

EXECUTIVE SUMMARY

The goal of the site visit team was to evaluate the progress in year five of the Center for Behavioral Neuroscience (CBN), a Science and Technology Center (STC) funded by the National Science Foundation. The CBN is a composite enterprise that includes two public institutions and six private institutions in the Atlanta metropolitan area. Overall the committee was extremely impressed with the progress of the CBN and some aspects of the progress were especially noteworthy. First, the fundamental goal of the CBN in fostering innovative opportunities for multidisciplinary research integrated with educational advancement ranging from K-12 to undergraduate and graduate levels has, thus far, been successfully realized. Second, significant advances have been made in broadening the involvement of underrepresented minorities and women at all levels of the Center's activities. Third, the quality of the current faculty and students is extremely high. The team was particularly impressed with the poise and scientific maturity of the students and postdoctoral fellows who provided us with stimulating and highly professional presentations. Finally, the committee found the leadership of the CBN to be outstanding. Especially noteworthy are the tireless efforts of Dr. Elliott Albers, who not only provided critical and effective guidance for the Center in a time of transition, but also was instrumental in attracting Dr. Walter Wilczynski, who will be a significant asset in the future leadership of the CBN.

In addition to the numerous apparent strengths of the CBN, the committee also identified two key areas where more progress is warranted. The most significant of these areas is the need to develop a clear and comprehensive vision for the current and future directions of the Center. This is critical for two reasons: First, to guide the immediate growth and differentiation of the CBN to assure that, as it expands its research and educational horizons through the addition of new faculty and programs, it maintains its identity as articulated in its original mission statement. Second, such a comprehensive vision is also critical for the development of a clear sense of the legacy that the CBN wishes to provide for the future, once the NSF's support for the CBN terminates in 2009. In the service of these interrelated goals, it is imperative that the CBN develop a clear strategic plan for their implementation. The second area where some improvement is warranted is in the distribution of resources of the CBN. There is a clear asymmetry in resource allocation, with the larger, research-intensive institutions such as Emory and GSU apparently receiving proportionately more resources than the smaller members, for example, the Atlanta University Center (AUC). While this may be understandable from a research-oriented perspective, the team agrees that every effort should be made to distribute resources of the CBN to the smaller academic units to ensure that they are, and perceive themselves as, full partners in the research and teaching missions of the CBN.

In conclusion, the committee feels that the CBN represents a genuine success story in the broad range of STCs supported by the NSF. We applaud both its goals and its successes to this point, and thus unanimously recommend continued support.

INTRODUCTION

A team of external reviewers and NSF officials visited the CBN at Georgia State on November 14-16, 2004. This is the fifth evaluation of the CBN and is associated with oversight prior to their 6th year of funding. The team included the following participants:

External members:

Dr. Thomas J. Carew, University of California, Irvine
Dr. J. Steven de Belle, University of Nevada, Las Vegas
Dr. Jeffrey A. French, University of Nebraska at Omaha
Dr. Shaila Mani, Baylor College of Medicine
Dr. Antonio Nunez, Michigan State University
Dr. Christine Wagner, University at Albany

NSF members:

Dr. Nathaniel Pitts, Director, OIA
Dr. Bruce Umminger, Senior Staff Scientist, OIA
Dr. Thomas Brady, Division Director, IOB / BIO
Dr. Diane M. Witt, Program Director, IOB / BIO

The team met with the PI and CBN Director, Dr. H. Elliott Albers (Georgia State University - GSU) and interim co-Director of Research, Dr. Kim Huhman (GSU); new co-Director of Research, Dr. Walt Wilczynski (GSU), co-Director of Education, Dr. Paul Leonard (Emory University), co-Director of Knowledge Transfer, Dr. Stuart Zola (Emory University), and CBN Associate Director, Dr. Kelly Powell. The CBN maintains its collaborative partnerships with eight Atlanta institutions: Georgia State University, Emory University, Georgia Institute of Technology, Morehouse School of Medicine, Clark Atlanta University, Morehouse College, Spelman College, and Morris Brown University; the latter four are collectively referred to as the Atlanta University Center (AUC).

Both formal presentations and informal discussions ensued during the site visit, which was hosted by GSU at the Commerce Club. Research Collaboratory heads (Drs. Larry Young, Mike Davis, Kim Wallen, and Kim Huhman) provided collaboratory overviews, and graduate students and post-doctoral fellows presented brief examples of their latest research findings. Dr. Kim Huhman provided a brief overview of the CBN Cores, with Dr. Steve DeWeerth providing more detailed information of the Innovative Technology Initiative. Dr. Paul Leonard provided an overview of the CBN Educational efforts, and Drs. Laura Carruth, Joanne Chu, Matthew Grober, and Kelly Powell provided details of educational initiatives, assessment data, and programmatic statistics ranging from K-12 education through post-doctoral training. Dr. Stuart Zola provided an overview of Knowledge Transfer and Partnerships, with Susan Neugent (President and CEO of Fernbank Museum of Natural History) who underscored specific CBN-initiated programs that have been an integral part of Fernbank's educational outreach. Dr. Elliot Albers described the Legacy and future plans of the CBN.

CENTER ACHIEVEMENTS AND PLANS

Research

Strengths

The CBN has come a long way toward fulfilling their original mission: the interactive and interdisciplinary research goals are becoming realized. The many cross-laboratory and cross-institutional collaborations are an obvious strength of the Center. Many examples of this success were evident, such as the Davis lab venturing into a new area of hormone research, the Wallen lab moving into analysis of human sexual responses using fMRI, and the Huhman lab's ability to integrate its long history of social analysis using modern viral vector approaches. Recruitment of the Research Director, Dr. Walter Wilczynski, is a tremendous addition to the program. Clearly the research program at GSU has been substantially enhanced by the presence of the CBN and among the CBN institutions, it is leading the way in the integration of laboratories.

As the Center matures in the coming years, an evolution of research focus and the creation of new collaborations and laboratories is expected and encouraged. However, it will be important for the Center to maintain its identity as a leader in behavioral neuroscience. Among the many strengths of the CBN, the quality and caliber of the graduates was deemed to be extraordinary and one of the most impressive products of the Center.

Concerns and Recommendations

Last year's site visit team expressed a need for a more comparative, ecological and evolutionary perspective among the laboratories, yet a shift in the approach towards meeting this goal was not apparent in the research presented in this year's site visit. All laboratories aspire toward the original intent of the CBN mission statement – integration, comparative approach, and multiple levels of analysis. The aggression laboratory and to some extent, the reproductive laboratory represent excellent models in achieving this goal; all the laboratories should strive to follow suit.

Some concern exists regarding the balance between the laboratory concentrations. While the senior members of the faculty that head these laboratories are highly visible and extremely productive, (all strengths for the CBN research program), the team hopes that the CBN will make every effort to level the playing field across and within the laboratories as they move forward into Phase II. The distribution of resources across both junior and senior faculty, as well as across institutions, particularly the AUC schools, should be evaluated. It was noted that both the fear and the affiliation laboratories seem to be heavily weighted toward the inclusion of Emory faculty and it is the recommendation of the site visit team that every effort is made to increase the inclusion of the GSU and AUC schools in these research

projects. The team is confident that Dr. Wilczynski, the new research director, will be instrumental in ensuring that these concerns are addressed.

The question of which aspects of the smaller institutions are critical for the success of the CBN was discussed. It was clear to the team that faculty from the AUC schools are loyal to the CBN and want to become a truly critical component. While it appears that the Center is responsive to the needs of the smaller institutions, it is the recommendation of the site visit team that the Center management take a more active role in this regard and re-evaluate what the CBN and its resources can do for the smaller institutions to create a more “symbiotic” relationship between the eight institutions and the CBN.

Education

The educational initiatives are comprehensive and innovative. These initiatives focus on a variety of levels, including K -12, undergraduates, graduate students and post-docs. One of the notable accomplishments of these efforts is the recruitment of undergraduates, particularly women and under-represented minorities, to CBN labs; some of these students are already admitted for graduate training. The BRAIN program has been a clear success as a recruiting mechanism and as a way to enhance the diversity of the students associated with the CBN. Credit for the accomplishments of the educational component of the CBN is to a large extent due to the enthusiasm, competence and commitment of several junior faculty members from the participating institutions.

The leadership of the CBN has been responsive to the request of the previous site visit team to enhance the evaluation of the impact of the educational programs. The CBN’s assessment plan now includes recruiting a post-doctoral researcher with expertise in program evaluation. The site visit team sees this as a positive move and encourages the leadership of the CBN to actively recruit such a person and to involve the junior faculty in all aspect of this search. The CBN is also searching for a Deputy Director who will be involved in many aspects of the educational activities. The site visit team sees this as an opportunity to attract a Ph.D. level individual with expertise in program evaluation to advance the evaluation component of the educational initiatives. Here again, the junior members of the faculty, particularly those involved in educational and outreach activities, should participate in the crafting of the job description for the Deputy Director, and should participate in the search committee for that position. Quantitative and rigorous evaluations of the program are essential not only to refine the educational efforts, but also to generate data and enthusiasm from multiple funding sources to keep these programs active after the period of NSF support of the CBN.

One concern shared by all members of the team relates to how the efforts by junior faculty members will be evaluated and rewarded by their home departments with respect to tenure and promotion decisions. The CBN should be proactive in this area by engaging upper administrative officials in candid discussions to ensure that these

faculty members are not at risk due to their efforts in the areas of education and outreach.

Finally, the site visit team was surprised by the lack of information and discussion about the PROMISE initiative that was recommended for support by the previous review team.

Diversity and Development of Human Resources

Strengths

The CBN appears to be especially committed to diversity, both in terms of its membership and the communities served by its endeavors. New faculty hires are in line with national averages, reflecting the common problems of attracting minority and female scholars and educators. Especially noteworthy is the diversity of undergraduate students participating in the BRAIN program (80% African American), which by far exceeds the ANDP average. The team was also impressed with the extent of K-12 programs targeting minority students. Further, the CBN makes concerted outreach efforts that may have profound influences on a diverse population in the Atlanta area. The CBN programs have been effective in facilitating public education in science.

Concerns and Recommendations

Although the team recognizes the difficulties inherent in achieving targeted diversity goals in faculty hiring, it nonetheless has remaining concerns in the area of underrepresented minorities and women. Further, while improvements are apparent since the last site visit, there remain differences in success across institutions. The team, as noted elsewhere in this report, was impressed by the success of the CBN in meeting diversity goals in other areas (e.g., undergraduate, graduate, and K-12). Given the unique geographic and racial-ethnic characteristics associated with the CBN and the greater Atlanta metropolitan area, the CBN institutions would appear to be in a strong position to recruit under-represented minority faculty. Finally, the CBN should also encourage the recruitment and development of students from AUC institutions through the doctoral and postdoctoral levels for faculty positions in CBN partner institutions.

Knowledge Transfer, Outreach and Products

Public Outreach

One of the goals of the CBN is to bring science to the community. The CBN has been very successful in forging partnerships with the Fernbank Museum and Zoo Atlanta to achieve this goal. The community participation in these initiatives has been impressive and the exhibits have been faithful to the identity of the CBN. These partnerships should be nurtured by the CBN. There is clear support from the leadership

of the Fernbank Museum not only to continue these efforts but also to expand them in creative ways. One recommendation here is to expand the curricular offerings of Fernbank to include topics associated with the research mission of the CBN. Some energy has been devoted to assess the impact of these activities. However, in the future, more rigorous assessment tools should be used to evaluate the impact of these programs. Achieving this goal will be facilitated by the addition of the anticipated personnel discussed under EDUCATION. The CBN is encouraged to incorporate the new technology that is being developed at the center (e.g., the 3-D spatial activity tracker) to monitor the interactions of participants with the different components of the exhibits.

Product Development

Strengths

The team was very impressed with the CBN Innovative Technology Initiative. The eventual development of cutting-edge products, such as the neural tissue interface and tracking systems, are very exciting and should enhance many levels of CBN activities. The team recognizes that product development is in its early stages and is encouraged by the CBN's continued progress.

Recommendations

The CBN is uniquely positioned to make critical contributions to the analysis of behavior. In particular, the team recommends that the center seriously consider taking a lead role in the development and implementation of behavioral neuroinformatic tools.

Shared Experimental Facilities

Strengths

The team is impressed with the dissemination of information via workshops highlighting the availability of shared technical resources. The addition of the new building to house the imaging core is a bonus and a positive addition to the CBN. The venture grant mechanism that is in place to purchase shared equipment is innovative and should be encouraged.

Concerns & Recommendations

The team finds a decided asymmetry in the core usage. It appears that the broad range of opportunities has not been realized due to limited focus. Most of the cores (except viral vectors from Cellular and Systems cores) have yet to realize their full potential in serving the various collaboratories. It is also unclear how the systems core is being utilized to its full potential. This core should evaluate and integrate a broader

range of opportunities. The core facility development appears to occur in response to need, and is currently favoring only certain types of research, without anticipation of future needs. Thus the team strongly recommends a proactive rather than a reactive approach to drive the core initiatives to serve the best interests of the center. Implementation of these recommendations can be better achieved by the development of a coherent vision and a plan for the center.

It is also recommended that junior faculty not be burdened with supervisory roles for day-to-day activities in a core facility, since it could divert faculty effort from research career development. Perhaps a better use of faculty effort is in the role of an intellectual guide, directing activities of qualified and competent managers and technical staff. While the effective use of cores is highlighted by workshops, it would be more effective to arrange workshops focusing on purely technical aspects as well as scientific applications. Providing manuals will also be an added advantage.

Input from both the junior and senior members to the focus of core facilities is also recommended. The team also strongly recommends that cores be integrated into research and teaching missions. This would provide a strong opportunity for general training at undergraduate, graduate, post-doctoral and faculty level and optimize operation and budget constraints. Outstanding cores could be envisioned as potential recruitment tools.

Rationale and Value Added

Strengths

The team agrees with comments of the previous site visit report regarding the strong rationale and value added associated with the CBN. At the end of its fifth year, the CBN continues to fulfill its mission in establishing an interdisciplinary research program focusing on brain regulation of social behavior and on how social experience modifies the brain. The center provides a means for integration of interdisciplinary research, education and knowledge transfer. The team views this value-added benefit of CBN initiatives as a critical measure of their success. Through CBN activity there is clearly a tremendous enhancement of behavioral neuroscience in Atlanta. The whole of the CBN activities is clearly greater and more integrated than the sum of its parts. The center has provided venture funding for new creative programs in research, technology development, teaching and outreach. In particular it has served as important magnet and facilitator of programs in the AUC institutions.

Concerns and Recommendations

The team was of the opinion that the CBN would achieve even greater success if their activities were better articulated across institutions and at all levels of their faculty. It was also felt that “value added” should continue to be the unifying force driving CBN endeavors.

Institutional and Other Sector Support

Commitment from the Lead Institution

The transition from Emory University to GSU has now been finalized, and the Lead Institution has continued to demonstrate exceedingly strong commitment to all of the missions of the CBN. Of particular note is the institutionally supported initiative called “Brains and Behavior”, which will lead to an investment of \$2 million per year in human and physical infrastructure in behavioral neuroscience. Nine new faculty have been hired since the onset of the Center program, and these faculty contribute substantially to the research, education, and outreach components of the CBN. These efforts, combined with the “out year” commitments to faculty and staff in the CBN, leave little doubt to the team that GSU is fully committed to this NSF STC program.

Commitment from the Partner Institutions

Financial and institutional commitments to the human resources of CBN are clear from Emory University, with 10 new faculty hires. Further, investment in physical space to support neuroscience research, including imaging capabilities and lab space for CBN faculty and students, demonstrates a strong commitment to infrastructure required for research efforts by CBN collaboratories.

Many of the inter-institution collaborative efforts have developed nicely. A brochure describing the potential integration of courses in the curriculum across institutions is a welcome development for students, and the facilitation of cross-institutional registration is aided by ARCHES. However, it was not clear to the team that all partner institutions have incorporated the goals of the CBN into their missions as independent academic departments and units. This may lead to some dissonance concerning the goals and expectations as faculty in an academic department, relative to goals and expectations as faculty participants in the CBN, particularly among new hires. The team did not meet with administrators (*e.g.*, provosts, deans, chairs) from the AUC campuses, and hence were not able to gauge the overall level of enthusiasm and continued commitment from these institutions. A clear statement of support for the CBN mission and legacy would provide faculty at these institutions with appropriate career guidance.

Other Partners

The CBN has clearly been a critical player in leveraging support from a number of partners outside the NSF and the host institutions. Primary among these partners is the Georgia Research Alliance (GRA), which provides start-up for new faculty, equipment/instrumentation, and long-term support for the CBN. The collaboration with CTI/PETNet will provide dollars for the purchase and maintenance of a cyclotron, critical for current and future imaging efforts.

Budget

The overall budget seemed quite reasonable to the team. There are a few specific concerns or suggestions that are discussed in detail in the relevant sections of the report.

Recommendation

Based on the detailed evaluation provided in the above sections, the team recommends continued support for the CBN.

**Site Visit Report Certification Page
Science & Technology Center for Behavioral Neuroscience
Award IOB 0349042 / 0506504, Georgia State University, H. Elliott Albers, PI
November 14-16, 2004**

We agree with the text of this site visit report:

Dr. Thomas Care, Chair

Dr. John Steven de Belle

Dr. Jeffrey French

Dr. Shaila Mani

Dr. Antonio Nunez

Dr. Christine Wagner