several members of the STEM faculty conducted market research to investigate the viability of a key component of our proposal—providing contractual services through the Center (e.g. through its NE SciLEAD Consortium office). We concluded that there is an unmet demand for such services and that providing those services will help ensure a robust, sustainable funding model for the STEM TRAIL Center. The only similar entity we identified in Nebraska is Pearson Publishing, who is more engaged with higher education consulting (such as with Metropolitan Community College) than their name implies. Similarly, this industry (i.e., research design and evaluation services) which is predicted to have a 2.1% annual growth (2016–2021), is a \$14.6 billion revenue area nationwide. Finally, the barriers to entry into the market are low to medium. The growth is rapid with revenue volatility being categorized highest at “medium.” Consequently, we (alongside the unbiased agency, Nebraska Business Development Center) have ensured that this is a viable, sustainable model, even outside of extramural funding long-term (i.e., solely on a

contractual basis). Thus, we expect to engage and serve several key stakeholder groups within a contractual environment, including the following:

1. UNO and other University of Nebraska investigators conducting STEM-related research and assessments with undergraduate or graduate students
2. Faculty and other collaborators across the NU system interested in designing and implementing STEM elements of their instruction or outreach work within a context of DBER
3. New tenure-track faculty across the NU System who wish to design and implement a DBER portfolio in their teaching, research, or outreach, with special attention to activities that build toward their tenure-track success
4. Community partners interested in contracting for innovative teaching, research, and outreach projects for P16 students, with special attention to integrating research into the classroom or evaluating research experiences
5. Those regional, national, and international partners interested in contracting with us to provide external evaluation for STEM-related programs, at a significant cost savings to for-profit educational consulting firms

Other models of funding include those replicated at other sites, such as Click2SciencePD and the incubator model of NIH & NSF STTR/SBIR projects.

In addition, contractual constituencies served, the work spearheaded by the proposed STEM TRAIL Center will continue to serve students, P-12 schools, and community partners.

8. Anticipated Measures of Success

The proposed Center will support numerous existing STEM programs and will provide the infrastructure necessary to support continued growth of STEM teaching, research, and outreach initiatives. Furthermore, as one example of capabilities within the Center, the NE SciLEAD Consortium will provide consulting services in STEM-related design, implementation, evaluation, and assessment, meeting regional and national needs and generating revenue for the Center. Primary measures of success will include the following: 1) increased student recruitment, retention, and graduation in STEM disciplines (as demonstrated in the 4-year pilot of NE STEM 4U with 96% retention to degree and in STEM careers); 2) increased extramural funding for STEM teaching, research, and outreach; 3) further engagement with stakeholders locally, regionally, and nationally; and 4) formal recognition as *the national-level* Center for supporting student research as a pedagogy in STEM areas. Other anticipated outcomes include increases in the number of faculty and staff devoted to interdisciplinary STEM initiatives and in the number and types of mission-directed products and services, including an increase in publications and other methods of disseminating research products (e.g. IP of various kinds, including process patents).

9. Centrality to Role and Mission of the Institution

Foundational to UNO's Metropolitan University mission is the belief that, in order to serve a diverse student body reflective of a dynamic metropolitan region, university faculty must forge meaningful partnerships with community leaders. The UNO STEM Leadership Team clearly demonstrates engaged partnership with community leaders, as represented by its leadership role in the Omaha Citywide STEM Ecosystem and the many collaborative projects currently led by UNO STEM faculty. The proposed STEM TRAIL Center will further advance the UNO mission and reinforce its three overarching strategic goals, as follows:

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- **Goal 1, Student Centeredness**—The proposed STEM TRAIL Center will model and implement high-impact practices that have been demonstrated in the literature and recognized by the Association of American Colleges and Universities (AAC&U) and the NSF as being the most effective in preparing students. Specifically, we will offer courses and programs that provide genuine research experiences to students, which aligns with Strategy 1.2, to “*prepare students for academic success, careers, and professional responsibilities in an increasingly complex world (academic programs, advising, co-curricular leadership development opportunities, internships, graduation).*”
- **Goal 2, Academic Excellence**—The proposed Center will aggressively “*support and enhance faculty and student research and creative activity*” (Strategy 2.3) and will facilitate faculty efforts to “*develop and enhance applied and experiential learning opportunities*” (Strategy 2.5).
- **Goal 3, Community Engagement**—Building on a strong foundation of existing collaborative STEM initiatives, the proposed Center will provide the resources necessary to help “*build new and strengthen existing connections with a broad range of community partners*” (Strategy 3.1), “*prepare students to be engaged citizens and community leaders in a diverse and evolving society*” (Strategy 3.2), “*promote, recognize, and incentivize engaged scholarship*” (Strategy 3.3), and “*fortify rewards and resources supporting engaged teaching and learning*” (Strategy 3.5).
- **Goal 4, Institutional Quality**—By providing the personnel and physical infrastructure necessary to efficiently and effectively support the continued growth of UNO’s STEM efforts, the proposed Center will also help the University to “*recruit, retain, and reward outstanding faculty and staff*” (Strategy 4.1), “*prudently manage the financial resources entrusted to us*” (Strategy 4.4), “*increase public awareness of UNO’s standing as a premier Metropolitan University*” (Strategy 4.5), and “*maintain and expand facilities to meet the growing needs of the campus*” (Strategy 4.6). Furthermore, the Center’s new laboratory facilities will help UNO faculty and students to “*utilize technology that supports learning, effectiveness, and innovation*” (Strategy 4.7).

Finally, the proposed STEM TRAIL Center directly aligns with the original **STEM Priority**, one of UNO’s five academic priority areas (<https://www.unomaha.edu/engagement/docs/2012-campus-priorities-2020.pdf>).

10. Consistency with the University of Nebraska Strategic Framework

As illustrated by the following examples, the proposed Center also aligns with the University of Nebraska Strategic Framework (version dated 2014–2016, the most current version available on the University of Nebraska website, <https://nebraska.edu/strategic-framework.html?redirect=true>, at the time of this writing):

- **Goal 1.d** states that the University of Nebraska will “*expand lifelong educational opportunities.*” The STEM TRAIL Center will provide educational pathway opportunities for STEM learning across the P16 pipeline by engaging students and community partners in inquiry-based learning and research activities—in the classroom, in research laboratories, and in informal education settings across the community.
- **Goal 2** states that the University of Nebraska will “*build and sustain undergraduate, graduate, and professional programs of high quality with an emphasis on excellent teaching.*” Using best practices for STEM teaching and learning, as recognized by the AAC&U, we will integrate inquiry-based learning and research experiences into our undergraduate and graduate programs.
- In alignment with **Goal 3**, the proposed Center “*will play a critical role in building a talented, competitive workforce . . . in Nebraska in partnership with state, private sector, and other educational institutions.*” UNO STEM faculty will continue to work closely with business and community leaders in the Omaha STEM Ecosystem and other stakeholders across the state to

ensure we provide high-quality STEM programming that prepares students for dynamic and evolving STEM workforce needs across Nebraska.

- In alignment with **Goal 4**, the proposed Center will allow the University to further “*pursue excellence . . . in research and scholarly activity, as well as their application.*” The STEM TRAILS Center will engage as a focused catalyst to many STEM departments on campus for building upon their collaborative teaching, research, and service interests. For example, faculty efforts in the Department of Geography/Geology have been instrumental in facilitating interdisciplinary research activities with P16 teachers at UNO’s Glacier Creek preserve. The Center will assist those faculty with locating additional external funding opportunities for such high quality P16 engagement efforts. Research as a pedagogy is a core strength of the STEM TRAIL Center, and that research spans teaching, research, and outreach. It may also be a powerful student recruitment tool, especially for exceptionally academically talented students. As a result, this Center will position UNO for continued growth in extramural funding, will support student engagement through that funding, and will lead to increased research and scholarly activity. Furthermore, the Center will “*encourage and support interdisciplinary, intercampus, inter-institutional, and international collaboration.*” We have existing and close interdisciplinary collaborations across UNO, with colleagues on all University of Nebraska campuses, and with higher education institutions and agencies across the country. We are now ready to build on this foundation to better serve the growing STEM needs of the University, Nebraska, and partners and stakeholders across the U.S.

11. Potential for the Center or Institute to Contribute to STEM Workforce and Economic Development

We expect the contributions of the Center will mirror and expand upon existing projects of the STEM Leadership Team related to STEM workforce development. This Center will work collaboratively with the Omaha STEM Ecosystem and local, state, and regional employers to ensure that we are developing dynamic students that add to local economies. These important partners will also be brought to the table to engage students in internships and other workforce mentoring mechanisms. Furthermore, based on the market research analysis conducted by the Nebraska Business Development Center (NBDC), we believe this Center concept represents a sustainable model with strong economic development potential for businesses, education, industry, and higher education in the areas of educational assessment, STEM Education program and research design, and consultation for best practices related to teaching and research in STEM areas.

12. Consistency with the Comprehensive Statewide Plan for Postsecondary Education

In addition, the proposed STEM TRAIL Center is consistent with Nebraska’s Comprehensive Statewide Plan for Postsecondary Education in several ways, including the following:

- **Chapter 3, Meeting the Needs of the State**, states that “*employers need college graduates and trained workers who have extensive and varied knowledge, skills, and demonstrated competencies that prepare them for entering and succeeding in the workforce. To advance in business and succeed in their careers, these graduates also need good oral and written communication skills, . . . teamwork abilities, general workplace skills, and, increasingly, conversancy in more than one language.*” The proposed Center will provide the education and training students need to prepare them to meet the increasing STEM workforce demands in the State of Nebraska. For example, the NE STEM 4U model, developed at UNO and also implemented at UNK and UNL, provides hand-on training for undergraduates in key pre-professional practices—including teaching, research, and mentoring—to help students develop the diverse skills they need to succeed in the workforce.

Projects like NE STEM 4U, which are led by UNO and/or developed in close partnership with our colleagues at UNMC, UNL, and/or UNK, provide evidence of the Center’s potential to facilitate continued collaboration to implement effective programming that will positively impact postsecondary education in the state. Based on our existing collaboration and the support from influential STEM colleagues at all NU campuses, we are convinced the STEM Trail Center will provide the infrastructure necessary to allow us to continue and expand our synergistic work with our NU colleagues and others colleagues across Nebraska.

- **Chapter 3, Meeting the Needs of the State**, goes on to call out a specific goal to *“contribute to the health and prosperity of the people and to the vitality of the state through research and development efforts, technology transfer...and by attracting external funds to support these activities.”* Moreover, *“...institutions will assess evolving needs and priorities in a timely manner and will be prepared to change and adopt new methods and technologies to address the evolving needs and priorities of the students and people of Nebraska.”* In 2012, the National Research Council established DBER as a field of study to encourage interdisciplinary teams to apply findings and strategies from the cognitive learning sciences to the STEM disciplines in order to improve understanding of student learning in discipline-specific contexts. In the years since, NSF has strategically increased funding for DBER, and the associated research on student retention and learning clearly demonstrates that research as a pedagogy is a highly effective approach to STEM education that should be offered to each and every student.
- **Chapter 4, Meeting Needs by Building Exemplary Institutions**, describes the need for Nebraska to *“value higher education and support its investment in public higher education through fair and reliable funding policies...”* The funding model outlined above for the new STEM TRAIL Center favors a multi-stakeholder model wherein part of the funding is requested from the state in the form of a legislative priority, with the remainder contributed through extramural dollars (grants and contracts) and/or donations. The multi-stakeholder funding model is to best respect the contributions of each stakeholder and make the best use of dollars. The proposed STEM TRAIL Center, the first and only facility of its kind, would elevate UNO and the State of Nebraska to exemplary status in STEM, regionally and nationally. Our colleagues across Nebraska recognize UNO as a leader in STEM and, as mentioned, we are confident that they will write letters of support to endorse the STEM TRAIL Center at UNO and to acknowledge how they themselves will benefit from the increased NU collaboration that a Center at UNO will help to support.
- **Chapter 5, Meeting Educational Needs through Partnerships and Collaboration**, includes a goal for higher education institutions to *“work as partners with one another and with other entities whenever appropriate to share resources and deliver programs cooperatively to enhance learning opportunities for Nebraska residents.”* The proposed Center is founded on the success of UNO STEM’s existing partnerships and collaborations, as represented by UNO’s leadership role in the Citywide STEM Ecosystem and many ongoing projects of the STEM Leadership Team, as previously described (see parts 6 and 7 above).
- **Chapter 6, Statewide Facilities Plan**, identifies the need for Nebraskans to *“advocate a physical environment for each of its public postsecondary institutions that is supportive of role and mission.”* Currently, the UNO campus does not have sufficient space to accommodate the growth of UNO’s STEM initiatives in support of the STEM priority that was established in 2012.

Long-term Vision

Responsive to growing workforce demands, advancing STEM education has been an academic priority at UNO. The STEM leadership team led by the innovative model of STEM Community Chairs, and strongly supported by deans and other executive campus leaders, has grown the STEM programs to a level where UNO is nationally admired. Indeed, UNO organizes hundreds of workshops, programs, and activities geared

to STEM annually. Many of these programs are nationally applauded for their impact in changing students' trajectories.

The creation of the UNO STEM TRAIL Center as an organizational unit is the appropriate next step to advance the UNO STEM initiative. As an organizational unit, the STEM center will provide unity to the disseminated and decentralized activities already occurring at UNO. It will make UNO more competitive in securing external grant funding. While positioning Nebraska as a leader in STEM Education, the proposed center – as an organizational unit – will allow UNO to capitalize and grow existing efforts and collaborations.

While the creation of the organizational unit is not dependent on the existence of a standalone, physical STEM facility, this is one of the long-term goals for the UNO STEM initiative. The STEM Leadership's long-term vision includes a physical space dedicated to STEM. The idea for an interdisciplinary STEM-devoted building on the UNO campus is certainly not new. More than once over the last few years, campus administrators have initiated the idea and hired consulting and architectural input while engaging faculty in discussing ideas and site plans for a STEM building. However, we of course realize that deciding feasible locations for a new building or similar space infrastructure and financing such an infrastructure is a very complex process that typically requires extensive expertise, planning, and conversations with many different stakeholders. STEM leadership however believes that **to systematically move to a higher level of STEM distinction and attract the best and brightest STEM students in the country will require systematic facility innovation as well as program innovation.**

Specific offices organized within the Center will serve as liaisons to key stakeholders in the STEM research and education arenas and are anticipated to include the following:

STEM Outreach Office

- In collaboration with the STEM Outreach subcommittee, the STEM Outreach office will focus on ensuring public engagement and recognition of the Center, aligning needs of stakeholders with priorities of the Center, and advising all STEM Outreach staff across campus on best practices, inclusive of evaluation and assessment strategies. Members of the STEM Outreach office and subcommittee will collaborate with the Research subcommittee as needed to ensure extramural funding (or, at the very least, sustainable funding) is available to implement and support STEM outreach activities that contribute to broader impacts of the Center's DBER efforts. Collaboration with the Omaha Citywide STEM Ecosystem will be particularly important to this effort.

Office of the NE SciLEAD Consortium

- A new and innovative entity in the STEM TRAIL Center will be the office of the NE SciLEAD Consortium, which will fill a gap in regional and national markets by providing contracted consulting services in the design, implementation, evaluation, and assessment of STEM education research and programming, as well as academic program assessment. The Consortium currently has four partners (UNO, UNL, UNK, and Beyond School Bells), and demand for their services is high and increasing. The Consortium is conceptualized to eventually have dedicated office space and two permanent professional-level staff who will be trained in mixed-methods research, phenomenological research, and STEM-related assessment tools and strategies, including, for example, the Youth Program Quality Assessment (YPQA), Dimensions of Success (DoS) observation tool, Classroom Assessment Scoring System (CLASS), and other DBER and cognitive sciences protocols. Services offered by the NE SciLEAD Consortium will include contracted external evaluation for NSF-, DOE-, or NIH-funded awards. In addition, this office will serve as the point of contact for graduate students interested in pursuing DBER or ultimately becoming

professors, providing training in the learning sciences and connecting students with research and teaching opportunities. This office is also targeted to be a revenue generator for the Center, while also being a catalyst to entrepreneurial endeavors that may for example work with UNeMed. The STEM Leadership Team has already met with UNeMed to brainstorm possible future strategies.

Office of Computer Science Education

- The Office of Computer Science Education would be directed by the Community Chair of Computer Science. UNO leads the state in computer science education, with new programs such as a Supplemental Teaching Endorsement and a M.S. in Computer Science Education. This office would help to facilitate UNO's increasingly national models for helping P12 schools to integrate CS as a true partner with other STEM disciplines. Specifically, UNO's growing national leadership in CS Education (including several visits to the White House) would help to be facilitated by this office would be devoted to ongoing implementation of innovative pre-service and in-service teacher training to address this critical national workforce challenge.

Office of STEM Fellows

- The Office of STEM Fellows will help to facilitate "fellows" at various levels—to include NU Faculty that aim to work on-site for a semester or more at a time, in-service STEM teaching fellows (e.g. as funded by a Noyce Track IV award or via the Teacher Researcher Partnership Program), graduate students working on degrees in STEM Education, and finally for international colleagues on international STEM issues or initiatives. The office will be dynamic in using data-driven best practices for training and ongoing professional development (including fee-based workshop series) for training of all fellows in a personalized way.

Office of Student Programming Innovations

- This office will help to mentor and to facilitate meeting and work spaces for funded undergraduate students from UNO involved in high impact practices (Kuh, 2008) centered around research as a pedagogy. For example, this space will be a base of operations and workspace for all Noyce Interns and Scholars (from all areas of science and mathematics), as well as all NE STEM 4U students from all colleges on campus. Additionally, we anticipate acquiring grants such as NSF Research Experiences for Undergraduates (REU) funding for summer experiences and this collaborative workspace would also house those participants.

STEM Ed Incubator Office

- This office will house externally funded student interns, with specialized skills in marketing, market analysis, economics, statistics and STEM education to allow students and faculty alike to take ideas from conception to market stage. This office will also be the point of contact to communicate with the IP firms regarding upcoming technologies or processes (for patenting, trademarks, licensing, etc.), such as Center developed and marketed educational assessments. This office will also be the liaison with UNeMed and Nebraska Business Development Center to ensure that new technologies make it to market quickly.

Administrative Office

- The STEM Community Chairs, with roles of Director, Associate Director, and Assistant Directors, as well as staff assistants, program support personnel (research assistant professors, staff assistants, and key graduate assistants) will be housed in a single office mechanism. This office will serve as

the administrative hub for the Center and facilities and communicate and advise on key stakeholder partnerships and oversee operations.

The STEM Center will allow faculty to adapt quickly to meet changing economic conditions, STEM workforce development needs, and training needs for students in the state of Nebraska. Specifically, in the long term, the goals are for the STEM TRAIL Center to provide the following resources:

- A shared organizational entity to coordinate interdisciplinary UNO input, planning, and strategic action for P16 STEM Learning in close collaboration with community partners, such as school districts, businesses, and the community
- Collaborative spaces and activities dedicated to and focused efforts on creating innovative courses that implement undergraduate research experiences, inquiry-based learning, problem-based learning, CUREs, and other STEM pedagogies that empower students to be critical thinkers and problem solvers to be demonstrated on an international scale
- Shared and collaborative spaces for housing research initiatives in STEM areas (including wet-bench research space, social science workspace, graduate students and faculty in residence, conference rooms, and showcases for STEM research dissemination)
- A base for professional development resources, consulting, and contracted services of the NE SciLEAD Consortium related to the design, assessment, and implementation of STEM-related teaching, research, and outreach projects
- An array of workshops dedicated to aggressively developing grant proposals for submission to extramural entities (to include hosting program officers and scientific review officers from NSF and NIH, respectively)
- A STEM Outreach office and structure to provide a shared vision and workspace for outreach personnel across colleges and to facilitate coordination of STEM-related outreach activities with partners across campus and in the community
- Faculty support offices (to assist faculty with IP considerations, external start-up assistance, DBER training, and grant conceptualization assistance)
- A periodic seminar series to encourage and to support interdisciplinary STEM research and instructional innovation
- A pre-tenure advisory committee to support interdisciplinary STEM research productivity, inclusive of grant mentoring, editing, and peer support strategies
- A seminar space and mechanism to hold 350 people for STEM community engagement lectures, workshops, Aim for the Stars expos, STEM Ecosystem events, etc.
- Office space for STEM personnel, inclusive of directors of the new offices within the Center

We are confident that the creation of the UNO STEM TRIAL Center as an organizational unit will allow UNO to take one step closer to realizing its long-term objectives and STEM vision.

References

- Kuh, GD. 2008. *High-impact educational practices: What they are, who has access to them, and why they matter*. Washington, D.C.: Association of American Colleges & Universities. Available from: <https://secure.aacu.org/imis/ItemDetail?iProductCode=E-HIGHIMP&Category>
- Beard V, Booke, P. 2016. Research as Pedagogy: Using Experimental Data Collection as a Course Learning Tool. *College Teaching*, 64:149–157. doi:10.1080/87567555.2015.1125843
- Congressional Research Office: <https://fas.org/sgp/crs/misc/R42642.pdf>
- Cutucache, CE, Leas HD, Grandgenett NF, Nelson KL, Rodie S, Shuster R, Schaben C, Tapprich W. 2018. Genuine faculty-mentored research experiences for in-service science teachers: Impact on content acquisition, inquiry, and translation into the classroom. *Journal of Science Teacher Education*, 28:724–744. doi:10.1080/1046560X.2017.1415615
- Elgin SC, Bangera G, Decatur SM, Dolan EL, Guertin L, Newstetter WC, San Juan EF, Smith MA, Weaver GC, Wessler SR *et al.* 2016. Insights from a convocation: Integrating discovery-based research into the undergraduate curriculum. *CBE Life Sciences Education*, 15:1–7. doi:10.1187/cbe.16-03-0118
- NSF STEM Statistics: <https://www.nsf.gov/statistics/2017/nsf17310/>
- Lopatto, D. CURE and SURE Surveys: <https://www.grinnell.edu/users/lopatto>
- Price, JN. 2001. Action research, pedagogy and change: The transformative potential of action research in pre-service teacher education. *Journal of Curriculum Studies*, 33:43–74. doi:10.1080/00220270118039
- Schmid, TJ. 1992. Classroom-based ethnography: A research pedagogy. *Teaching Sociology*, 20:28–35.
- Deslauriers L, Schelew E, Wieman C. 2011. Improved learning in a large-enrollment physics class. *Science*, 332(6031):862–864.

**TABLE 1: PROJECTED EXPENSES - NEW ORGANIZATIONAL UNIT
UNO STEM TRAIL Center**

	(FY2018) Year 1		(FY2019) Year 2		(FY2020) Year 3		(FY2021) Year 4		(FY2022) Year 5		Total	
	FTE	Cost	FTE	Cost								
Personnel												
Faculty ¹		\$95,000		\$95,000		\$120,000		\$95,000		\$145,000		\$550,000
Non-teaching staff: Professional ²		\$100,000		\$100,000		\$100,000		\$100,000		\$100,000		\$500,000
Graduate Assistants												
Non-teaching staff: Support												\$0
Subtotal		\$195,000		\$195,000		\$220,000		\$195,000		\$245,000		\$1,050,000
Operating												
General Operating ³		\$20,000		\$20,000		\$20,000		\$20,000		\$20,000		\$100,000
Equipment												\$0
New or Renovated Space ⁴		\$36,000		\$36,000		\$36,000		\$36,000		\$36,000		\$180,000
Library/Information Resources												\$0
Other												\$0
Subtotal		\$56,000		\$56,000		\$56,000		\$56,000		\$56,000		\$280,000
Total Expenses		\$251,000		\$251,000		\$276,000		\$251,000		\$301,000		\$1,330,000

¹ The proposed center will be run by the executive director, associate director, and three co-directors. Starting in Year 1 the STEM TRAIL Center Executive Director will receive a 25% workload assignment, this will become 50% in year 3 and 75% in year 5. Further, starting in year 1 the Associate Director will receive a 25% workload assignment and the three co-assistant directors will receive 15% workload assignments. The workload assignment expenses are based on a \$100,000 salary. The workload assignments have been funded in the past and will be continued to be funded by reallocation of funds in all three colleges.

² UNO is in the process of hiring a Research Technologist with a salary of \$45,000 and has hired a grant coordinator with a salary of \$55,000. Grant funding will support these expenses from year 1 through year 3. Starting in year 4 either grant funding or the colleges will accept this expense.

³ The Executive Director will have \$20,000 for general operating expenses every year. This will be paid for by grant funding.

⁴ While creating a standalone STEM Building is the long-term goal, it is expected that the UNO STEM TRAIL Center will need to rent or renovate space before this long-term vision is realized. Currently, funding is available and used by STEM faculty to rent meeting space. This expense will be paid for with the reallocation of funds or grant funding.

**TABLE 2: PROJECTED REVENUES - NEW ORGANIZATIONAL UNIT
UNO STEM TRAIL Center**

	(FY2018) Year 1		(FY2019) Year 2		(FY2020) Year 3		(FY2021) Year 4		(FY2022) Year 5		Total	
	FTE	Cost	FTE	Cost								
Reallocation of Existing Funds ¹		\$150,000		\$150,000		\$150,000		\$150,000		\$150,000		\$750,000
Required New Public Funds												
1. State Funds												
2. Local Funds												
Tuition and Fees												
Other Funding ²		\$980,000		\$980,000		\$980,000		\$980,000		\$980,000		\$4,900,000
Total Revenue		\$1,130,000		\$1,130,000		\$1,130,000		\$1,130,000		\$1,130,000		\$5,650,000

¹ The colleges of Arts and Sciences, Business Administration, and Education have committed to support the proposed center with \$150,000 annually.

² As mentioned in the proposal, the STEM Leadership Team has been immensely successful in securing grant funding. To date, 4.9 million dollars have been secured in support of the proposed UNO STEM TRAIL Center for the next five years. It is reasonable to expect this number to go up drastically in the coming years as additional funding requests are approved. For additional information, please review the 'Grant Funding' sheet.

EXISTING RESOURCES FOR STEM CENTER INFRASTRUCTURE

Current funding (2018-2023)

**This column should be dollars of project OK'd for STEM Center use, not total of each grant

Project Short Title	Type (grant, contract, royalty)	**Total Dollars	Indirects? (Yes or no)	Initials	YEARS
Worlds of Connections	grant	\$140,400	Yes	CEC	2018-2023
NE STEM 4U-Omaha middle	grant	\$70,000	Yes	CEC	2018-2023
NE STEM 4U-elem	contract	\$19,200	Yes	CEC	2018-2023
Science Noyce Teacher Prep	grant	\$960,000	Yes	CEC	2018-2023
Teacher-Researcher Partnership	grant	\$755,146	Yes	WT as PI, NG & CC as col	2019-2022
Haddix Community Chair Science	NU Foundation budget	\$18,000	No	CEC	2018 continuing
Haddix Community Chair Physical Science	NU Foundation budget	\$12,000	No	CM	2018 continuing
Haddix Community Chair Mathematics	NU Foundation budget	\$12,000	No	PXR	2018 continuing
Haddix Community Chair of STEM	NU Foundation budget	\$18,000	No	NG	2018 continuing
Union Pacific Community Chair Computer Science	NU Foundation budget	\$18,000	No	BD	2018 continuing
BODYMODELS (NSF ITESST)	NSF ITESST Grant	\$1,200,000	Yes	NG	2018-2020
EAGER (NSF) NE Innovative Maker Co-Lab	NSF Grant (Shared: UNL/Others/B. Barker PI)	\$300,000	Yes	NG	2018-2019
Mathematics Noyce Teacher Prep	NSF Grant (Matthews PI)	\$1,197,265	Yes	NG	2014-2019
Girls Inc. EUREKA Camp	Girls Inc.	\$80,000	No	NG	2014 continuing
NRI Planning Grant: (with UNK)	Internal Grant	\$20,000	No	NG	2018-2019
Citywide STEM Ecosystem	PKF, MCC, UNMC, MCC, OPPD, UNL, others	\$80,000	No	NG	2018-2020
		\$4,900,011	SUM OF EXISTING DOLLARS FOR NEXT 5 YEARS		

Note: UNO Portion is \$68,040
 Note: Matthews PI ; Grandgenett CoPI/Sen
 Note: McGlamery PI; Grandgenett CoPI
 Note: UNO portion is \$9,400
 Note: J. Sigmon salary as Director

Planned submissions (2018-2019)

Entity	Type	Dollars	Indirects	Initials/PI
NSF RI Track 2	Federal research infrastructure grant	\$4,000,000	Yes, 48.5%	Community Chair Team
NSF RI Track 1	Federal research infrastructure grant	\$20,000,000	Yes, 48.5%	Community Chair Team
NSF IUSE Engaged Student Learning	grant	\$135,000	Yes	CM
NSF IUSE Institutional and Community Transformation	grant	\$3,000,000	Yes	CM
NSF IUSE Institutional and Community Transformation	grant	\$300,000	Yes	PXR
NSF ITESST BODYMODELS II (Earlychildhood)	grant	\$1,200,000	Yes	NG
		\$27,135,000	SUM OF PLANNED SUBMISSIONS 1-YEAR OUT	

Note: Karabon will be PI, Grandgenett CoPI

Currently Under Review Submissions (2017-2018)

Entity & Title	Type	Dollars	Indirects	Initials/PI
NSF SSTEM	Federal	\$1,000,000	Yes	CC
NSF ITESST: NE STEM 4U (with UNK)	Federal	\$1,200,000	Yes	NG/CC
NSF Noyce, Track IV	Federal	\$3,000,000	Yes	CC/NG
IS&T Omaha STEM Ecosystem Portal Proposal	Local	\$200,000	Yes (10%)	NG
		\$5,400,000	SUM OF CURRENT AND PENDING SUBMISSIONS	
		\$37,435,011	TOTAL	

Note: Will submit with UNK per NRI Plan

Note: with Deepak, Zac Fowler, Julie Sigmon