Report Submission - ID: 17Admin26

Author(s):

Richard Bridges

Unit of Analysis ID Number: 130

Sector: Provost

Division : College of Health Professions & Biomedical Sciences

Unit for Assessment: Center for Structural & Functional Neuroscience

State the mission, objectives, and primary functions of this unit. : The Center for Structural & Functional Neuroscience (***CSFN***) was established as an NIH-funded Center of Biomedical Research Excellence (2000-2010, COBRE total award: $17,500,000, PI: Bridges) and then recognized as a UM Center by the BOR in 2001. Its mission is to increase the quality and quantity of neuroscience research at UM and across Montana. Given the breadth of neuroscience, the ***CSFN*** primarily focuses on serving UM faculty and students whose research aims to advance our understanding of how the brain functions at the molecular and cellular levels and how these functions are altered in brain injury and disease.

The ***CFSN*** supports and coordinates a wide array of the activities critical to creating, maintaining and enhancing the infrastructure and environment required for any biomedical researcher to be successful. This includes, but is not limited to:

• a critical mass of neuroscientists with shared interests

• collaborative and mentoring opportunities related to both science and funding

• access to high-end instrumentation

• the availability of talented undergraduate and graduate students

Consequently, the ***CFSN***:

• remains active in recruiting neuroscience faculty across multiple academic units

• supports weekly research meeting, visiting seminar speakers and statewide neuroscience conferences

• supports the acquisition and maintenance of shared equipment

• played a significant role in the development and operation of the Neuroscience Graduate Program (NGP) and the new undergraduate Neuroscience major

To a large degree, the ***CFSN*** meets the needs of UM neuroscience faculty and students on a campus that lacks a Department of Neuroscience.

Identify the primary users of the unit.: As the ***CFSN*** is a research center, and not a department, it has neither assigned faculty nor enrolled students. Faculty choose to be affiliated with the ***CFSN*** because they believe the activities and resources it provides increases the their research efforts. Currently, about **20** UM faculty (tenure and research track) and their lab groups (i.e., typically a combination of 3-4 undergraduate and graduate students, postdocs, or technicians) from the Division of Biological Sciences and the Departments of Biomedical & Pharmaceutical Sciences, Psychology, Chemistry & Biochemistry and Mathematical Sciences are affiliated with the ***CFSN*** and would be considered internal users. This group represents a subset of UM "neuroscience" faculty whose research is focused at the cellular and molecular levels.

R. Bridges	M. Grimes	D. Lurie	K. Parker
F. Cardozo-Pelaez	K. Hansen	D. Jackson	S. Patel
S. Certel	J. Hay	L. Kavachev	E. Stone
P. Diaz	T. Hughes	M. Kavanaugh	C. Thompson
J. Gerdes	N. Insel	N. Natale	

CFSN also promotes inter-institutional activities and collaborations across the state. Thus, external users would include 4 scientists at the McLaughlin Research Institute (MRI) in Great Falls and 7 faculty at Montana State University (MSU) in Bozeman.

MRI	**MSU**	
J. Birmingham	R. Bradley	C. Merzdorf
D. Cabin	L. George	S. Sowers
T. Gunn	C. Gray	K. Wanner
J. Mercer	T. Hughes	

Submit Organizational Chart : 17Admin26_SubmitOrganizationalChart_1001010707.pdf

Complete the FTE Detail Excel spreadsheet provided in the link below.:
17Admin26_CompletetheFTEDetailExcelspreadsheetprovidedinthelinkbelow_1001013821.pdf

Using the space below, address any issues with your FTE Detail Sheet.: Personnel: The contract faculty, administrators, professionals, staff listed were supported by a mixture of ***CSFN*** operational funds and, more significantly, by "pass-through" funds generated from grants submitted through the CSFN by its affiliated faculty. Thus, the names of these personnel and their salaries are too difficult to trace and, as "soft" money positions, are not really relevant to the assessment of the CSFN. Consequently, these details have not been listed.

The students listed in the Personnel section were primarily summer research undergraduates participating in the ***CSFN*** Summer Undergraduate Fellowship (SURF) Program who were also primarily supported with "pass-through" funding from grants administered by the CSFN. Their names and salaries have not been listed.

The Revenue and Expenses listed as "Current Restricted" are presumably based upon expenditures and reflect: *i*) only those grants that were routed through the ***CSFN*** for submission and *ii*) only the portion of the award spent in that time period. Numerous faculty, including the ***CSFN*** Director, are affiliated with more than one center. Thus, grants submitted through other centers by faculty who are also affiliated with the ***CSFN*** are not included. This underestimates the grant revenue attributed to the ***CSFN***. When viewed on an annual award basis since 2012, ***CSFN***-affiliated faculty have secured grant funding in excess of $13,000,000. This is summarized below as total award costs on an annual calendar year timeline.

2012	2013	2014	2015	2016	2017 to date
$149,000	$2,237,200	$1,311,110	$6,919,760	$2,543,450	$163,000

Finance: Budget and Financial Planning,Purchasing/Procurement,Accounts Payable

Research: Pre-award,Post-award,Research compliance

Communications: Marketing and Communications,Website Maintenance/Development,Event Planning

Development: Fundraising

Student Services: Admissions/recruitment

Criteria 1. - Bullet 1.: ***Partnering for Student Success / Dynamic Learning environment:*** The ***CFSN*** supports faculty and helps them engage students in "real-life" laboratories in ways that augment classroom learning with training that is dependent upon IT and high-tech instrumentation, as well as provides leadership opportunities that come with both independent projects and team-based collaborations. Specifically the ***CFSN*** supports: weekly student-inclusive research meetings, the Summer Undergraduate Research Fellowship (SURF) Program, and student research presentations.

Education for the Global Century: Through its support of both faculty engaged in neuroscience research and UM's graduate and undergraduate degree programs in neuroscience, the ***CFSN*** is a critical component in UM's efforts to better educate students (and community members) as to the increasing threat and devastating impact that brain disorders, such as Alzheimer's, TBI, PSTD, depression, addiction, etc., will have on individuals, families, and our society.

Discovery and Creativity to Serve Montana and the World**:** Of all of the benefits that students derive from first-hand participation in a research project, the most significant is arguably the sense of discovery that it instills within them. The process of research and discovery provides not only points of relevance for classwork and practical skills for future careers, but also inspiration to pursue a life path that continues to embrace discovery and life-long learning. Equally significant, faculty researchers and their students hold the potential to contribute to discoveries that will help to understand, diagnose and/or treat patients suffering with neurological disorders.

Criteria 1. - Bullet 2.: The ability of a university to recruit, retain and support the success of faculty researchers in the biomedical sciences (as well as a majority of STEM fields) is dependent upon a number of critical factors, including:

i) a critical mass of scientists with shared interests

ii) collaborative and mentoring opportunities

iii) access to high-end instrumentation

iv) availability of talented undergraduate and graduate students.

The mission of the ***CFSN*** is to help create an environment that meets these needs for UM faculty and students interested in cellular and molecular neuroscience, in particular, and all the neuroscience fields, in general. The fact that UM lacks a Neuroscience Department and that its existing departmental structure is

organized around instruction and not research, means that without the ***CFSN***, UM faculty and students interested in the neuroscience research would likely be less cohesive, less productive and smaller in number.

Criteria 2. - Bullet 1.: It is unclear what trends in demand are relevant to the impact or success of a research center with a mission to increase the research productivity of UM neuroscientists. Given the growing presence of neuroscience on campus (CSFN, 2001; Neuroscience Graduate Program, 2001; Brain Initiative, 2014; Neural Injury Center, 2015; Neuroscience B.S. degree, 2015), the increased efforts to recruit students in the health and biomedical fields (UMHM, 2016), the dramatic growth in undergraduate neuroscience major, and the tremendous potential for interdisciplinary ties between neuroscience and the liberal arts, it is likely that UM will continue to need and attract faculty in this field. The ***CSFN*** will continue to be a positive force in their recruitment and a critical resource to support their research goals.

Another trend that reflects the demand for neuroscience research and supports the continued development of it as a focal strength at UM is the growing priority that brain diseases, such as Alzheimer's, occupy within the healthcare challenges facing our community, state, and nation. This is readily reflected in funding trends for biomedical research targeting neurological disorders. For example, within just the NIH over the past 5 years, funding has increased: 2.7x for Alzheimer's ($504M to $1.35B), 1.25x for TBI ($88M to $110M), 1.3x for neurodegenerative diseases ($1.6B to $2.1B) and 1.2x for PTSD ($77M to $93M). Clearly, the demand for neuroscience research and the funding to support it are markedly increasing.

Criteria 2. - Bullet 2.: As was the case in Bullet 2 above, it is unclear what "demand" is most relevant to a research center and its "external" users. However, as stated above, the sheer scope of medical and economic pressure that will be brought to bear on our communities and state by the increasing impact of brain diseases suggest other research institutions in Montana, such as MSU and McLaughlin Research Institute (Great Falls), will continue to develop neuroscience related programs. Similarly, regional hospitals would be expected to grow to meet increased patient demand, especially in the area of age-related neurodegenerative diseases. In this respect, the ***CSFN*** will be ideally positioned to take a leadership role and collaborate with these institutions and further the research agenda of UM and the state.

Criteria 3. - Bullet 1.: When the ***CSFN*** was first established as an NIH Center of Biomedical Research Excellence, its COBRE award required annual external advisory meetings (2001-2010) for it to be renewed. This process established the strategic priorities that the ***CSFN*** continues to adhere to following the sunset of the COBRE awards. The consensus conclusion from these assessments indicated that the ***CSFN*** should continue to prioritize those activities that most directly impacted the research productivity and funding competitiveness of its affiliated faculty. The most important of these were identified as:

• maintaining a critical number of cohesive neuroscience faculty with a shared focus at the molecular and cellular levels,

• supporting activities that promote collaboration

• maintaining/increasing access to good students and required instrumentation.

This same guidance emerged from the very positive Program Review that the School of Pharmacy completed in 2012. Significantly, it included a site visit by research scientist Dr. T. Monks, who was specifically tasked to review graduate and research programs. The next external review of the ***CSFN*** will

take place this year as part of the Center Review process overseen by the Provost's office. (This review was delayed by a year owing to the change of leadership from M. Kavanaugh to R. Bridges). The ***CSFN*** has submitted a list of potential external reviewers to the Provost and has committed funds for a true site visit, rather than a teleconference-based review. The external review, which will include input from stakeholders, will be shared with the ***CSFN*** Director and the Provost.

Criteria 3. - Bullet 2.: Professional development activities focused on enhancing the quality and quantity of the research produced by the faculty lab groups affiliated with the ***CSFN*** are central to the Center's mission. Consequently, almost all of the ***CSFN's*** sponsored activities and resources are linked to the professional development of faculty and students.

Activities include weekly conferences where faculty and students present and critiques recent data. These meetings provide an opportunity for collaborative critical assessment of projects and grant proposals for faculty (both presenter and audience), as well as an opportunity for students to develop their communication skills.

By sponsoring visiting scientists, faculty have an opportunity to stay current on emerging area of neuroscience, develop new collaborations and interact with nationally recognized investigators who serve on grant review panels and editorial boards. Visitors are often invited on the basis of the potential to start new collaborations, particularly with young investigators. Students also have the opportunity to meet with visiting scientists and gain both knowledge breadth in neuroscience and insight into different career paths (academic, clinical, biotech, pharma, etc.).

The ***CFSN*** also assists in grantsmanship mentoring (e.g., highlighting neuro-relevant RFAs and PAs, shared critiques of specific aims, review of preliminary drafts, providing successful grant templates, etc.). ***CSFN*** resources have also been used to support faculty and student travel to national meetings. Again, this is particularly critical and valuable for young faculty, as these meetings provide an opportunity to meet staff from federal funding agencies, such as NIH and NSF.

Criteria 3. - Bullet 3.: Scientific Publications: The 20 UM faculty affiliated with the ***CSFN*** published more than 125 articles in peer-reviewed journals or books from 2012-2017. This number does not include additional papers published within this time frame by new ***CSFN*** faculty prior to relocating to UM, nor does it "double count" papers with multiple ***CSFN*** authors. It is also notable that about 50% of these publications included UM graduate and undergraduate students as authors. Lastly, a number of these scholarly works were published in the most prestigious, high-impact journals, including: Nature, Neuron, Nature Communications, Proceedings of the National Academy, Journal of Neuroscience, Journal of Medicinal Chemistry and the Journal of Biological Chemistry.

Patents: 7 ***CSFN*** -affiliated faculty submitted 15 provisional or complete US patents from 2012-present. Again, a majority of these patents had multiple ***CSFN***-affiliated faculty as inventors.

Grants: While not specifically scholarly products, ***CSFN*** faculty grant awards certainly reflect successful research. In this respect, ***CSFN***-affiliated faculty were awarded a little over $13,000,000 in total grant funding since 2012. (See Criteria 4, Bullet 4).

Criteria 3. - Bullet 4.: As the ***CSFN*** is a research center, and not an academic unit, it has neither enrolled students nor an assigned curriculum. However, as the research success of ***CSFN***-affiliated faculty is, in part, heavily dependent upon access to talented graduate and undergraduate students, the ***CSFN*** has been very proactive in the establishment of UM's Neuroscience Graduate Program (2001) and the recently launched B.S. degree in Cellular and Molecular Neuroscience (2015). In this capacity, the ***CSFN*** has

provided funding for graduate student stipends, undergraduate research salaries, supplies for the neuroscience laboratory classes, and supported instruction costs in some BS degree courses. The ***CSFN*** has assumed many of these responsibilities because UM lacks a Neuroscience Department.

Another way in which the ***CSFN*** does actively contribute to teaching and instruction is in the area of undergraduate research mentoring. This effort is exemplified by Center's Summer Undergraduate Research Fellowship (*SURF*) Program. From 2011-2016 47 students (70% from UM) participated in the ***CSFN*** *SURF* program and carried out research projects in 13 ***CSFN***-affiliated labs. As an indicator of quality, tracking data shows that of those students who have now completed their undergraduate degrees: ? 37% entered graduate school, ? 26% entered into post-graduate programs in the medical fields, and 17% took STEM-related science / education / clinical jobs.

Students 2011-2016	M/F	Continuing Undergrad	Graduate School	Medical / Dental / Pharmacy / PA School	Science / Education Clinical jobs
47	23/24	12	13	9	6

Criteria 4. - Bullet 1.: Revenue: The sole source of revenue for ***CSFN*** operations are the SPABA funds derived from F&A returns from the Office of the VP for Research. The SPABA funds revenue and expenses are listed on the Administrative FTE "detail sheet" and categorized as follows:

	FY13	FY14	FY15	FY16	FY17
Revenue	$72,329	$34,881	$122,692	$39,669	$22,480
Expenses	$156,435	$201,383	$111,037	$123,141	$77,055
Expense Categories					
Personnel Services	$60,752	$71,225	$47339	$34,611	$25,850
Personnel Students	$22,806	$9,410	$8,161	$21,452	$19845
Operating & Capital	$35,152	$60,164	$29,535	$36,695	$17,144
Lab Supplies	$31,051	$33,650	$19,986	$15,906	$13,130
Maintenance	$6,674	$26,934	$6,018	$14,447	$1,086

Expenses: The category breakdown detailed above demonstrates that the primary expenses are for Personnel (shared support of pre- and post-grant award management, staff for instrument cores, undergrads research students, graduate student stipends) and for Operations (equipment maintenance, core lab supplies, conferences, travel, seminar speakers). Expenses also include bond payment for Skaggs Building research space and UM's "Internal Assessment".

It should be noted that SPABA funds are cumulative. Thus, revenue and expenses need not align each year and category priorities are determined on an annual basis depending upon SPABA balance and new revenue. Current SPABA balance in the ***CSFN*** is approximately $136,000.

Criteria 4. - Bullet 2.: The sole source of revenue for the ***CSFN*** is the accumulated SPABA balance derived from the F&A return from the Office of the VP for Research. Consequently, revenue will increase or decrease depending upon several factors, including: F&A return rate, number of research

competitive faculty, grant submission numbers, funding frequency of grants and award amounts. The obvious concern is decreasing revenue, such as occurs with decreased in NIH pay lines, fewer grants being submitted and/or fewer grants being funded. One significant cause for the decreased revenue can be attributed to the sunset of COBRE support (Total award ? $17,000,000) after 10 years. Also concerning, over the last few years the ***CSFN*** has lost 3 well-funded faculty (net FTE=2) who relocated to other universities and have not been replaced. When revenue declines, expenses are deceased based upon research priorities. For example, in FY16/17 personnel expenses were reduced by sharing a greater portion of the grant management duties, which were judged to be less critical to research productivity, with staff from participating departments and/or other centers. (See Bullet 3 below). Budgets are modified on an ongoing basis prioritizing ***CSFN*** resources that have the maximal impact on faculty research productivity (student support, professional development, equipment maintenance, etc.).

Criteria 4. - Bullet 3.: In the face of decreasing extramural funding, upon which the ***CSFN*** is solely reliant, steps are already in place to collaborate with other units and centers to increase efficiency. Examples include:

• ***CSFN*** contributing to the operational costs of the Neuroscience Graduate Program and the Cellular and Molecular track of the undergraduate Neuroscience B.S. degree

• sharing costs of pre-and post-award duties with other academic units (BMED, DBS) and centers (CBSD)

• sharing costs of invited seminar speakers and developing a coordinated seminar program in "Molecular & Biomedical Sciences" with other programs (BMED, DBS, Chem, CMMB) and centers (CEHS, CBSD).

• collectively contributing to shared graduate recruiting with other graduate programs (Chemistry & Biochemistry; Cellular, Molecular and Microbial Biology, Toxicology, Pharmaceutical Sciences & Drug Design, Medicinal Chemistry)

• collectively contributing to the operation of instrumentation and core facilities in association with BMED, other centers (CEHS, CBSD) and the VP for Research

Criteria 4. - Bullet 4.: The operation of the ***CSFN*** is solely dependent upon revenue generated from an F&A return from the VP for Research that is based on a percentage of the extramural support garnered by ***CSFN***-affiliated faculty.

While only that portion of F&A return is directed toward the operation of the ***CSFN***, the impact of the grants generated by ***CSFN***-affiliated faculty represents a revenue source for many parts of campus. It should also be noted that the grant award data listed on the Administrative Services FTE Detail Sheets, is an underestimate, as it includes only those grants that were routed through the ***CSFN*** for submission. Numerous faculty, including the ***CSFN*** Director, are affiliated with more than one center. Consequently, grants submitted through other centers by faculty who are also affiliated with the ***CSFN*** are not included. Similarly, these amounts are assumed to represent expenditures and thus only reflect the portion of the award spent in that time period. When viewed annually on a total award basis since 2012, ***CSFN***-affiliated faculty have secured grant funding in excess of $13,000,000. This is summarized below as total award costs on an annual calendar year timeline.

2012	2013	2014	2015	2016	2017 to date

$149,000	$2,237,200	$1,311,110	$6,919,760	$2,543,450	$163,000

Criteria 5. - Bullet 1.: ***Engage Students:*** The ***CSFN*** provides exceptional opportunities to engage students through research. By joining active lab groups undergraduates gain high-value technical training unavailable in classrooms, have increased access to faculty mentoring and advising, relevant peer mentoring by other lab members, and a needed space on the campus to call "home".

Invest in People: With its mission to enhance faculty research, a majority of ***CSFN*** resources are directed specifically toward professional development. By supporting weekly meetings, regional conferences, grantsmanship mentoring, visiting scientists, instrumentation and students, the ***CSFN*** invests to assist faculty in attaining their scholarly goals. Albeit on a different scale, students similarly benefit from these investments through advanced training and increased competitiveness for post-graduate career paths.

Partner with place: CSFN faculty served as co-PI and personnel in the NIH Neuroscience Research Science Education Award that provided funding to design and implement the BrainZone at spectrUM. Continued participation by ***CSFN***-affiliated faculty and students have helped make spectrUM a gem in UM's community outreach portfolio.

Foster Knowledge Creation and Innovations: CSFN's research mission closely aligns with this strategic opportunity. Serving as a catalyst to increase the research productivity of its participating faculty, the ***CFSN*** helps them become more competitive for funding and more successful in generating scholarly publications. The ***CSFN*** also promotes entrepreneurship, as evidenced by it multi-year support from the state's Montana Board of Research and Commercialization Technology program, its rate of patent generation, and the five spin-off companies created by ***CSFN***-affiliated faculty.

Criteria 5. - Bullet 2.: In the face of decreasing extramural funding, upon which the ***CSFN*** is solely reliant, steps are already in place to collaborate with other units and centers to increase efficiency. Examples include:

• ***CSFN*** contributing to the operational costs of the Neuroscience Graduate Program and the Cellular and Molecular track of the undergraduate Neuroscience B.S. degree

• sharing costs of pre-and post-award duties with other academic units (BMED, DBS) and centers (CBSD)

• sharing costs of invited seminar speakers and developing a coordinated seminar program in "Molecular & Biomedical Sciences" with other programs (BMED, DBS, Chem, CMMB) and centers (CEHS, CBSD).

• collectively contributing to shared graduate recruiting with other programs (Chemistry & Biochemistry; Cellular, Molecular and Microbial Biology, Toxicology, Pharmaceutical Sciences & Drug Design, Medicinal Chemistry)

• collectively contributing to the operation of instrumentation and core facilities in association with BMED, other centers (CEHS, CBSD) and the VP for Research

The greatest need (and impact) for centrally provided services would be related to the continued operation and expansion of the shared instrument core facilities.

Criteria 5. - Bullet 3.: Rather than allocating additional resources directly to the ***CSFN***, the greatest benefit would be derived from an increased investment in recruiting new neuroscience faculty and increasing stipend support for the Neuroscience Graduate Program. In turn, the increased productivity and resulting grant funding would provide additional resources to both UM and the ***CSFN*** (through F&A return). Indeed, the ***CSFN*** has always been completely reliant on extramural funding and continues to operate based upon the success of its affiliated faculty's ability to garner research awards. Supporting evidence can be found in the increased funding that came with hiring research competitive young tenure-track faculty (K. Hansen, S. Certel) or, unfortunately, in the decreased funding that accompanied the loss of well-funded tenure-track neuroscience faculty (D. Poulsen, J. Lawrence, J. Gerdes). Further, an investment in faculty recruitment would markedly strengthen both the Neuroscience Graduate Program and the rapidly growing undergraduate Neuroscience B.S. track.

An investment in graduate support for Neuroscience Ph.D. students is also necessary to maintain research productivity. Unlike most research-intensive universities, where productivity in the biomedical sciences is primarily "post-doc driven", research in ***CSFN***-affiliated faculty labs is "graduate student driven". To recruit the top students, neuroscience graduate programs must offer competitive stipends. This is an area in which UM falls further behind each year. Indeed, the ***CSFN*** has worked with the department and other centers (CBSD) to modestly supplement Ph.D. stipends so that they begin to approach national standards.