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# **Science and Engineering Alliance Inc.**

## **1998 Annual Report**

SCIENCE & ENGINEERING ALLIANCE

Annual Report

Fiscal Year 1998

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SCIENCE & ENGINEERING ALLIANCE

Annual Report

FISCAL YEAR 1998

From the Office of the Executive Director

This was an exciting and productive year for the Science and Engineering Alliance (SEA). The SEA has secured a reputation for commitment and success throughout the community of research, industry and the Federal government. As founding executive director, I continue to be gratified and humbled by the recognition and rewards received. These awards and other recognitions validate the vision set for the SEA and reminds us that the success of the SEA has come as a result of our individual and collective contribution of time and talent.

We are honored by the recognition of our efforts and the awards for our accomplishments. However, such recognition inspires us to work harder and smarter in serving the SEA members, students of the membership institutions, our supporters, and the American society.

We are extremely thankful to the individuals and organizations who supported the SEA in 1998.

## INTRODUCTION

### Purpose

This document serves as an annual report on the actions and accomplishments of the Science and Engineering Alliance (SEA) during fiscal year (FY) 1998. The report also provides highlights of significant accomplishments and challenges for future activities concerning scientific research and engineering.

### Background

Since 1990 the SEA has worked diligently, and successfully, in its quest to create a model partnership with selected Historically Black Colleges and Universities (HBCUs) and the Lawrence Livermore National Laboratory (LLNL). The partnership with the SEA institutions, Alabama A&M University; Jackson State University; Southern University and A&M College; Prairie View A&M University; and the Lawrence Livermore National Laboratory has seen much growth in the years since its inception. It is anticipated that the relationship will continue to expand scientific and engineering opportunities to the four alliance member Historically Black Colleges and Universities (HBCUs).

While the SEA was born out of a reduction in the resources for education and the government and industry's commitment to improve science and mathematics education; it has emerged as a successful multifaceted mentor and champion of the capabilities of each of its member institutions. The SEA has, successfully, taken on multiple roles and their associated responsibilities to continue the exposure of the alliance institutions.

As a result, successful relationships continue between the member institutions and the national laboratory and expanded opportunities for inclusion of member institutions in Federal scientific research and development initiatives have appeared. Each of these ventures has been beneficial not only to the institutions but also to their students, researchers and academic staff.

### Scientific Program and Project Summaries

The SEA has, successfully, taken on multiple roles and their associated responsibilities to continue the exposure of the capabilities of scientific researchers and students from alliance academic institutions. Each of these scientific program and project undertakings has been beneficial not only to the institutions but also to their students, researchers and academic staff. By broadening the awareness of the nontraditional academic institution as a "pipeline" of potential highly qualified scientists and engineers, the SEA has provided a source of highly qualified and skilled scientists and researchers to the public and private sectors. The Office of the

Executive Director (OED) of the SEA has acted as Mentor, Role Model, Challenger, Coach, Market Representative, Promoter, Facilitator and Consultant. To meet the challenges ahead, the role of the SEA will be to continue educating organizations and firms to the benefits and advantages of tapping the non-traditional source of expertise and talent of nontraditional academic institutions. The SEA scientific research journey moves through a variety of venues. These venues include:

- The SEA High Performance Computing & Communications (HPCC) Initiative

Forged by the efforts of the SEA Office of the Executive Director (OED), the SEA partnership was recognized as a competent technical resource by the U.S. Department of Energy's (DOE) Office of Scientific Computing. The OED worked diligently to bring together the SEA researchers involved in high performance computing and communications (HPCC) research. In February 1993 a meeting was held on the campus of Jackson State University. The purpose of this meeting was to develop a network of technical expertise for moving forward with an expanded collaborative initiative in the area of HPCC. As a result, an SEA-HPCC Design Team was formed. By March 1993, abstracts were submitted by the SEA researchers. By May 1993, a "Talking Paper for Marketing Purposes (TPMP) was completed. The TPMP was composed of an executive summary, expertise tables, and was classified into six sub-areas of research:

- Global Change;
- Biotechnology and Biomedical;
- Data Acquisition, Storage, Processing and Integration;
- Toxic Waste;
- High Performance Computational Issues in Materials Science and High Energy Physics; and
- Outreach.

In June 1993, the OED launched efforts to market the TPMP. The TPMP reflected the SEA member institutions' existing collective strengths in the area of HPCC. In January 1994, the U.S. Department of Energy (DOE) showed interest and chose one project from each institution as possible candidates for funding. In April 1994, the SEA-HPCC proposal was officially submitted to the DOE. Following peer review and modifications, the SEA-HPCC initiative was funded in FY 1995 (late calendar year 1994) by DOE's Office of Scientific Computing for three years at a revised funding level of \$1,069,200. The HPCC initiative became the SEA's first multiyear grant.

Following full implementation of the SEA-HPCC initiative at the campus level of the alliance member institutions, the OED moved to expand the initiative by creating organizational networks and connections with public and private organizations and national and international groups. Thus, establishing bridges, for the alliance institutions through national conferences and meetings with other technical groups became the primary strategy for expanding the SEA-HPCC initiative. The efforts of the OED are reflected in the following journey for access and inclusion in the field of supercomputing:

- 1994 -- CRAY Research, Inc. makes an offer to expand the SEA-HPCC initiative.
- 1995 -- The SEA-HPCC PIs hosted a forum at the 22nd National Conference of the National Organization of Black Chemist and Chemical Engineers (NOBCChE). The SEA executive director served as Session Chairperson for the forum that allowed him to acquaint the conferees with the work, experience and capabilities of the alliance institutions.
- 1996 -- Strategic meeting arranged between the SEA-HPCC PIs and the Lawrence Berkley National Laboratory (LBNL) to forge a partnership between the two entities. The meeting identified several areas showing potential for collaboration between LBNL and the SEA.
- 1997 -- Research Consortium Innovative (RCI), Ltd. invites OED to participate in discussions to bring SEA-HPCC program into mainstream national and international Supercomputing arena.
- 1998 -- SEA, along with Cornell Theory Center, named Associate Member of RCI, Ltd. through the sponsorship of IBM Corporation.

The SEA-HPCC initiative, funded by DOE, has provided SEA researchers access and has fostered their extensive engagement into the field of HPCC. The initiative enabled the alliance member institutions to make significant contributions to the full range of HPCC activities, including existing supercomputing systems, special purpose and experimental systems and the new generation of large scale parallel architecture.

The OED has been very skillful in exposing the alliance member institutions' researchers to the state-of-the-art in the area of supercomputing. Attendance and participation by SEA-HPCC researchers in the National Supercomputing Forum identifies another access point for the alliance member institutions. SEA membership in RCI, Ltd. adds tremendous value to the acceptance and respectability of the investigations being conducted by SEA researchers.

An important benefit of the SEA model is that it can simultaneously provide institutional and career opportunities. Students who attend the alliance member institutions gain a competitive advantage by having research experiences and mentors and coaches in cutting-edge technical areas like HPCC. The fact that three African American students obtained Master's degrees while working on the SEA-HPCC initiative supports these conclusions.

- The SEA CAMD Phase II Project

The successful completion of the first phase of a \$600,000 three (3) phase grant to the SEA from the U.S. Department of Energy (DOE) for the installation of a synchrotron Radiation Beamline Facility at the J. Bennett Johnson Sr. Center for Advanced Microstructures and Devices (CAMD) in Louisiana was a major accomplishment last year.

The first phase of this grant involved materials research on existing CAMD beamlines and end stations. Phases 2 involves the design, construction, and installation of end stations on existing

CAMD beamlines. Phase 3 involves the design, construction, and operation of a dedicated SEA synchrotron (SEAsyn) radiation beamline that will cover the full spectral range of the CAMD storage ring and expanded research in the new facility. Student internships and research assistantships are integral parts of all three phases of this initiative.

The SEA has embarked on the next leg of its scientific journey to complete phase 2 of the CAMD grant requirements; the design, construction, and installation of end stations on existing CAMD beamlines. Unlike traditional grants awarded to HBCU's, this grant is for a "big ticket" scientific requirement. The SEA has been successful in the early part of the phase two journey. The early sensitivities concerning the overly broad focus of the project and the lack of accountability and institutional support have been overcome and the SEA is now pursuing the development of a facility to be erected for installation of end stations on existing CAMD beamlines.

The SEA Co-sponsors the Gulf Coast Regional Workshop on Global Climate Change

The SEA has joined the Global Warming scientific discussions as an interested research group and as active participants in the on-going debate. Recognizing the activism of the SEA, the leadership of the U.S. Global Change Research Program selected SUBR to lead the EPA-sponsored Gulf Coast Global Climate Change Regional Workshop.

Southern University hosted the two-day workshop with the Environmental Protection Agency (EPA) and the U.S. Global Change Research Program. On February 26 & 27, 1998, approximately 150 scientists, academicians, and representatives of industry, government and citizens groups met in Baton Rouge, Louisiana to consider the impact of global warming on the states bordering the Gulf of Mexico.

Representatives from other SEA institutions, Alabama A&M, Jackson State, and Prairie View A & M universities, along with representatives from Louisiana State University, Tulane University and Florida State University were invited and accepted membership on the steering committee to develop a "white paper" that characterizes the climate change in the Gulf Coast region. Florida A & M University, another HBCU, was also invited to join the steering committee.

The Vice President of the United States, Al Gore, in a special video to open the workshop, welcomed the participants to Southern University, and expressed his delight in seeing one of the nation's HBCUs leading one of the more than 25 workshops that have been convened across the country. Vice President Gore noted that climate change will have an impact on people all over the United States and the rest of the world regardless of background. He encouraged the participants to explore the way in which it affects the Gulf Coast region.

In his keynote presentation at the opening forum of the workshop, Dr. John H. Gibbons, Assistant to the President for Science and Technology, stated "global climate change is perhaps the most pervasive and challenging long-term environmental issue that we face as we enter the 21st century. As we confront this threat to our entire planet's future, one of the things we increasingly realize is that many of its most significant consequences will be witnessed at the regional and even local scales, and that the effects of greatest concern will differ from place to

place.”

In addition to large forums for all participants, smaller working groups convened to examine impacts and possible solutions in eight areas:

0. Food
1. Forests
2. Water
3. Ecosystems
4. Health
5. Communities
6. Energy
7. Commerce

For each of the eight areas, the groups created scenerios and devised coping mechanisms to deal with them. A final report is being completed. The National Committee on Climate Change will entertain the possiblity of incorporating the results in the national assessment on climate change.

The workshop outlined areas where research is needed as well as the priority for the research. As a by-product of the common ground established and that which already existed among the workshop participants, the SEA, with the support of the EPA, has formed a technical design team to formulate research projects for submission to other agencies, including the DOE. The SEA anticipates working with the design team to develop proposals around the following abstracts submitted by the workshop’s HBCU participants:

- Assessment and Modification of Ecosystem-Hydrology-Atmospheric Model for sensitivity of Food Events to Gulf Coast Region, (Southern University and A & M College).
- Sensitivity of Storm Flow Events under Changing Temperature Condition to Gulf Coast Region (Southern University and A&M College).
- Assessment of Lynch Street Watershed in Jackson Mississippi: A Model for Evaluating Local Ecosystem Vulnerability to Global/Regional Climate Change (Jackson State University)
- Storm Surge Forecasts Based on Projected Coastal Erosion and Sea Level Rises (Jackson State University)
- Characterization and implication of Climate Change Model on the Gulf Coast Region of the United States (Prairie View A&M University).

#### Scholarship and Incentives

The SEA is aware that the workforce is becoming more diverse faster than most companies, corporations or organizations can address the concomitant issues. Clearly those interested in recruiting and retaining the best of this new workforce must be prepared to address the myriad

issues that accompany the population of this changing workforce. Attracting and preparing the most talented students available is a crucial component of the SEA mission. If we are to be successful as we move into the next century it behooves us to work with this new workforce in a way that unites a talented, committed group of people, supported by commonly held personal values, around a common purpose.

- The ARL's STARS Program

The ARL has created a Science and Technology Academic Recognition System(STARS) to attract and retain graduate level students who are enrolled in science, engineering and mathematics. STARS target, for career government service, top performing students at the completion of the junior year of study and provides early exposure of the student to the ARL's world class research capabilities and programs. STARS is intended to reach students who excel in science, engineering and mathematics and are U.S. Citizens and possess a cumulative 3.0 grade point average on a 4.0 scale. Continued participation in the STARS requires that the students maintain their 3.0 grade point average during the entire period of enrollment in the program. Additionally students must receive satisfactory performance reviews for all periods while working under the guidance of an ARL mentor. STARS provide for the payment of tuition, books and fees up to \$20,000 for the undergraduate senior year and \$30,000 for each of two years of graduate study.

STARS is the ARL's newest effort to attract the many bright and promising science, engineering and mathematics SEA graduate researchers entering the pipeline for the millennium. The ARL wants to alleviate a projected shortfall of graduate (Master's) level scientists and engineers by approaching and seeking potential qualified applicants and employees from nontraditional academic sources. Past efforts to recruit and retain the graduating students who have the highest potential for becoming outstanding scientists and engineers have been disappointing. This initiative, undertaken by the SEA, is intended to develop and institutionalize student support and exposure activities that will enhance the successful STARS program. Given the success of the SEA approach, the ARL's overall goal to attract and retain more of the rising stars of the future from nontraditional academic institutions will be successful. The SEA's vision includes STARS student participants who have completed the program and elected to join their family of world-class research scientists.

### The SEA Approach

Using the experience and expertise gained in previous situations, the SEA concluded that an approach was needed that would concentrate and enhance the areas of student support in "nonlaboratory related activities" and exposure.

In response to the needs expressed by the STARS students and the ARL, the SEA OED began work toward accomplishing the objectives that it had identified and to apply the subsequent results to the program. Accordingly, the following activities and actions were achieved,.

The SEA sponsored weekly Brown Bag sessions to provide students with a better understanding of the "big picture" that extends beyond science. The agenda of session topics is in the Appendix section of the report.

The OED of the SEA also developed the opportunity for each STARS participant to make a video taped oral presentation at the end of their assignment. STARS students were encouraged to prepare a presentation on their work at the ARL and their experience as a STARS student. This presentation was then video taped to provide the student and the ARL with a “live” history of the student’s experience. Additionally, an activity that provided opportunity for each STARS student to work with their mentors to develop a scientific technical paper based on their work assignment at the ARL. Presentation of the technical paper by the student was video taped and the technical paper will be published as a special ARL Technical Report.

- The Eighth Annual SEA Awards program

The Eighth Annual Science and Engineering Alliance (SEA) Scholarship and Incentive Awards program was held on October 16, 1998 at the Capital Hilton Hotel in Washington, D.C. Over 300 persons attended this year’s event. Those who attended represented several Federal agencies, private and public corporations, the banking industry, SEA alumni, friends and relatives of the awardees and incentive award recipients, and friends of the SEA. Awards were presented to twenty-six talented African-American undergraduate and high school students. Twenty-six students (16 undergraduates and 10 high school students) were presented scholarships and incentive awards. Undergraduate scholarship recipients received \$1000 and were designated “SEA Fellows.” The high school incentive award recipients received \$500 each. Three (3) of the high school students were from the Washington, D.C. Metropolitan area.

The success of this year’s program was enhanced by the addition of a recruitment fair for interested high school students in the Washington metropolitan area, and a workshop for SEA students. On the morning of October 16, the first SEA Recruitment Fair was held in the Federal Room at the Capital Hilton Hotel in Washington, D.C. An estimated 350 high school students from Washington, D.C., Maryland, and Virginia attended the fair. Information on the academic programs of SEA institutions was provided to students and their chaperones. Feedback was positive from both SEA institutions and the participating high schools. On October 17, The SEA hosted a special workshop for its students. The Executive Director and Mr. Otis Smith, City Manager, City of Falls Church, Virginia lead a workshop on how to market or position oneself for the best possible job.

Planning has already begun for next year’s event that will also celebrate the tenth anniversary of the SEA.

- SEA Teacher Enhancement Workshops  
(VACANT)

#### Significant Accomplishments

- Received \$10,000 contribution from the Coca-Cola Foundation to support the SEA’s Teacher

Enhancement Program. These funds are earmarked for involvement of teachers in Washington D.C. SEA sponsored workshops.

- Signed a Cooperative Agreement with the Small Business Administration The Executive Director, on behalf of the SEA, endorsed a cooperative agreement with the U.S. Small Business Administration to work in concert with four other organizations to provide assistance to small and disadvantaged businesses (SDBs) and HBCU's. This agreement between the U.S. Department of Defense Advanced Research Program Agency (DOD/DARPA), The U.S. Environmental Protection Agency (EPA), The National Aeronautics and Space Administration (NASA), the Minority Business Enterprise Legal Defense and Education Fund (MBELDEF) and the SEA. This is a grant of \$200,000 from multiple government agencies. The SEA has accepted the leadership role in this effort and has received ninety percent (90%) of the funds to provide workshops on marketing, outreach, training and technical assistance to the designated SDBs and HBCUs. Expected outcomes of this endeavor are:

- Increased HBCU and SDB participation in the Federal R&D arena.
- Expansion of the population of SDB high technology service providers .
- Stimulate commercialization of technologies resulting from Federal R&D requirements, and
- Increase opportunities for SDBs and HBCUs to secure Federal R&D awards individually or in teaming arrangements.

- For the first time in the seven-year history of the SEA and LLNL partnership, support for the SEA 1998 summer research program is being provided by the major scientific components of the LLNL. In past years the program has received its support from the Affirmative Action and Diversity Program. In 1998 the full support is being provided by the technical divisions. This is a significant decision by the LLNL because it supports LLNL's commitment to diversity and supports the vision of the SEA.

#### Advocacy and Marketing

Much of the false stereotypical information concerning the capabilities of HBCUs come as a result of a lack of information and familiarity. In some situations HBCUs have not served themselves well because of their absence at important meetings and conferences. In this area of marketing and institutional advocacy the SEA has served the alliance members well. Speeches and presentations on the capabilities and vision of the SEA are an important part of the Executive Director's active advocacy on behalf of the SEA institutions. Speeches and presentations were made by the Executive Director to the following organizations

- The SEA Executive Director was invited by the Research Consortium Innovative Ltd. (RCI) to participate in discussions on how to bring groups like the SEA HPCC researchers into mainstream national and international supercomputing research arena. Subsequently, through the sponsorship of the International Business Machines Corporation (IBM), the SEA, along with the Cornell Theory Center, was named an Associate Member of the RCI.
- The SEA has established bridges for the alliance institutions through the National

Conference of the National Organization of Black Chemist and Chemical Engineers.

- The SEA Executive Director served as Technical Program Chairman which allowed him to acquaint the conferees with the work, experience and capabilities of the alliance membership institutions.
- To broaden opportunities for access into cutting edge research initiatives, the SEA arranged strategic meetings between the alliance membership and the Lawrence Berkley Laboratory (LBL) to forge a partnership between the two entities. Several areas were identified as showing potential for collaboration between the LBL and the SEA.
- The SEA has been very skillful in exposing the alliance member institution's researchers to the state of the art in the area of supercomputing. Attendance and participation by SEA researchers in the National Supercomputing Forum adds another access point for the alliance membership institutions..

A primary benefit emphasized by the Executive Director of the SEA model is that it can simultaneously provide institutional and career opportunities. Students who attend the alliance member institutions gain a competitive advantage by having research experiences and mentors and coaches in cutting-edge technical areas like HPCC. The fact that three African American students obtained Master's degrees while working on the SEA-HPCC initiative supports these conclusions.

Additional advocacy connections were made with the following organizations

- The Wharton School of Business , School of Engineering and Applied Science's Executive Master of Technology Management Program.
- The Johns Hopkins Applied Physics Laboratory (APL)
- The EPSCoR Human Resources Development (HRD) and Louisiana Alliance for Minority Participation (LAMP) Research Conference.
- The DOD's HBCU/MI Managers meeting
- The Jackson State University Minority Science Improvement Program
- The City of Jackson, Mississippi's Second Annual Juneteenth Celebration.

#### Awards

Awards serve as motivators. The Executive Director and the SEA have been extremely fortunate to receive the following support and motivational awards from colleagues and supporters.

- The Twentieth Century Trailblazer Award and Proclamation from the City Council of Jackson,

Mississippi;

- A Most Distinguished Alumni Award from Howard University;
- An award from the Army Research Laboratory (ARL) for leadership provided to ARL's Science and Technology Academic Recognition System (STARS) program.

New Initiatives

- To link SEA researchers to the various ARL facilities, the Executive director expects to add a task to the contract that will implement quarterly HBCU technical seminars in the areas to be identified as of primary interest to ARL. The idea is to use the technical seminars to: (1) create a faculty exchange program between SEA and ARL and (2) initiate research collaborations between the two entities.

Challenges For The Next Millennium

- The SEA anticipates developing a proposal, with the Gulf Coast Climate Change Design team, centered understanding what is occurring on a regional scale using a high resolution adaptation for climate change prediction model developed by the SEA partner Lawrence Livermore National Laboratory (LLNL).
- The SEA approach to the "Year 2000 (Y2K) Problem

(VACANT)

Appendices

WP Defaults

Document

SCIENCE & ENGINEERING ALLIANCE

Robert L. Shepard

Geneva