Research Support Model
Recommendation
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Executive Summary

Project Goal

The goal for this project is to develop a model that provides broad support for computation used in research that facilitates high-performance computing while still providing a broad spectrum of services and support for the broader range of research activities that occur at Miami University.

Project Drivers

Consider the climate for research computing at Miami University in 2002. Whether by design or necessity, Miami Computing and Information Services (MCIS) served only the broadest academic and administrative needs of the University, so the burden of acquiring and maintaining specialized or high-end computing resources generally fell on individuals. Faculty and students had no place to go for advice on scientific software, no general access to high-performance computing (HPC) platforms, and no entity to address issues of research-oriented computing. Such a climate constrained faculty productivity, limited opportunities for student research, and even derailed the research agendas of some junior faculty. All of this, plus the desire to pursue new opportunities, suggested the need to develop a coherent, institutional support structure for research computing. In that year, the first step was taken to change this state of affairs. A group of faculty from three academic divisions established the Center for the Advancement of Computational Research (CACR).

Subsequently, the internal environmental analysis conducted in 2003-2004 for the IT Strategic Plan uncovered an inconsistent, inadequate, and highly distributed information technology infrastructure with limited support for researchers. Even when support services were available, faculty did not know what was available or how to obtain the services. Also, Miami has not received research funding at the same levels as our peer and aspirational institutions.

One goal in the University's First in 2009 plan is to enrich the climate for research at Miami. Implementing a comprehensive support model for research computing will play an important role in supporting this goal. A support model will:

- Promote innovation.
- Increase competitiveness for external funds.
- Promote undergraduate research.
- Attract the best faculty and graduate students and retain them.
- Modernize the undergraduate and graduate curriculum.

Summary Recommendations

The recommendations include additional funding for several research support units. The coordinated, cumulative effect of the increased level of support will improve the climate for research and accomplish the above goals. The summary recommendations are as follows:

- Hire collaborative research staff in Academic Technology Services, IT Services.
- Fully fund the Center for the Advancement of Computational Research (CACR).
- Hire UNIX support staff in IT Services.
- Add staff to the Statistical Consulting Center.
- Create a Survey Support Center (SSC).
- Purchase a small grid cluster; purchasing a site license for Matlab.
- Charter a Research Support Council.

The recommendations are based on the qualitative, gap analysis presented in Appendix 3. The Research Support Council will assess the success of the changes in two years. Complete details can be found in the Recommendation Summary section.
Introduction

This document outlines a model for research support at Miami University in accordance with the objectives of the IT Tactical Project: Research Support Model (see Appendix 1 and Appendix 2). This project began in August 2004 with the following deliverables:

- Identification of information technology requirements (Appendix 3) to support research at Miami University.
- Gap analysis (Appendix 3) between actual requirements and current services and support.
- Requirements for research support personnel in Academic Technology Support (Appendices 4 and 5).
- Research support model built on the existing strengths and available resources of the college, schools, libraries, regional campuses, administrative units, and other existing groups. In developing the model, the following should be addressed:
  - Research Information Technology and Network Infrastructure
  - Research Data Storage and Management Services
  - Research Support Services

This document addresses all of these deliverables.

Background

The role of IT support for research is also an issue of discussion at the national level, as illustrated by the following quote from “Research Universities and the Central IT Organization: Rebuilding,” by Bill Decker and Bonnie Neas, EDUCAUSE Review May/June 2003:

"More than ever before, central IT organizations need to rededicate themselves to becoming involved with the research mission and enterprises at their institutions." Their recommendations include:

- Increasing campus dialogue regarding the respective roles for the researchers and the IT organization.
- Identifying best practices for support of the research enterprise and for dissemination of those support models.
- Identifying and disseminating models for mutually beneficial research collaborations.
- Identifying and disseminating models regarding mutually beneficial development by researchers and IT providers of IT policies.
- Identifying and disseminating information about electronic grant proposal processing and grant accounting.
- Creating forums for education about and discussion of the implications of emerging federal and state policies for research and scholarly enterprises.
- Identifying and disseminating information about cost-effective licensing strategies.

At Miami University research has become a high priority. As a result, robust infrastructure and support are needed to facilitate research. The internal environmental analysis conducted for the IT Strategic Plan during 2003-2004 indicated an inconsistent, inadequate, and highly distributed information technology infrastructure with limited support for researchers. Goal 1.2 of the IT Strategic Plan addresses the nature of the research support needed:

1.2 Develop Information Technology Infrastructure and Support Plan for Research

The university will establish a well-communicated and collaborative model that provides broad support for computation used in research that facilitates distributed high-performance computing while still providing a broad spectrum of services and support for the broader ranges of research activities that occur at Miami University. Create a plan to develop and implement a research information technology infrastructure and support model. The model should build on the existing strengths and available resources of the college, schools, libraries, regional campuses, administrative units, and other existing groups. In developing the model, the following should be addressed:
1.2.1 **Research Information Technology and Network Infrastructure**: Determine and implement appropriate tools and infrastructure to support research collaboration within the university and across worldwide communities.

1.2.2 **Research Data Storage and Management Services**: Facilitate and provide advanced data storage and management services for research.

1.2.3 **Research Support Services**: Determine the appropriate information technology resources necessary, including people, services, and equipment, for a research support infrastructure at Miami University. Develop a continuous process to prioritize needs for services and implementation of solutions. Services under consideration should include a broad spectrum of institutional services, including centralized services, grant writing and submission support, distributed platform support, and research application development and support.

1.2.4 **Commercialization Center**: Consistent with the university’s plans to initiate a new center for innovative commercialization, provide the necessary information technology support to assist in establishing this center and undertaking its initiatives consistent with revenue generated by the center.

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**Support Model Development Process**

To ascertain the research support needed across the University, numerous faculty focus groups were conducted during fall 2004. Several dozen faculty members representing more than 40 departments and 3 campuses were interviewed. The resulting 32-page document identified critical needs in all divisions and the subsequent analysis led to the identification of the following:

- IT research support requirements
- Gaps in campus research support
- Skills needed by ATS research computing staff
- Major support units needed in the research support model

Additionally, a detailed report was compiled containing an itemization of the research hardware, software and services provided by the colleges/universities listed below, against which Miami benchmarks itself:

- Carnegie Mellon University
- Georgia Institute of Technology
- Indiana University
- Indiana University-Purdue University Indianapolis
- Kent State University
- Northwestern University
- Notre Dame University
- SUNY Binghamton
- University of Delaware
- University of North Carolina at Chapel Hill
- Pittsburgh University
- University of Vermont
- University of Michigan
- Virginia Institute of Technology
- College of William & Mary
- Wright State University
Research Support Model—Proposed

An analysis of the responses from the focus groups on research support make clear that Miami University needs to have a coordinated, university-wide research support model. The figure below illustrates the major units involved in providing university-wide support of research. This recommendation proposes recognizing these units as part of a coherent support model for research, and also recommends instituting a Research Support Council with senior representatives from each of these units.

Many of the units above are currently being organized or reorganized, and a new Survey Support Center is being proposed herein. Each unit’s role in research support will be discussed separately in the sections that follow, with recommendations for each unit made where applicable. Following that will be a discussion about coordination and governance, including the role of the proposed Research Support Council.
Center for the Advancement of Computational Research

Purpose
The Center for the Advancement of Computational Research (CACR) was formed as a collaborative support structure for faculty and student research in all divisions. The goals of the CACR are to

- Enrich the climate for research computing at Miami in order to promote innovation.
- Increase competitiveness for external funds.
- Stimulate the use of high-end computing in the undergraduate and graduate curriculum.

The CACR is housed in the College of Arts and Science and is overseen by an interdivisional faculty steering committee that includes the Senior Director of ATS and the Associate Dean for Research. The current list of acknowledged CACR participants includes 53 faculty members in 17 departments and four divisions.

Services
The CACR provides services in several areas:

Funding
1. Preparing external proposals to enhance the University computational resource base.
2. Identifying appropriate funding opportunities and building teams to pursue them.
3. Coordinating support from OSC and IT Services on projects and proposals.
4. Providing information on resource allocation and cost sharing for computationally intensive projects and proposals.

Resources
1. Serving as a primary source for informing IT Services, OARS, and other administrative units about faculty perspectives and needs on research computing issues.
2. Providing expert facilitation on collaborative or computational projects.
3. Organizing workshops and training sessions.
4. Promoting HPC as an invaluable tool for both familiar and novel problems in research.

Collaboration
1. Administering a Small Grants for Computational Research program to support focus groups initiating research collaborations. [Planned]
2. Inviting nationally acclaimed speakers for colloquia and workshops. [Planned]
3. Providing an information hub for computationally intensive research, including a network of Miami researchers sharing specific interests.

Instruction
1. Administering a Small Grants for Computational Research program to support development of courses and workshops on or involving high-performance computing. [Planned]
2. Assisting with grant proposals for curriculum development projects involving scientific computing or computational science. [Planned]
3. Advising instructors on new or better computational methods for solving familiar problems in their areas. [Planned]

Recommendations & Benefits
The CACR currently operates on a volunteer basis. The recommendation is to fund the CACR as described (Appendix 7) in the President’s Academic Enrichment Award (PAEA) proposal submitted this year. Eventually, funding will derive from external grants and contracts. This will allow the CACR to implement the planned services and expand current services to the broader research community at Miami University. A viable faculty organization with a small grant program will assist faculty in starting research programs and facilitate interdisciplinary research by understanding what other faculty are doing. This environment will attract and retain the best faculty and graduate students and increase the competitiveness for external grants.
Information Technology Services

Several units within IT Services are involved in research support.

Academic Technology Services—Research Computing Services

Purpose
Research Computing Services is a new unit being created within ATS as a result of the IT Strategic Planning process. The primary purpose of this unit is to provide faculty, staff, and students with full support in using research computing systems and software, including grid computing and High Performance Computing systems.

Services
A comprehensive range of research computing services will be provided:
1. Provide leadership and vision to the University regarding research computing.
   o Track national trends and make recommendations concerning staffing levels, services and infrastructure for research.
   o Represent Miami University at the Statewide Users Group of the Ohio Supercomputer Center. (OSC, Appendix 6)
2. Support and collaborate with faculty on research projects requiring research computing.
3. Facilitate interdisciplinary research through collaborations.
4. Prepare grant proposals to enhance the University’s research computing systems.
5. Assist faculty in preparing grant proposals to support their computational research.
6. Organize/create workshops and training sessions.
7. Host nationally acclaimed speakers for colloquia and workshops.
8. Provide documentation and training materials about research computing.
9. Create and maintain a website about all research support at Miami.
10. Interface effectively with other support units on and off campus to meet faculty and graduate student needs.
11. Coordinate support from OSC (Appendix 6) on projects and proposals.
    o Facilitate account creation for individuals and classes.
    o Facilitate porting of code and test programs to OSC for production runs.
12. Support faculty & graduate students using research computing including:
    o General services such as debugging, testing, scripting, creating portals.
    o Specialized support for scientific and high performance computing (HPC).
    o Specialized support for data facilitation.
13. Support undergraduate research programs.
14. Assist faculty in preparing instructional materials regarding research computing in conjunction with ATS’s Advanced Learning technologies group.

Current Plan
To begin addressing the needs identified in the gap analysis, ATS will hire three research support staff members with skills distributed according to the target mix shown in the table in Appendix 3. These positions are now open and are being advertised nationally. The specific positions include an assistant director for Research Computing Services and two senior research computing specialists (one for scientific and high performance computing and one for data facilitation). See Appendix 4 and Appendix 5 for the detailed job descriptions. ATS will begin providing the services above as soon as the three staff members are hired.
Recommendations & Benefits

Provide the additional salary money as requested for FY06 (Appendix 7) so that all three staff members can be hired rather than only two. With only two staff members, either scientific/high performance computing or data facilitation will be largely unsupported.

CACR faculty and ATS staff work will closely together to ensure that faculty needs are understood and that trust relationships are maintained. When the faculty needs are understood, trust is built, and the proposed services are offered, faculty will have support from staff that understand their research and can ensure that the use of technology is valid. Additional benefits will include the following:

- Faculty will have support for many of the facilitating tasks that are necessary for the success of their research but are outside the scope of their expertise or are prohibitively time consuming.
- Having a unit that works with faculty in all locations and divisions will lead to interdisciplinary research.
- Having support staff who are collaborators and grant coordinators will lead to increased external grants.
- A unit such as this on campus will help in attracting the best faculty. Experience has shown that when recruiting faculty with computationally intensive research, the level of support and local facilities are important considerations.
- Combining the efforts of the ATS research and instructional staff will lead to enhanced course materials for students and increase the ability to incorporate research computing into the curriculum.
- ATS will also assist in pursuing undergraduate research grants and conducting programs for undergraduate researchers.
Computing and Communications Services

Purpose

In the area of research support, Computing and Communications Services (CCS) will provide and manage the central computing and networking infrastructure as deemed appropriate and funded by Miami University.

Services

CCS provides full infrastructure services including:

1. A physical location in the IT Services Computing Room for server(s) configuration.
   - Required configuration space plus HVAC characteristics – heat, ventilation, and air conditioning;
   - Continuously protected electrical power, sourced by an Uninterruptible Power Supply (UPS) configuration, encompassing a battery, automated switchgear, and a diesel generator;
   - Connectivity to the Miami University campus network, inclusive of inter-building access at 1 Gbps.

2. Continuous operational oversight, conducted by the Network Operations Center (NOC):
   - Monitoring the configuration’s operational characteristics on a “24x7x365” basis, including server performance against predefined availability, capacity, and utilization service levels;
   - Performing problem identification and resolution activities, as required, inclusive of effecting escalation procedures, as warranted;
   - Ensuring that adequate backup and recovery strategies are developed, implemented, and tested periodically, but at least semi-annually.

3. Assuring a physically and logically secure environment through proven safeguards.

4. The prompt application of security patches to the operating system;
   - Affording protection from outside intrusion by developing and implementing the appropriate access rules on the Miami University campus firewall;
   - Providing protection from internal intrusion by infected workstations through the deployment of Intrusion Prevention Appliances and Intrusion Detection Systems as integral components to the campus network.

Additional Background

In a recent keynote address, Dr. Larry Smarr* stated that “In the past 20 years, we have seen the establishment of the global Internet and the Web. We are now seeing the emergence of universal grid infrastructure, providing researchers from many disciplines interactive visual access to remote scientific instruments and enormous distributed data archives.” During the address, Dr. Smarr highlighted the best practices at Indiana University, where all research computers in an institutional grid are physically kept in a central location with researchers contributing processors as grants are funded. Grant overhead is used to partially fund the maintenance and system administration of the grid. There are numerous advantages to this over having systems distributed across campus, not the least of which is that it allows the high bandwidth to researchers’ desktops for visualization tasks.

Recommendations & Benefits

Purchase a small grid cluster for research computing locally and hire a UNIX System Administrator to support the central research configuration with minimally 3-4 TB of data storage. This would be a base to which researchers could add processors and software purchased through grants. The configuration would be managed so that contributors would get minimally what they funded and more as available.

The above recommendations will include the following benefits:

- Availability of 1Gbps network access to the desktop for researchers needing it for activities like scientific visualization.
- Increased ability to hire the best faculty and recruit the best graduate students and maintain them.
- Having a central cluster that can be expanded by grants and startup equipment will not only allow larger problems to be executed, but will actually expand the nature of the research that can be done.
- Being able to run experimental programs locally will expand the breadth of the research, leading to increased external grants and innovation.
- The ability to visualize research results at the desktop can lead to many new insights and innovations.

*Founding Director of the California Institute for Telecommunications and Information Technology. The comments here are taken from his keynote address, “Providing Your Faculty Global Access to the Instruments of Scientific Discovery,” delivered at the EDUCAUSE Center for Applied Research (ECAR) 2004 Symposium "Innovation at the Boundary between Science and Science Fiction" in November.
Support Services and Computing Partnerships

Purpose

In the area of research support, Support Services and Computing Partnerships (SSCP) will provide general support services and the ability contract for support of UNIX desktops and servers as needed.

Services

The Support Desk is the central point of contact for technology questions at Miami University. It answers questions on a wide variety of topics, such as problems with user accounts, e-mail, and use of on-line services such as myMiami and Blackboard. The Support Desk maintains the Knowledge Base and provides both online and face-to-face training opportunities.

The Partnership Program will provide, through service level agreements, support for UNIX, PC and Mac desktops and servers as well as application development.

Recommendations & Benefits

The Partnership Program should be seeded with 1 UNIX person to facilitate support for UNIX desktop computers and distributed servers.

Realizing the urgent need for UNIX support, IT Services will fund a new UNIX position for 1 year with responsibilities for both the central research computing systems and UNIX desktop support. This fulfills half of the identified UNIX support needs.

The benefits of these recommendations include the following:

- Providing these services will assist in recruiting faculty because a common concern is “How do I manage my startup desktop and computing systems?”
- Increases in research productivity because faculty will not need to spend time on patching computers and installing software.

Support Services should purchase a site license for the Matlab software package as soon as possible. Matlab is the most requested research software across the University. Currently, it is being purchased centrally with chargeback to individuals. Purchasing a site license is warranted by several considerations, including:

1) The overhead in processing a large volume of small requests.
2) The many researchers who need the package but can’t afford it.
3) Those that do purchase it can’t afford all the modules they need.
4) The difficulty that individual researchers have in keeping the package updated.
Libraries

Purpose
A primary mission of the Libraries is to support the curricular and research needs of faculty and students. The Libraries provide the University community with unrestricted access to information, as well as continued development and support of technological tools, services, and facilities to deliver information in many formats.

Services
Electronic Data Center (EDC): The EDC supports academic and scholarly activities with access to collections of numeric data files, software for data manipulation, research assistance, and instruction, as well as Internet-accessible data extraction tools. Data librarians meet with graduate students and faculty to acquire and prepare numeric data files for research projects. They help design student research assignments to integrate data services with the research goals of courses. The Libraries represent the University at the Inter-university Consortium for Political and Social Research (ICPSR).

Geographic Information Services (GIS) and OhioView: GIS is designed to acquire and promote access to geographic data and software, provide instruction and assistance in the manipulation of geographic data, and create electronic tools for the innovative use of GIS technology. The Libraries maintain a campus site license providing access to most of the software packages available from the Earth Systems Research Institute (ESRI). OhioVIEW is an innovative, state-wide effort to provide access to federal satellite data to Ohio citizens.

Center for Information Management (CIM): CIM is a high-end multi-media production facility that offers student and faculty researchers advanced hardware, software, and drop-in assistance for publishing research results in digital formats. Digital publishing projects are supported by the facility, including web pages, presentations, image manipulation, movie and sound editing, posters, maps, and statistical packages.

Digital Resource Commons (DRC): The DRC will be a robust content management service and repository that supports the storage, publication, distribution, and long-term preservation of digital educational and research materials of participating colleges and universities. Miami is involved in developing a prototype for the state.

Institutional Repository: To contribute to the DRC, the Libraries are planning an institutional repository with rights management policies and procedures to store and disseminate the scholarly output of faculty and students. Researchers can store or archive working or completed digital objects such as research papers, conference proceedings, technical reports, pre-prints and post-prints, raw scientific data, and recordings of fine arts projects.

Digital video, images, and sounds: The Libraries support broad access to digital video, images, and sounds. Media collections include photographs from the Associated Press Archives as well as digital images, sound clips, and videos from OhioLINK’s Digital Media Center. The Libraries also digitize their own holdings and have electronically published pictures, manuscripts, and primary documents related to the history and culture of Miami University, Greater Cincinnati, the Miami Tribe, the State of Ohio, and the United States. The Libraries’ E-Reserves program was recently expanded with software for securely streaming audio files over the web.

Electronic Dissertation and Theses (ETD) Center: OhioLINK’s ETD Center is a free, online database of the doctoral dissertations, masters theses, and undergraduate honors theses produced at participating OhioLINK member institutions. Originally conceptualized and beta-tested by Miami Libraries, the ETD Center gives researchers immediate access to the most current research occurring on Ohio’s campuses.

Research Assistance: The Libraries’ Information Literacy/Fluency program trains student researchers to navigate an array of information tools and resources. Librarians partner with academic departments to deliver 400 guest lectures per year and help shape effective library-research assignments. The Libraries’ liaison program links subject-specialist librarians with departments and aids researchers with one-to-one consultation. The Libraries also offer live, online research assistance.

Resource acquisition and access: The Libraries purchase or acquire access to abundant print and electronic collections of scholarly resources to support research, preliminary review, and ongoing investigation.
Miami Center for Commercialization and Innovation

Purpose
Miami Center for Commercialization and Innovation’s (MCIC) vision is to become the Miami University and small business community’s one-stop-shop for innovative product development and commercialization needs. MCIC’s objectives are

- To provide new and unique educational opportunities for Miami students.
- To be the economic development engine for the region.

Services
As envisioned there are four basic scenarios that will involve MCIC:

- Development/commercialization of Miami University intellectual property.
- Consulting/development/commercialization of external entrepreneur’s intellectual property.
- Enhancement of venture capitalist’s intellectual property.
- Act as an interface to the outside community to the IT services and provide a revenue stream to IT.

In the initial three-year period, MCIC will focus on the first scenario and lay the groundwork for the second and third scenarios.

Current Plan
Funding for Initial Phase:
The funding for the first three years of operation will be provided equally by GSOARS, the Provost’s office and the Vice President for Finance and Business Services. This group will hire an Executive Director (ED) to manage MCIC. The ED will report to the Provost’s Office. The ED will be hired with a three-year commitment and will be reviewed annually. The continuation or growth of MCIC is dependent on MCIC meeting the success evaluation listed below.

The charge for the Executive Director is:

- From a list of 3-5 MU IP projects, direct their development into a commercial product.
- Develop internal contacts with MU personnel to help with MCIC projects and in particular those professors that can utilize the projects in the classroom.
- Establish external network contacts with entrepreneurs, venture capitalists, and economic development offices.
- Be involved in the discussions about a Research Campus in the Oxford area.
- Apply for external funding to support and expand the operation of MCIC.

MCIC success evaluation is based on:

1. Three MU IP projects are commercialized.
2. Educational opportunities have been established including externships.
3. External funding to support MCIC and/or MU IP projects has been received.
4. A strong and supporting external network has been established.
Office for the Advancement of Research and Scholarship

Purpose
The purpose of the Office for the Advancement of Research and Scholarship (OARS) is to encourage, initiate, assist, and celebrate faculty research, scholarship and effective teaching at Miami University.

Services
The services include the following:

1. Assistance with faculty efforts to obtain external grants from federal, state and private agencies, including:
   - Locating grant funding opportunities
   - Proposal development and preparation
   - Requirements and research regulations and responsible conduct of research (human subjects, animals, radiation, bio-safety)
   - Training faculty and staff in grants writing and budget preparation
   - Patenting, copyright and trademark
   - Technology transfer

2. Administering of internal grants and programs to assist the development of faculty capabilities and expertise in areas of:
   - Faculty Research including grants from the University Senate Committee on Faculty Research (CFR)
   - Undergraduate Research Mentorship (including grants through the Undergraduate Summer Scholar (USS) program and grants from the University Senate Committee for Undergraduate Research (CUR)
   - Research challenge grants to foster center development
   - Shoupp awards to promote industry/university cooperation
Statistical Consulting Center

Purpose
The Statistical Consulting Center (SCC) offers statistical consulting to faculty, staff, graduate and undergraduate students conducting research at Miami University. The SCC is a group of statisticians who provide consultation on all aspects of data collection, analysis and interpretation. The Center is funded by the University to promote high quality statistical consulting to researchers and is staffed by a Manager, full-time statistics faculty and graduate students.

Consulting services are provided free to Miami University students, faculty and staff who have no external support, or on a cost recovery basis to those with externally funded support. External projects are accepted on a case by case basis and will be charged competitive rates.

Services
SCC can participate as short-term consultants on a specific well-defined problem or as long-term collaborators and research partners. The SSC can provide services at each stage of a research project:

Phase 1: Project Formulation and Initiation
- Conceptualization of the project
- Grant Preparation (e.g. study design issues, sizing studies, writing methods sections, measurement issues)

Phase 2: Assistance during Data Collection
- Ongoing monitoring of the data collection
- Data base issues – variables, definition – design of data structure, data dictionaries, construction of databases

Phase 3: Data processing
- Greater involvement when data is in
- Data validity checks, range checks

Phase 4: Statistical Analysis
- Formal Analysis and Modeling
- Evaluate the research hypothesis that motivated the work

Phase 5: Manuscript preparation
- Presentation and summarization of the results

Recommendations
The SCC should be given funds to hire an additional staff member to meet the demands in this area. One or two additional tenure-track faculty hires in applied statistics are also warranted. As shown by the services above, the SCC plays a direct role in faculty obtaining and executing external grants. Many faculty members would not be able to get these grants without this support written into the grant, and many grant proposals would be more fundable if such support were cited.
Survey Support Center

Purpose
Recent discussions with faculty in all divisions about research support needs indicate a widespread concern about the lack of a central facility to provide assistance on designing, implementing, and analyzing surveys. We propose instituting a Survey Support Center (SSC) at Miami University to meet this need. The SSC would provide professional guidance and expertise on the use of surveys in faculty and student research and in faculty-directed assessment programs.

Services
Specific areas of SSC expertise would include:

- Survey design and analysis
- Qualitative research
- Instrument design and measurement issues (e.g., issues of reliability and validity)
- Human-subjects and privacy issues (as an adjunct to OARS)

At the same time, the SSC would advise technical support staff on various issues related to surveys, such as

- Data checking and quality assurance
- Sharing data internally and externally
- Survey implementation and data acquisition (paper, phone, web)

Most faculty have limited practical knowledge of survey issues and are unable to stay abreast of the myriad scientific and regulatory developments. The SSC would provide this expertise and also serve as the primary interface for researchers to other survey-support resources provided by IT Services, the Statistical Consulting Center, and OARS.

Recommendations & Benefits
Instituting a Survey Support Center would keep researchers up to date on survey issues and streamline the survey process from start to finish. Furthermore, a Survey Support Center would increase interdisciplinary collaboration, strengthen publications and theses, and enhance proposals for extramural funding. Preliminary discussions indicate a need to seed this Center with a minimum of two full-time staff members. Administrative oversight of the Center might be given to the Graduate School or it could report directly to the Office of the Provost.
Coordination and Governance

Coordination
Given the number of major units involved in supporting research, the effectiveness of the support will depend on close coordination among the units and seamless access to services for students, faculty, and staff. To facilitate access, ATS will take the lead in creating a user-centric website for Research Support detailing all the services available from the major support units and how to obtain them. Numerous and repeated marketing activities will be conducted to keep faculty informed about services and events.

An ideal situation would include facilities which can house all the research support personnel from the various entities and provide one-stop shopping for those needing services. Such a facility is certainly recommended by this report and should be kept in mind if a research center is created. However, taking this recommendation any farther is past the scope of the present project.

Governance
Currently the CACR Steering Committee has agreed to be an advisory group for ATS Research Computing Services. This will be invaluable in terms of ensuring that faculty needs are well understood and projects are properly coordinated. The Senior Director of Research Computing Services is a member of the CACR Steering Committee to ensure two-way communication.

The Ohio Supercomputer Center (OSC) is an invaluable statewide resource. The Director of the CACR and the Senior Director of ATS were appointed to represent Miami University on the OSC Statewide User Group which meets bi-monthly. The OSC is very flexible and responsive to needs of the member schools and we are committed to providing a seamless interface and the requisite support in moving research from our local test facilities to full production on supercomputers as appropriate. The recent connection of Miami University to the Third Frontier Network will be invaluable.

To coordinate and strengthen research support, a Research Support Council will be instituted. This council will consist of senior level representatives from each of the major research support areas. This will ensure that research needs are understood by all units and that appropriate services can be put in place to meet all needs. Major projects will be coordinated and monitored at a high level by this council. A commitment will be made that when one support unit is approached for research support, that unit will bring in members of the other units as needed.

Recommendation Summary

Following is a high-level review of the research support model recommendations.

Staffing and organizational recommendations:

- Provide the additional salary money (requested by ATS for FY06) to hire all three staff members needed to provide comprehensive research computing support services.
- Hire a UNIX System Administrator in CCS to support the central research configuration.
- Seed the Partnership Program with one position to facilitate support for UNIX desktop computers and distributed servers. This initial cost would not be ongoing. IT Services had provided this funding.
- Fund the CACR as specified in the PAEA (Sheriff) proposal.
- Hire an additional staff member in the Statistical Consulting Center to fully support the needs for statistical support.
- Create a Survey Support Center with two funded positions to provide comprehensive support for qualitative research and survey needs.
Computing and networking infrastructure and software recommendations:

- Purchase a site license for the Matlab software package as soon as possible since this is a critical need University-wide and will pay for itself in terms of staff time saved.
- Purchase a small grid cluster for research computing locally and with minimally 3-4 TB of data storage to run experimental and test programs. Large production problems would then be run at OSC. This would be a base to which researchers who get grants could add processors and software.
- Provide 1Gbps network access to the desktop for researchers needing it for activities such as scientific visualization.

Governance and ongoing planning recommendation:

- Charter and create the Research Support Council to oversee the wealth of services provided. This is deemed to be a vital recommendation.
- Ensure the Research Support Council assesses the effectiveness of the University-wide research support after two years and recommend changes as deemed appropriate.

Facility recommendation:

- Provide a central office facility to house the research support personnel from all the above units in one place and provide one stop shopping for those needing services.

See Appendix 7 for the budget requirements to implement these recommendations with the exception of the central office facility.

Benefits

The coordinated, cumulative effect of the above recommendations will achieve the stated goal of enriching the climate for research at Miami University, with the following outcomes:

- Promote innovation.
- Expand interdisciplinary research.
- Enable researchers to work on more complex problems.
- Increase competitiveness for external funds.
- Promote undergraduate research.
- Attract and retain the best faculty.
- Attract graduate the best students.
- Stimulate the use of high-end computing in the undergraduate and graduate curriculum.
- Lead to integration of research activities in the undergraduate curriculum.
Appendices

Appendix 1: Project Scope Document

**Project Information**

**Project Name:** Research Support Model Project  
**Date:** November 19, 2004  
**Project Sponsor:**  
Reid Christenberry  
Vice President for Information Technology

**Project Steering Team:**  
Reid Christenberry, John Hughes

**Project Manager:**  
Carolyn Gard  
Senior Director of Academic Technology Services

**Project Consultants:**  
Kay Roman  
Cornelius & Associates

**Document History**

<table>
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<th>Requestor</th>
<th>Approved By</th>
<th>Description(s) of Change</th>
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<td>11/23/04</td>
<td>Kay Roman</td>
<td>Carolyn Gard</td>
<td>reviewed for updates after project was further defined for critical deliverables.</td>
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1.
Objective:

1.1. Develop a model that provides broad support for computation used in research that facilitates high-performance computing while still providing a broad spectrum of services and support for the broader ranges of research activities that occur at Miami University.
   - Identify support needs to aid in the hiring of three positions in Academic Technology Services during FY05.

1.2. Create a plan to develop and implement a research IT infrastructure and support model by February 2005 to be included in the FY2006 budget discussions.

2. Background & Narrative:

2.1. Research has become a higher priority for Miami University. As a result, robust infrastructure and support is needed to facilitate this research. The internal environmental analysis indicated an inconsistent, inadequate, and highly distributed information technology infrastructure with limited support for researchers.

3. References:

3.1. IT Strategic Plan 1.2 Develop Information Technology Infrastructure and Support Plan for Research. The university will establish a well-communicated and collaborative model that provides broad support for computation used in research that facilitates distributed high-performance computing while still providing a broad spectrum of services and support for the broader ranges of research activities that occur at Miami University.

4. Deliverables:

4.1. Requirements for research support personnel in Academic Technology Support.
4.2. Information technology requirements to support research at Miami University.
4.3. Gap analysis between current services and support and the requirements.
4.4. Research support model built on the existing strengths and available resources of the college, schools, libraries, regional campuses, administrative units, and other existing groups. In developing the model, the following should be addressed:
   - Research Information Technology and Network Infrastructure
   - Research Data Storage and Management Services
   - Research Support Services

5. Boundaries:

5.1. The focus of the project is to plan and not implement the appropriate research support and IT infrastructure.

6. Assumptions:

6.1. Three IT support personnel will be hired into the ATS group over the next year to make research support possible.

7. Risks:

7.1. Being in an environment with very little support, researchers may not realize the nature and level of support actually needed, nor the impact that a high level of appropriate support can have on their research.

7.2. The research needs of those not using high-performance computers may be underrepresented and hence not met.

7.3. This is a planning and not an implementation project so there might be expectations that an IT research infrastructure will be in place far sooner than it will.
Appendix 2: Project Organization

The following people participated in the project process to develop this recommendation.

**Project Sponsor**
Reid Christenberry

**Steering Team**
Reid Christenberry, John Hughes
Project Manager
Carolyn Gard

**Core Team**
Luis Actis (MBI)
William E. Even (ECO)
Carolyn Gard (IT Services)
Nathaniel Johnson (IT Services)
James Kiper (CSA)
Mark McBride (ECO)
Gil Pacey (CHM, OARS)
Jon Patton (IT Services)
Amit Shukla (MME)
M. Henry Stevens (BOT)
Robin Thomas (PSY)
Stephen Wright (MTH, CACR)

**Requirements and Support Model Focus Team**
Carolyn Gard, Gil Pacey, Steve Wright
Appendix 3: IT Research Support Requirements and Gap Analysis

The table below summarizes the gap analysis indicated by a subjective, qualitative analysis of the data collected from the faculty focus groups. The table identifies the support personnel and expertise needed to provide comprehensive research support to faculty and students at Miami University. The Actual Personnel Planned indicates positions for which funding is now available, whereas the Personnel Recommended is what should be funded now to start the enhanced level of support offerings. The Estimated Personnel Gap represents positions that are likely to be required in the longer term (according to focus group input), but which do not have the same level of immediacy. An assessment will be made in two years to determine the Actual Personnel Gap after the currently proposed level of support is deployed.

<table>
<thead>
<tr>
<th>Area of Expertise</th>
<th>Estimated FTE Required</th>
<th>Actual Personnel Planned</th>
<th>Personnel Recommended</th>
<th>Estimated Personnel Gap</th>
</tr>
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<tbody>
<tr>
<td>Statistics</td>
<td>2</td>
<td>1 (SCC)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Surveys &amp; qualitative research support</td>
<td>3</td>
<td>2 (SSC)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>UNIX/Linux system management</td>
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<td>2 IT Services (SSCP)</td>
<td>1 IT Services (CCS)</td>
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<tr>
<td>Data facilitation</td>
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<td>IT Services (ATS)</td>
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<td></td>
</tr>
<tr>
<td>High-performance computing</td>
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<tr>
<td>Scientific computing &amp; modeling</td>
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<td>IT Services (ATS)</td>
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<td></td>
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<tr>
<td>Research facilitation</td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Biology</td>
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<td>0.25 IT Services (ATS)</td>
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<td>Humanities</td>
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<tr>
<td>Fine arts</td>
<td>0.5</td>
<td>IT Services (ATS)</td>
<td>0.25</td>
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</table>

Facilities Needed
The focus group discussions also indicated a pervasive need for new facilities in support of faculty and student research. The following items are required on a University-wide basis:

- Gigabit network to researcher’s desktop
- Terabyte campus-wide storage — complementing Ohio Supercomputing Center (OSC)
- High-performance computing systems — complementing OSC
- Research software — acquisition, license management, and access
- Centrally located office suite — research support staff
- Scientific Visualization/Digital media support center — research orientation
- Human-subjects research labs — equipped for videography and computing
Appendix 4: Assistant Director of Research Computing Services

Department:
This position reports to the Senior Director of Academic Technology Services, who reports to the Vice President of Information Technology.

Responsibilities:
The responsibilities of this position fall into 3 categories:

- Provide leadership and vision in supporting research computing
- Track national trends and make recommendations concerning staffing levels, services and infrastructure for research
- Represent Miami University at the Statewide Users Group of the Ohio Supercomputer Center
- Present at regional and national conferences
- Create and manage a collaborative research computing support unit
- Interface effectively with other support units on and off campus to meet faculty and graduate student needs
- Participate in undergraduate research support programs
- Manage staff to ensure appropriate and high quality services
- Collaborate with faculty on research projects
- Facilitate interdisciplinary research
- Support research and grant writing projects

Additional Information:
This is a unique opportunity to help create a research computing support organization. This position will assist in hiring 2 staff initially. As the unit expands, the position may become promotable to Director. Miami University has Ph.D. programs in Botany, Chemistry and Biochemistry, Educational Leadership, English, Geology, History, Microbiology, Political Science, Psychology, Zoology and soon Gerontology, in addition to over 50 Masters Degree programs.

The IT Strategic Plan specifies that “the university will establish a well-communicated and collaborative model that provides broad support for computation used in research that facilitates high-performance computing while still providing a broad spectrum of services and support for the broader ranges of research activities that occur at Miami University”.

Qualifications:

- Masters Degree required with a terminal degree preferred
- Significant experience supporting research computing, especially grid/distributed computing
- Experience in writing grant proposals
- Ability to manage and mentor staff
- Ability to work collaboratively with faculty as a peer
- Ability to work independently and as a team member
- Ability to organize and administer large scale programs
- Excellent interpersonal, organizational, analytic, verbal and writing skills
- Experience with scientific computing, modeling, and simulation is desirable.
Appendix 5: Senior Research Computing Specialists (2 positions)

Department:
These positions report to the ATS Assistant Director of Research Computing Services.

Responsibilities:
The responsibilities of each position fall into several categories:
- Support faculty and graduate students using research computing
- Provide one-on-one consulting and assistance in using IT for research
- Facilitate/conduct seminars and training programs
- Interface effectively with other support units on and off campus to meet needs
- Provide scripting, programming and debugging services
- Collaborate with faculty on research projects
- Present at regional and national conferences
- Co-author papers
- Facilitate interdisciplinary research
- Support research projects and grant writing
- Support undergraduate research programs
- Participate as a member of Research Computing Services team
- Evaluate options and make recommendations regarding hardware, software, databases, etc.

Qualifications:
- Doctorate or Terminal Degree required (MS or Bachelors for Research Computing Specialist)
- Significant experience supporting research computing
- Experience in writing grant proposals
- Ability to work collaboratively with faculty as a peer on research projects
- Ability to work as a team member
- Excellent interpersonal, organizational, analytic, verbal and writing skills
- Experience with data mining highly desirable

Position 1: Scientific and High–Performance Computing Support
- Significant experience with scientific and high-performance computing
- Parallel computing (distributed and shared memory)
- Programming languages (F77/9x, C/C++, Python, Java, Matlab, etc.)
- Debugging and Profiling
- Porting code across architectures
- Scientific visualization
- Significant experience with modeling and simulation of physical systems
- Numerical methods and libraries (IMSL, NAG, GAMS, LAPACK, netlib)
- Standard software and libraries for statistics, simulation and optimization

Position 2: Data Facilitation Services
- Significant experience analyzing quantitative and qualitative data
- Significant experience creating, organizing, merging, manipulating, storing and archiving large data sets
- Significant experience translating data between formats
- Significant experience with searching data
- Significant experience with survey implementation and data acquisition
- Significant experience with portal development for data and software
Appendix 6: Ohio Supercomputing Center

Purpose
The Ohio Supercomputing Center (OSC) was founded in 1987 as a statewide resource designed to place Ohio’s research universities and private industry in the forefront of computational research. The OSC mission statement is:

“OSC provides a reliable high performance computing and communications infrastructure for a diverse, statewide/regional community including education, academic research, industry, and state government.

In collaboration with this community, OSC evaluates, implements, and supports new and emerging information technologies.

OSC, as a shared resource, accelerates the use of information technologies to strengthen the state's attractiveness and global competitiveness.”

Services
OSC is a fully-scalable center with mid-range machines to match those found at the National Science Foundation centers and national labs. Its impressive array of machines and visualization equipment includes a Cray X1, Altix, SunFire 6800, Intel P4 Linux Cluster, and Itanium-2 Linux Cluster.

Researchers can get accounts for themselves and for their classes on these systems. In addition, extremely large amounts of disk space are available.

OSC provides many site licenses for the state for research software and has many other software packages installed. Researchers can request that software be purchased for all users, have software installed for their group or install software in their own account. Software that is not purchased for all users is essentially not supported.

Numerous educational opportunities are available such as the Summer Institute for high school students. Training about UNIX and HPC topics is provided at OSC or can be arranged on campus locally. General support services are available and, for several disciplines, in-depth support is available.

OARnet is OSC’s networking arm and Internet Service Provider. It was designed to help its clients achieve educational and business goals and has several significant initiatives underway, one of which is the Third Frontier Network. The goal of this project is to create a premier network that will enhance research, education, and economic development that will help expand Ohio’s role and reputation in networking technology.

The scientists and engineers who use OSC find interaction in the research community to be central for the advancement of computational methods within and between disciplines. To ensure a productive environment for research, an active Statewide Users Group (SUG) provides the OSC director with program and policy advice. Carolyn Gard and Stephen Wright represent Miami University as members of the OSC Statewide Users Group (SUG).
### Appendix 7: Budget to Implement Recommendations

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<th>FY06 One time</th>
<th>FY06 Ongoing</th>
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<td><strong>Academic Technology Services</strong></td>
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<tr>
<td>Salary to hire 3rd staff</td>
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<td><strong>Computing &amp; Communication Services</strong></td>
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<td>UNIX Staff</td>
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<td>Grid Computing System</td>
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<td><strong>Support Services &amp; Partnership Program</strong></td>
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<td>UNIX Staff seed</td>
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<td>Matlab Site License</td>
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<td><strong>Statistical Consulting Center</strong></td>
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<td><strong>Survey Support Center</strong></td>
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<td>2 Staff</td>
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<td><strong>TOTAL Without Fringe</strong></td>
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### CACR Budget from the Submitted Proposal

Project Budget (July 1, 2005 – June 30, 2008) by Type of Expense

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