Report from the Research IT Strategic Plan Committee

Preface

The Research Subcommittee of the Penn State University Information Technology Strategic Planning Committee was established by the Provost and the Vice-Provost and CIO in July 2012. Faculty members on this committee met on a weekly basis throughout the 2012-13 academic year and developed a report that was unanimously approved by the full committee and adopted as part of the proposed IT strategic plan. The report is presented here separately so that implementation may begin immediately for three reasons:

- Research computing at Penn State is in a critical state that demands immediate action independent of the eventual implementation of the rest of the IT strategic plan.
- A key recommendation of the report is that planning and administration of research computing be “decoupled” from enterprise IT, and that implementation begin prior to the 2013-14 academic year.
- A necessary step toward correcting the state of research computing at Penn State is the urgent need for appointment of a “Chief of Research Computing” and a research computing implementation committee, both with reporting lines to the VPR as detailed in the report.

The report has been broadly distributed, and the recommendations have the support of several important Penn State constituencies including: (1) The Evan Pugh Professors; (2) The Directors of the Huck Institute of the Life Sciences, the Social Science Institute, the Materials Research Institute, and the Institutes of Energy and the Environment; (3) The University Research Council, which voted unanimously to pass a resolution that “The changes proposed by the Research IT Committee for Strategic Planning are long-overdue, much needed, and have enthusiastic support for urgent and immediate implementation”; (3) The Senate Committee on Research, which unanimously supported the report and the urgency to take action, and has recommended the implementation of the report as a priority agenda item for 2013-14; (4) Vice Presidents David Gray (Finance and Business) and Henry Foley (Research) have individually and collectively endorsed the recommendations and assured us of their support and endorsement for prompt implementation; and (5) Several college Deans have been consulted and strongly support the recommendations. This report and its recommendations for improving research computing at Penn State have been widely endorsed by relevant stakeholders and major constituencies.

1 Faculty members of the committee included D. Scott Bennett (Political Science), Michael Furlough (Library), Lee Giles (IST), Robert D. Hume (English), Jainendra Jain (Physics), Vivek Kapur (Huck Institute of the Life Sciences), Susan Marie Mc Hale (Social Science Research Institute), Padma Raghavan (Institute for CyberScience), Marylyn Deriggi Ritchie (Biochemistry and Molecular Biology), Jorge Sofo (Physics), and Denise Solomon (Communication Arts and Sciences). IT representatives on the committee included, Vijay Agarwala (RCC), John Domico (Engineering), Joshua Fritsch (Science), Dave Gindhart (Sponsored Programs), Jim Leous (ITS-ET), Mark Linton (ITS-TNS), Rick Marhoe (ARL), Mairead Martin (ITS-DLT), Rich Rauscher (Hershey), and Ed Smiley (ITS-SOS). The ITS staff on the committee agreed that it was appropriate to abstain from endorsement of specific recommendations for revisions of organizational structure, but will wholeheartedly support the implementation of the full set of recommendations if adopted by Penn State’s senior leadership.
Preamble

Research computing is the life and blood of present-day research in many fields. Penn State’s research productivity has risen impressively during the last two decades, supported by dramatic increases in external funding. However, Penn State’s research computing infrastructure has failed to keep pace with its growth in research. In both administrative structure and funding, our Advanced Research, Computing, and Data Enterprise (ARCADE) now lags behind comparable research universities (e.g., Minnesota, Wisconsin, Maryland, Purdue, Illinois). In short, the operational model for ARCADE at Penn State is outdated and underfunded, and we are in—or fast approaching—a state of crisis. (See Appendix A for an overview what components should constitute ARCADE.)

Action is needed now. Penn State’s upward trajectory as a major research university is in jeopardy, and careful planning and adequate provisioning of our ARCADE are essential. Penn State’s position in the latest Academic Ranking of World Universities has slipped from 6th to 9th amongst 12 peer or aspirational institutions in the past decade. Continued falloff in reputational rankings is unacceptable, and unless the underlying issues are addressed promptly, reversing the downward trajectory will become increasingly difficult and expensive. Fortunately, addressing the crisis in ARCADE requires only relatively modest steps at this stage, and taking them will allow us fundamentally to transform the system. Doing so will pay huge dividends in the coming years.

Over the past six months, members of the Research IT Strategic Plan Committee have met regularly. We have discovered what we could about the ways ARCADE is conceived, administered, and funded at Penn State and at comparable institutions. By analyzing what other institutions do and what Penn State does, including clarifying our strengths and areas of concern, we have developed a set of “Guiding Principles” (stated immediately below). Applying these principles, we have identified a variety of conceptual and practical problems. We have addressed these in a brief series of findings and recommendations (which are laid out after the Guiding Principles). Appendices that follow supply additional facts, rationale, and justification for our recommendations.

Guiding Principles

1. **Core value.** Research is central to Penn State’s mission and reputation.
2. **Universal access.** Appropriate computing and data resources should be accessible to all researchers.
3. **Forward-looking.** We cannot afford to be trapped by legacy practices, policies, and organizational structures if we are to maintain our position as a top research university.
4. **Faculty governance and responsible stewardship of resources.** Research faculty need to drive the planning, evaluation and decision-making regarding ARCADE. Penn State has internationally renowned experts in computing and information sciences, engineering, and interdisciplinary cyberscience, and their knowledge should be fundamental to our ARCADE planning and oversight.

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2 “ARCADE” has been employed here as a temporary placeholder, pending further discussion of what constitutes an effective acronym. We have used the term as though the holistic enterprise it represents currently exists. Obviously it does not yet do so, but we believe that it urgently needs to be a reality.

5. **Do no harm.** We must ensure that we are pursuing a carefully thought out plan that will produce significant long-term benefits without jeopardizing current strengths.

Working from these principles, we have evaluated the status of advanced research computing at Penn State. What follows is our summary of what we have found and what we think needs to be done.

**Preliminary Findings**

1. **ARCADE is a common good and is critical to the continued success of research and scholarship at Penn State** across the physical (including engineering and computational), life, and social sciences—and in some fields, the arts and humanities. Our ability to attract and retain the best faculty and students is increasingly dependent on the quality of our research computing capabilities and, correspondingly, on our investment in ARCADE. Currently Information Technology Services (ITS) provides both the basic infrastructure and services (such as email service, high speed networks, wireless connectivity, etc.), and also access to high performance computing—primarily through its Research Computing Cyberinfrastructure (RCC) division. While the RCC provides extremely valuable services to many of our colleagues, its size and scope are far too limited for a research university of the size and caliber of Penn State. An integral priority of ARCADE ought to be customization and innovation that provide fertile ground from which significant research advances will grow. **In consequence, ARCADE should be part of the academic domains overseen by the Vice President for Research (VPR) and the Provost.** ARCADE is integral to the University’s academic (research and teaching) enterprise, and in our recommended model it should subsume the current RCC while adding new services to address the research needs of a larger body of our faculty and students. The alignment of ARCADE and the requisite personnel dedicated to ARCADE within the Office of the VPR (OVPR) is an essential reflection of the role of ARCADE in the research and education missions of the university.

2. **Funding for ARCADE at Penn State has lagged significantly behind that of our peer institutions. This seriously undermines and jeopardizes the ability of our faculty and students to compete at the highest levels in the future.** We have discovered that our present model for investment in ARCADE is inadequate and inefficient, as a result of what appears to be a combination of benign neglect, a broken governance model, and a legacy-based approach to resource allocation. The only significant University-wide investment in research computing is the RCC, funded through ITS, with an annual budget allocation of approximately two million dollars and 14 assigned FTEs. In contrast, a comparable peer-institution that has a well-coordinated university-wide implementation of research computing (the University of Minnesota) invests approximately $11 million and has more than 40 assigned FTEs. Not surprisingly in the face of this disparity, we are failing to keep pace with
Findings and Recommendations

our competitors. According to the latest Academic Ranking of World Universities (ARWU), Penn State’s research rankings have slipped from 40th in 2003 to 49th in 2012 (see Figure below).

Tellingly, we note that several of our Big Ten and aspirational peers have recently leapfrogged ahead of, or drawn much closer to, Penn State in research rankings. Minnesota was only one place ahead of us in 2003 and is now 20 ahead; Maryland was 35 places below us and is now 11 ahead; we were 40 places ahead of Purdue, and are now only seven. Currently, Penn State joins University of Iowa and Michigan State as one of just three institutions in this cohort with a significant decline in ranking. Importantly, most of these competing institutions have already developed and have in place rational and transparent faculty-driven governance models for their versions of ARCADE.

We recognize that University rankings are inherently controversial, and that it is impossible to draw a causal relationship between the ARWU rankings and the investment and operational model for ARCADE at Penn State. Nonetheless, the trends are instructive and of considerable concern. Considering the pivotal role that ARCADE must play in facilitating research across the University, we believe that these rankings provide a strong impetus for structural change in the operational and funding model for ARCADE at Penn State.

3. We have discovered a lack of coordination of activities and investment in research computing and cyber-infrastructure at Penn State. Faculty and students at a major research University such as Penn State should have easy access to both basic and high-end IT facilities as a common good. However, gaining access to both basic and advanced ARCADE is currently difficult for some and impossible for many, as is even identifying what resources and services are available and where on campus they can be accessed. This lack of coordination in ARCADE amongst various entities—including colleges and institutes (which apparently account for approximately 2/3 of ARCADE expenditures on campus) and ITS (which is currently charged with coordinating this activity)—is a major impediment to research. For instance, we learned that faculty members (especially recent recruits) with research computing needs must spend considerable time, some without success, trying to navigate the system. The lack of coordination is also manifested in varied policies for use and access to key research computing resources across units, including policies around and access to servers, software, data storage, security, and consulting support for ARCADE. This lack of coordination is not merely reputational. For the criteria, see http://www.shanghairanking.com/ARWU-Methodology-2012.html For another set of rankings in which PSU is slipping or staying static, see http://mup.asu.edu/research2011.pdf

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4 Source – arwu.org; and http://en.wikipedia.org/wiki/Academic_Ranking_of_World_Universities, This is not merely reputational. For the criteria, see http://www.shanghairanking.com/ARWU-Methodology-2012.html For another set of rankings in which PSU is slipping or staying static, see http://mup.asu.edu/research2011.pdf
5 Dean Susan Welch points out as a precedent and parallel the kind of strategic planning done for the university’s business systems some years ago. An attempt was made to assess needs and resources and to set priorities and have them reviewed by both academic administrators and administrators in the business area. She suggests that “the research side deserves at least that much.”
coordination contributes to considerable systemic inefficiency and opportunity costs, not to mention frustration on the part of faculty, students, and IT staff. Indeed, the lack of coordination of resources and infrastructure between and among entities such as the Institute for Cyber Sciences, the Research Computing and Cyberinfrastructure group, and the Academic Services and Emerging Technologies unit of ITS (now restructured to include RCC, Applied Information Technologies, and Emerging Technologies groups) appears to be a major missed opportunity for leveraging resources amongst the few examples of strength in ARCADE at Penn State. Funding agencies have changed expectations; they expect strong computing and permanent archiving solutions to be part of the infrastructure available to researchers applying for grants. We believe that because of missed opportunities and the lack of easy core coordination and support for research faculty, money is being left on the table in terms of grants and contracts that are not being pursued, or which have been declined because of inadequate capacity and infrastructure. (For a comparative analysis of Research Computing models at peer institutions, see Appendix B.)

Recommendations

1. **We must create a cultural shift in philosophy regarding research computing.** Penn State should instill a philosophy of abundance, whereby ARCADE is made highly visible to the research community and its benefits made available to all researchers through transparent and even-handed processes. Further, policies and practices surrounding ARCADE must be grounded in an appreciation that the most innovative research requires embracing rather than avoiding risk. There is a “long-tail” of research computing at Penn State: although a small number of researchers use high-performance computing facilities intensively, a large number of researchers use smaller (often local) facilities. Basic and customized ARCADE need to be readily available across all parts of the University, including the physical sciences, engineering, the social sciences, and arts and humanities. Because research computing is central to the university’s tripartite mission, support for ARCADE must be implemented at all levels rather than through a few high-end centralized facilities, and faculty experts should play a key role in Penn State’s ARCADE planning and oversight to ensure that policies and practices are at the cutting edge and serve to advance – rather than limit – the research productivity and achievements of Penn State faculty and students.

2. **The solution to problems of research computing will lie not just in hardware, but equally in solutions regarding software, personnel, and especially governance.** The keys to facilitating research at PSU include:
   - An organizational structure that locates ARCADE within the OVPR to reflect the importance of ARCADE to our research enterprise and enable planning, provisioning, and customization of resources (personnel, hardware, and software) and services so that PSU faculty and students remain competitive at the highest levels.
   - Faculty involvement and oversight in planning processes for ARCADE.
   - An IT support structure that can provide ARCADE to researchers across the University along with making these resources and services highly visible and transparently accessible to users.
• The development of additional research computing and data capacity and integration of appropriate research computing at all levels of complexity (from desktops to central servers).
• Development of better and more flexible standards for data and computing that are common across the university and that also provide for customization to match needs of different disciplines and research programs.
• The development of better ways of communicating about research computing and data resources to faculty and other campus researchers.

For a discussion of many specific issues and solutions identified by researchers, see Appendix C.

Thus, we recommend a revision to PSU’s organizational structure that elevates the importance of research computing within the University and decouples research computing from enterprise computing. Having explored alternative models, we recommend the appointment of a faculty ARCADE Director who reports directly to the VPR. The Director should be advised by a faculty-led governance committee that is appointed by the VPR and Academic Deans, and the committee should be given the responsibility and authority to make policy and resource allocation decisions about ARCADE. This approach is similar to the models at other peer universities and emphasizes the centrality of research computing to the University’s mission. To foster an essential change in our culture toward visibility and transparency, and to promote our research excellence, there should be a highly placed university official and dedicated advisory personnel whose job it is to ask every day to ask, “How can ARCADE at Penn State better serve the needs of our research community?”

The rapid pace of change and the development and adoption of new computational tools in scholarship and research necessitate a major rethinking of the current organizational structure and governance model for research computing and cyber infrastructure at Penn State. This restructuring and investment are essential to meet the growing needs of the academic community and to ensure that our faculty and students remain competitive with those of our peer institutions.
Conclusions

Maintaining the status quo or embarking on cautious and incremental change are not viable options. Thus, we propose an action plan to set Penn State on the path of research excellence enabled by state-of-the-art, transparent, and widely accessible resources and services in research computing and cyberinfrastructure and services.

We recommend an urgent action plan that includes:

1. Decoupling of the research computing and data cyberinfrastructure planning process from the current planning process within ITS.
2. Appointing a faculty Director or “Chief” of ARCADE who reports directly to the VPR (and coordinates with the Provost and the VP for Finance and Business).
3. Forming an ARCADE Steering Committee consisting of nine to twelve faculty thought leaders that reports to the VPR (coordinating with the Provost and the VP for Finance and Business). The committee should be charged, in consultation with colleges and institutes, to develop and oversee the implementation of a master plan for ARCADE at Penn State. The plan should feature transparent operations, governance, and funding models based on the guiding principles and recommendations outlined above. We expect that this empowered committee will begin by conducting a series of cross-campus workshops and hosting open forums so that within a period of no more than a few months it can refine and begin implementation of the plan to re-envision and re-invigorate research data, computing, and cyberinfrastructure services at Penn State.
4. Recognizing the need to invest in ARCADE on a scale comparable with such peer institutions as Minnesota and Wisconsin. We are manifestly under-investing by about eight million dollars a year. How the money should be spent this committee leaves to the judgment of the faculty Director and his or her advisory committee.

Explanatory note: The faculty members of the “IT Strategic Plan Research Committee” decided early in our deliberations that we needed to recommend a major conceptual and structural change for research computing at Penn State, but that we should not try to foresee the details of implementation that would follow the appointment of a “Chief” of Advanced Research Computing and the advisory faculty committee that we are recommending. The Appendices to this document and the links given at the bottom of this page are intended to supply both (a) information that will help explain the basis of our recommendation and (b) particulars, needs, problems, and suggested solutions that may be of use to the Chief and the advisory committee as they address implementation issues.

For some particular issues concerning implementation, see Appendix D below.

For information concerning the RCC unit of ITS, see [http://sites.psu.edu/researchitcommittee/].

For details on the role of the University Libraries in Research IT, see [http://sites.psu.edu/researchitcommittee/].
For an account of the University Research Council Strategic Plan Committee meeting of November 1, 2012, see [http://sites.psu.edu/researchitcommittee/]. Note that an earlier draft of these recommendations was presented to the University Research Council on February 6, 2013, and was very positively received.

For a brief account of ARL (the Applied Research Laboratory) and the Electro-Optics Center kindly supplied by Dr. Richard C. Marboe, see [http://sites.psu.edu/researchitcommittee/]. These Defense-Related Research Units operate under the Vice President for Research, accounting for almost 23% of total research expenditures.

For a partial list of faculty with interest in Advanced Research Computing at Penn State, see [http://sites.psu.edu/researchitcommittee/].

For commentary received from a wide spectrum of current RCC users, see [http://sites.psu.edu/researchitcommittee/]
Appendix A

Overview of Research Data and Computing Resources and Services

“The fabric of science is changing, driven by a revolution in digital technologies.”
Harvesting the Power of Digital Data for Science and Society, 2009

The academic landscape is being rapidly transformed through the enhanced role of information technology (IT). Research IT represents the combined whole of data, software, hardware, and services; we refer to this domain as Academic Research Data & Computing Resources and Services (ARCADE). Research IT needs of Penn State faculty typically involve the following three major components.

1. **Basic IT**: services for scholarship and research, including wired and wireless networking, desktop computing, e-mail, help desk services, discounted publishing and scientific software licensing, and a basic level of cluster computing and data hosting resources.

2. **Preservation IT**: services for curating, distributing, and archiving scientific data and software, publishing scholarly texts, digital arts etc.

3. **Innovation IT**: services for enabling the innovative application of IT to drive research outcomes and to re-engineer research IT of the future through research outcomes. Examples include digital milling systems, 3D-printing for design, real-time scientific data acquisition, analyses for environmental studies or within-person health/behavioral studies, workflows for engineering design optimization, embedded computing for smart grids, and distributed workflows for genome-wide association studies. These services should also encompass “big data” or “big simulation” systems for research in a variety of areas including astronomy, earth systems, life sciences, physics, political science, and manufacturing.

Basic IT services are necessary for faculty productivity and scholarship. Preservation IT services are needed for managing the products of completed research by Penn State faculty. Innovation IT is an area of opportunity with the digital revolution in research and scholarship—it can enhance and accelerate outcomes when it is properly aligned to meet the requirements of research. Basic and Preservation IT will shape measures of success such as quality and impact of publications. However, Innovation IT is the differentiating factor for Penn State’s leadership in research—it can be a liability that stymies our scholarly output relative to our peers or an asset that catalyzes our success in research and scholarship.

Principles and practices to guide the strategic planning for Research IT include the following:

1. **Basic IT** services are intrinsically “commodity” services. Our focus should be on cost-effective implementations with guarantees on the quality-of-service to the users. The latter requires evaluation of service quality by faculty users in order to produce “actionable results” and enable iterative improvement.\(^6\) Outsourcing, clouds, software license negotiations and third-party hosting should be explored for providing cost-effective solutions. Available services should be

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\(^6\)Evaluating IT service quality using SERVQUAL, Janice G. El-Bayoumi, University of New Brunswick, Fredericton, NB, Canada, Proceedings of the 2012 ACM SIGUCCS 40th annual conference, Special interest group on university and college computing services.
transparent and accessible to the broad faculty community. Inadequate basic services must not be allowed to impede faculty as they work to pursue “Innovation IT” (below); rather, flexible and comprehensive basic services should be the foundation on which innovative and advanced computing are built.

2. **Preservation IT** services require some “commodity” or “base” layer of functionality that is well defined. Additional customization services should be provided to map to practices in a specific research community regarding sharing of data, models, or scientific software.

3. **Innovation IT** is by nature intimately tied to research and our intellectual capital. Research cyberinfrastructure, comprising the pipe from scientific software down to the hardware, is but a specialized research instrument. By continually translating scientific innovations in the form of new models, algorithms, etc., into the cyberinfrastructure we get “cyber-scopes”—the equivalent to the telescopes of Astronomy and microscopes of Biology—in that they will give us a deeper understanding of complex phenomena, systems, and designs. Without Innovation IT in support of specific research needs, Penn State faculty are at a great disadvantage when they compete to secure prestigious awards, prizes and external funding. The scientists on the committee believe that “we are leaving money on the table” when we apply for grants because of our failure to keep up with peer institutions in Advanced Research Computing.

Our investments must be shaped by our priorities in research. *Innovation IT cannot be achieved solely by IT professionals—we need faculty governance to bring critical insights to define our technical and strategic priorities.* We should develop an open process for solicitation of proposals that are reviewed by faculty experts who select those that we should invest in. We should include assessment so we can explore many promising ideas but continue to support only those that perform well. We will need our faculty and our leadership including deans, heads, and institute directors to work together to promote flexible buy-in mechanisms from a combination of institutional and faculty-controlled resources. In short, there is a critical need to develop structures that enable the active engagement of our faculty to drive our investments in Innovation IT.

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Appendix B

Research Computing Organizational Structures at Peer-Institutions and Funding Benchmarks

Summary. An examination of operational models and governance structures for research computing at peer (“Big-Ten”/CIC schools) and comparable aspirational institutions suggests that there are two general organizational models in use.

First, and more commonly encountered, is what we term as the “distributed” or “loosely federated” model. This model is exemplified by what is in place at peer institutions such as University of Wisconsin-Madison, UIUC, University of Maryland, Northwestern, Cornell, and others. The distributed model reveals considerable variance in support for shared resources provided from central allocations, and typically includes an individual with campus-wide responsibility for research computing who either reports solely to the VPR or to both the VPR and the CIO (or equivalent). Many of the institutions surveyed that use this model either have in place or are in the process of adopting clearly defined faculty governance processes. A deeper review and discussions with leaders at some of the institutions that currently use the distributed model suggests a growing tendency for central provisioning and coordination of shared resources, a closer federation amongst various internal stakeholders, and increased faculty governance.⁸

The second model, as exemplified by the structure in place at the University of Minnesota, is what we here term as the “coordinated” or “tightly federated” model for research computing and services. This model involves a very substantial degree of coordination of activities and resources at the central (VPR) level, together with well-defined faculty governance structures and relatively transparent resource allocation and accountability processes. The current administrative structure for research computing and services at Penn State is broadly similar to the loosely federated model as described above, but it lacks both reporting lines to the VPR and faculty governance. A preliminary examination of expenditures and resource allocations for research computing shows that some of our peer institutions that have recently improved or are above us in research reputation rankings are investing significantly more (by a factor of five) in terms of general fund allocations for research computing services as compared to Penn State.⁹ Simply put, we have failed to keep up with our competition, and we are now falling even further behind.

Our committee recommends that, in order to catch up with (and potentially to leap-frog over) peer institutions, Penn State should adopt the “coordinated” model and develop an organizational structure with a high degree of interconnectedness amongst constituent parts. We need a unified leadership structure with reporting lines, preferably to the VPR. We also need a more visible and transparently

⁸See detailed benchmarking documents provided by Claire Gilbert (wiki space), and relatively recent white paper and planning documents related to reorganization of research IT from the University of Wisconsin - http://itc.wisc.edu/documents/researchcomputing_whitepaper.pdf
⁹Penn State RCC annual budget allocation from central funds (ITS) is approximately two million dollars with approximately 10 FTEs; General fund allocations for University of Minnesota MSI (through OVPR) is approximately $10 million, with approximately 49 FTEs.
connected research computing community in which the central administration invests on a scale comparable with our peer institutions.

An overview of the organizational structures and funding models at peer institutions along with relevant comparisons and benchmarks is provided below.

**Research Computing Organizational and Funding Structures at Peer Institutions: Contrasting the University of Minnesota “Coordinated” Model and the University of Wisconsin “Loosely Federated” Model.**

Both the University of Minnesota and the University of Wisconsin are peer CIC institutions with similar levels of research activity. They are both currently ranked higher than Penn State in the 2012 ARWU rankings (UW was ranked 19 and UMN was 29 while Penn State was 49). The organization of research computing and funding mechanisms for research computing at these two Universities are distinct, but they typify what seems to occur at other peer or aspirational institutions.

A summary of the major organizational features and funding mechanisms for both of these models, as gleaned from public records and personal conversations, is provided below:

1. **The University of Minnesota “Coordinated” Model.** Research computing at the University of Minnesota is organized as shown in the schematic below:

The primary responsibility and funding for research computing at the University of Minnesota is in the OVPR and is coordinated through an entity known as the University of Minnesota Supercomputing Institute (MSI). MSI provides UMN stakeholders with access to hardware (supercomputing and high-performance computing facilities and discipline specific laboratories), software, domain-specific expertise (user support and consulting, and bioinformatics support). MSI also plays a central role in supporting the research computational needs of various centers and the interdisciplinary informatics capacity within the University, as well as faculty-led research clusters and curricular programming (undergraduate, graduate, and professional development courses). MSI operations are coordinated with University-wide activities in Biomedical Health Informatics (Institute for Health Informatics, CTSI) and a State-wide initiative in Biomedical Informatics and Computational Biology that involves major branch campuses (Rochester, Duluth), the Hormel Institute, the Mayo Clinic, and IBM. The operations of the MSI are led by a full-time faculty Director who is a tenured Professor with experience and expertise in one or more areas of research computing, and who reports to the VPR. The Director has both
Appendix B: Organizational Structures at Peer Institutions

administrative and fiscal oversight responsibilities for MSI, and the staff are broadly grouped into those who provide operational support for the research computing enterprise, and those who are involved in application development and support systems (adjacent schematic).

There are three faculty committees that oversee the operations of MSI: the Director’s Advisory Committee, which provides advice to the Director on MSI’s long-term priorities and budget implementation; the HPC Allocation Committee, which is charged with reviewing research proposals for access to supercomputers and making recommendations for the allocation of HPC resources including disk storage space; and the Laboratory And Software Planning Committee, which provides advice on those high performance computing activities at MSI that are not directly tied to supercomputer use and related applications, but rather take place through MSI laboratories (software, large data/database applications, visualization).

The funding model for MSI is strikingly transparent (and publicly available) and is organized under three broad functional categories. MSI’s FY12 budget allocations all came from the OVPR and totaled $3,298,635 for administration and infrastructure support, $6,056,637 for technical and user support services, and $1,104,848 for computational labs. An additional $309,618 was generated from user fees and direct grant support. The annual funding of approximately $10.5 million supported 49 FTEs assigned to the MSI in FY12. Thus, the University of Minnesota is funding the MSI at a robust level, thereby building a competitive edge and accruing significant benefits in the conduct of advanced teaching and research.

On a related subject, it is noteworthy that the publicly available budget documents at the University of Minnesota suggest that a total of $142 million was generated in overhead revenue, and most if not all of this appears to flow transparently to their general funds budget and then to supporting University wide research infrastructure such as the MSI.

Additional details relating to MSI may be found at: https://www.msi.umn.edu/sites/default/files/MSIIntro2013Jan24.pdf

2. The University of Wisconsin “Loosely Federated” Model. At the highest level, the University of Wisconsin has an established and fully functioning Information Technology faculty-led committee that consists of eight faculty, three students, as well as non-voting representation from various stakeholders
appointed by the provost and the CIO in an ex-officio capacity. This committee is charged with making all policy and planning decisions regarding IT throughout the University, and is responsible for strategic planning and making specific recommendations regarding resource allocation, as well as reviewing performance and activities for all IT related activities supported by University funds.

The organizational structure associated with research computing at the University of Wisconsin was in the process of undergoing considerable change during the past year. The primary drivers associated with this change appear to have been a widespread recognition that the organizational structure and funding models had not kept pace with growing institutional needs, and coincided with the recruitment of a new CIO and a new Vice Chancellor for Research (VCR). In brief, over the past two years, led by a faculty committee, there has been a concerted effort to move from what appeared to be primarily a feudal model for research computing with nominal oversight by the office of the CIO to one that may be best described as loosely federated with reporting lines to both the VCR and the CIO. Three levels of coordinated management are present. At the very top, strategic and administrative decisions are made by a research computing officer with reporting lines to the VCR, Provost, and the CIO. The vision and leadership are provided by a faculty director and a faculty steering committee, and implementation is enabled through various technical steering committees and domain-specific technical directors and technical facilitators/consultants who support specialized communities of practice.

The University of Wisconsin has historically had considerable research computing capacity that is housed in their Center for High Throughput Computing (CHTC), the Grid Lab of Wisconsin (GLOW), and Open Science Grid (OSG)—all of which are broadly shared, federally funded resources that grew out of individual faculty research programs and continue to receive varying levels of institutional support. In addition, there are several nationally recognized computational research-focused clusters (e.g., Ice Cube, CIMSS, LHC). However, a series of faculty committees over the past two years noted that these resources lacked interconnectedness, unified leadership, visibility, and mechanisms for support for newcomers to computational science. It was also recognized that the piecemeal approach to research computing was not sustainable. This led to the recommendation of the formation of the Madison Advanced Computing Infrastructure (MACI) initiative, with the specific charge of coordinating research computing activities across the main campus. This recommendation was accepted by campus leadership (the provost, the VCR, and the CIO), with the near term goals of hiring a Research Computing Officer, creating an easily navigable portal to disseminate information and encourage participation in
computing infrastructure, hiring a pool of highly skilled consultants/facilitators with expertise in domain-specific research computing, and ensuring availability and access to HPC (CPU and GPU) computing hardware and software resources to enhance institutional competitiveness.

The University of Wisconsin has an open budget, known as the redbook, that can be reviewed online. However, because of the piecemeal nature of support for research computing at the University of Wisconsin, there is a lack of transparency in total institutional funds allocated for research computing through these publically available documents, and de-convoluting the sources and amounts of institutional support for research computing at the University level is difficult (this was confirmed in personal communications with the chair of the University-wide Information Technology Committee). What is clear is that, based on the recommendations of the faculty committee, University leadership (including the provost, the VCR, and the CIO) has committed three million dollars per year in new funds for MACI, which is enabling the hiring of key personnel and the development of hardware and software resources to improve institutional competitiveness.

Recent relevant white papers from the University of Wisconsin-Madison detail the implementation path for a change in culture related to research computing (click here). The process steps for “elevating” research computing and cyber-infrastructure at UW-Madison (including the formation of MACI) are here: http://itc.wisc.edu/wp-content/uploads/2012/07/UW_maci_march4.pdf

3. Summary of IT Governance and Funding Practices at Penn State with Benchmarked Peer Institutions

Some of the key features that relate to governance and funding of research computing at Penn State as compared with key peer institutions are summarized in the table below. They are informative in their striking differences.

<table>
<thead>
<tr>
<th></th>
<th>UMN</th>
<th>Wisconsin</th>
<th>Penn State</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Research Computing Responsibility</strong></td>
<td>VPR</td>
<td>VCR, CIO, Provost</td>
<td>CIO</td>
</tr>
<tr>
<td><strong>Faculty Governance</strong></td>
<td>Multiple faculty committees</td>
<td>Multiple faculty committees</td>
<td>None</td>
</tr>
<tr>
<td><strong>Faculty Director</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Governance Model</strong></td>
<td>Centralized (Coordinated)</td>
<td>Hybrid (Loose federation)</td>
<td>Decentralized (Anarchic)</td>
</tr>
<tr>
<td><strong>Funding mechanisms</strong></td>
<td>Central; transparent</td>
<td>Hybrid; lacks transparency</td>
<td>Hybrid; lacks transparency</td>
</tr>
<tr>
<td><strong>Annual support from central funds</strong></td>
<td>$10.5m</td>
<td>&gt;$6m estimate; $3m in new commitments</td>
<td>$2.5m</td>
</tr>
</tbody>
</table>

Our committee recommends that in order to catch up with (and potentially to leap-frog over) peer institutions, Penn State should adopt the “coordinated” model and develop an organizational structure with a high degree of interconnectedness amongst constituent parts. Further, we recommend a unified leadership structure with reporting lines to the VPR. We also need a more visible and transparently
connected research computing community in which the central administration invests on a scale comparable with our peer institutions.

Notably, the quantum of central investments needed for research computing at Penn State has been estimated in one quarter to be eight million dollars. This estimate was detailed in a thoughtful report to our committee prepared by Vijay Agarwala (see sites.psu.edu/researchitcommittee/); importantly, this figure appears in line with what we note at peer institutions. But we also note that without active efforts to develop and implement IT Governance models for research computing at Penn State, however virtuous and needed, these investments are unlikely to provide the desired impact on research growth and improved institutional competitiveness in conjunction with efficient return on invested capital and effective enterprise-wide asset utilization.

4. Benchmarks and best practices on IT governance from a diverse group of organizations

The well-regarded Weill and Ross MIT-Sloan Report on IT Management (2004—link below) offers a systematic review of IT Governance practices at 300 diverse enterprises in 23 countries and may provide a useful framework for the development of IT Governance practices at Penn State. According to this paper, IT governance is the process by which IT related activities are aligned with institutional priorities and performance goals, and responsibility and accountability are assigned for those actions. This study made several recommendations, and showed that, to be effective, institutional mechanisms for IT governance need to be actively designed and communicated as opposed to attempts at coordination of legacy practices. The study also provided compelling examples for Governance approaches that worked and are recommended versus those that are to be avoided.

The report suggested that it is essential to first define the key institutional objectives, and identified three key strategic drivers for development of IT governance policies: (a) maximizing profit, (b) ensuring efficient asset utilization, or (c) encouraging innovation and growth. Each of these was found to need strikingly different governance mechanisms in order to be successful, and the report provides a rational framework for the development of IT Governance approaches that meet key institutional needs.

Based on the analysis of practices at diverse institutions (ranging from Fortune 500 companies, 30 for-profit companies, large service organizations such as UNICEF, and State run utilities), the report outlines a matrix of how five key decisions are made in relation to the management of IT within the enterprise, which are crossed with six decision making archetypes that are typically employed. The matrix provides what is termed IT Governance on one-page (see schematic and links on the following page), and is one model that we strongly recommend be considered at Penn State. In this matrix, decision making archetypes are defined as follows (paraphrasing Weill and Ross 2004: 4), running roughly from more to less centralized decision making:

1. Business monarchy: IT decisions are made by a senior business executive or a group of senior executives, sometimes including the CIO.
2. IT monarchy: Individual or groups of IT executives make IT decisions.
3. Federal: C-level executives and business representatives of all the operating groups make IT decisions. This may include IT involvement (this archetype is the equivalent of the central government and the states working together).
4. IT duopoly: Decisions are characterized by two-party decision making involving IT executives and one group of business leaders.
5. Feudal: Business unit or process leaders make separate decisions based on the needs of their entities.
6. Anarchy: Each individual user or small group makes IT decisions.

A quick review of the IT governance matrix suggests that Penn State’s current governance practices most closely resemble the “IT monarchy” model, with many decentralized and non-coordinated processes that fall into the “feudal” governance model. In contrast, best practices call for a blended approach between business, IT, and federal decision making processes that depends on strategic drivers (profit/asset utilization/innovation and growth). This study reinforces our belief that strategic imperatives must drive governance structures. Hence, academic and research computing needs (with a growth/innovation imperative) should be considered and organized differently from the business (profit/asset utilization/risk management) arena, with due consideration to areas of overlap. We also note that, regardless of governance model, best practices (including in companies) are that funding decisions are not IT driven but rather involve governance committees that are more federal in nature as opposed to falling within the IT hierarchy.


For A Research Cyberinfrastructure Strategy for the CIC: Advice to the Provosts from the Chief Information Officers (2010), click here: [http://www.cic.net/cyberinfrastructurePaper](http://www.cic.net/cyberinfrastructurePaper)
Appendix C

Issues and Solutions from Staff and User Perspectives

Faculty and IT experts on the Research IT Strategic Planning Committee identified many specific issues and frustrations to be addressed as part of a reorganization and elevation of research computing at Penn State. This list is not exhaustive, and in some cases there may be several possible solutions to a given issue. Our object here is to identify important issues and activities that should be discussed and addressed or undertaken in the near term.

General Needs

- Provide access to national and local advanced computing assets for the training of graduate students and research support staff as well as faculty.
  - Provision local assets in a way that encourages experimentation and provides advance computing capability for non-funded research as well as funded research.
  - Enable improved access to core research services across all PSU locations, not just University Park.

- Allow easy guest access to PSU networking, e.g., by creating a “Traveling Scholar” profile for access to Penn State wireless services. (The lack of easy access for visitors is a common frustration. Another approach would be to use a service such as Eduroam, which is enabled at other North American universities. While a small example, the lack of such access illustrates the minor-but-frustrating roadblocks that researchers have come to expect at PSU).

- We need tighter communication between researchers and the providers of IT services, with the latter being responsive to the former.

- Allow a degree of nimbleness and a degree of anticipation in advanced research IT areas. We don’t know what is coming in 5 years, but need structures and groups prepared to respond to and incorporate new hardware, software, or models quickly.

- Researchers work on a variety of platforms and operating systems (Windows, Mac, Unix/Linux) and strong support for all of these platforms should be available. (Issue: support for non-Windows systems lags in some units; Linux is not always available as an option, but if it is not, there should be clear direction for where researchers can gain access to such systems.)

- Pursue ways to consolidate, coordinate, and negotiate software licensing for advanced research computing.

Policies

- Adjust primacy of security-based constraints on research computing: a necessary and appropriate concern for security should not prevent research and slow productivity; we should seek to reduce non-productive overhead added to research computing time by overly restrictive security policies. (Examples: not allowing grad students’ non-PSU computers onto the network; locking down desktop machines; not allowing user installation of software). Discussions have shown that security policies
are variously interpreted throughout the university, leading to confusion. An excessive concern for audits, standardization, and control can limit the flexibility needed by researchers and the efficient expenditure of funds.

- Work to coordinate support policies across units. Faculty in one unit sometimes find that faculty in another unit have access to more resources and are subject to more flexible policies than they experience in their own unit. (Example: researchers should be able to control their own desktop and immediately install necessary research software, and should be allowed to connect their own laptops to the PSU network; this is true in some units but not in others.)

- Clarify policies on use of, and facilitate access to, commercially-offered tools for research when they are easier than Penn State solutions (DropBox, Google Drive, Amazon AWS, etc.).
  - When classified data (e.g., ARL, federal, or similar) or personally identifiable information (PII) is involved, such external solutions may be against the conditions of a grant. But we suspect that for most data, use of such facilities, especially when sharing with colleagues at other institutions, is vastly simpler and more robust than similar PSU tools such as Angel, PASS space, etc.
  - Although we do not control it, we suspect that the security of data on such external sites is at least as secure as at PSU. We must understand that data will never be perfectly secure anywhere and balance restrictive security against efficiency and the imposition of overhead on researchers.

**Personnel**

- Recognize that the skills needed for and requirements of daily IT support are different from research IT support. Broad, daily IT support seeks standardization; control over equipment; security as a primary goal; basic equipment and services (working desktop, printer, email); and having enough personnel for emergency fixes. Research IT, both high- and low-end, requires specialized knowledge; specialized and customized hardware and software solutions; flexibility and experimentation; experts in particular software; forward looking planning; and anticipation of trends.

- Research IT support may be best facilitated by PhDs and field experts together with IT specialists.

- A greater investment in *permanent* research support staffing, as opposed to shorter-term, grant-funded staffing, can help to build a greater pool of expertise and stability in staffing. Permanent staff could better help researchers to navigate services across the University that may be available to them, but of whose existence they are ignorant.

- Work with Human Resources to provide clear career opportunities to Research IT support staff.
  - Invest in professional development and institutional coordination of this workforce.
  - Emphasize professional development and retention of this workforce.

**Coordination and Communication**

- Create a “Research Ombudsman” and Research IT on-boarding procedure for new faculty. New faculty have noted that it takes many units to setup access to specialized needs; there is no one-
stop-shop for obtaining what they need; and that finding out where necessary resources are located is excessively difficult.

- There are similar concerns for existing faculty. Some researchers have voiced a need for “research consultants” who could help them navigate the range of services and systems in place.

- Work to coordinate support from Research IT groups to the local IT support groups and staff embedded in College and other units. It is difficult to imagine a single organization that can manage the spectrum of needs from “my computer won't boot” to “I need another petabyte by tomorrow.” However, better coordination between basic support and advanced research support will be critical.

- Develop a central website or other tool to advertise and clarify what and where different advanced computing services are available on campus. This should include facilities in different units that run independently.

- Specialized or emerging areas may require a more focused approach, e.g., the development of a “Digital Humanities Toolkit.”

- Ideas for a setup or research “ombudsman” include the idea of having an individual embedded in major support units or there might be a core group of experts cutting across units. The general idea is that if a faculty member or member of the support staff does not know an answer or have the ability to provide a solution, the ombudsman is expected to know what solutions are possible and to facilitate a successful outcome.

- Support development of university-wide research profile service (e.g., Harvard Profiles or VIVO) to enhance new Penn State Identity and Access Management (IAM) services.
  - Include Scholarly Publishing ID (e.g., the nascent ORCID effort) in IAM services.
  - Link this service to other research services such as ScholarSphere (a PSU secure research data repository service).

- Expand support and assistance to faculty in preparing data management plans (DMPs).
  - Develop a self-service template for DMPs.
  - Develop services with formal agency approved rates to assist with DMPs.
  - Link programs to continued development of ScholarSphere.

Specific Hardware and Software Additions

- Acquire new widely-accessible, central, world-class advanced computing capabilities while continuing to pursue a course of shared cluster partnerships with specific research units with specialized IT capabilities (e.g., visualization labs, labs for computer-based experiments, GIS labs, imaging facilities, or survey facilities).
  - Expand RCC; it is an excellent unit with many parallel processors providing high-end user support, but it is underfunded.
• Access to advanced computers cannot just be on a fee-basis; non-funded research and the "long-tail" of research require access privileges as well.

• Continue to develop 3D/virtual visualization environments (e.g., ICON Lab, Immersive Environments Lab, Kinesiology VR, and Traumatic Brain Injury Lab) and share expertise, support, and development environments.

• Refresh the Penn State core network to support a software defined network (SDN) enabled Research “DMZ.”

• Expand ScholarSphere services and available central storage for medium-term and long-term storage needs for a variety of scenarios (e.g., active projects, research archives, and linked data services).
  o Provide a Hierarchical Storage Management (HSM) solution that serves both robust, high speed storage needs as well as secure, archival needs.
  o Extend library support for data organization and cataloging and to facilitate usage.

• Build a Private Cloud offering using software that allows one to scale by moving entirely to, or augmenting with, a commercial Cloud Computing solution.
  o Cultivate knowledge of commercial Cloud Computing solutions (e.g., AWS, Azure) and provide consulting to faculty who desire to move to or augment their cloud based solution.

• Create multi-tenant relational and noSQL database service.
  o Design this service to work with local repository services (e.g., ScholarSphere) or national archives (e.g. ICPSR).
  o Develop local knowledge in the area of data and database use and consult with faculty to pair data with database solutions.

• Provide secure, federated access to research collaboratories (e.g., HubZero, COmanage) to facilitate research collaboration with non-Penn State peers and graduate students

• Develop a lifecycle replacement model for local assets. We need a sustainable model, not subject to the ups and downs of individual research grants.
Appendix D

IMPLEMENTATION ISSUES

The committee believes that the details of implementation of a radically revamped administrative structure for Advanced Research Computing in particular (and ARCADE more generally) should be worked out by the Advanced Computing Chief and his or her Faculty Advisory Committee. We hope that the material collected in these Appendices (and made available through links provided along the way) will prove useful to those carrying out that task. A lot of short-form particulars have been listed in Appendix C. Here we will add several broader issues that will need to be addressed.

1. **Starting the implementation process.** We hope that the Chief and the Faculty Advisory Committee can be appointed sooner rather than later—i.e., by the end of this spring, and in time to get the enterprise seriously launched before Fall Semester 2013. We point out that the 2011 “Summary Recommendations” for IT at Penn State included all sorts of good things about which little or nothing seems to have been done. For example, “the University should implement a revised IT governance model” and should “appoint domain specific governance committees comprised of faculty, staff and IT providers.” The problems that need to be addressed are urgent and our situation is deteriorating.

We suggest that the Chief and Advisory Committee should immediately consult widely with research faculty across the whole of the university, inviting suggestions and complaints, and that they bring in two or three expert faculty consultants from appropriate peer institutions (e.g., Minnesota, Wisconsin-Madison, Purdue) to share their experience and give us advice based on that experience. People in other institutions’ “Chief” position would be particularly desirable. Katrina Forest of Wisconsin has indicated willingness to help us this way.

2. **Two funding issues: finding capital and priorities.** In comparison with Minnesota, we are direly underfunded in centrally supported research computing. When we sent a deputation to David Gray (who was extremely helpful), he made the point that finding the money was Old Main’s problem, not ours. He agreed with us, however, that insofar as money is needed for capital expenditures, selling bonds would be a reasonable way of coming up with the money needed for infrastructure investment. Second point: David Gindhart reports discussion among the Research Computing Working Group of the IT Leadership Council to the effect that more money is needed both for the RCC operation and “at all levels.” One attendee commented that in his daily priorities, “support for research-unique activities in the labs usually comes last,” and that this needs to change. We hope that the administrative structural changes proposed in this report will contribute to the creation of a separate funding stream for research computing and give this realm some of the clout it had in the days of the mainframe. The Chief needs to be a forceful advocate for “unique research activities in the labs” and for individual/unique research projects in general. We presume that he or she would have upper-end support from the VPR.

3. **High risk security issues.** Several points are made about security in Appendix C, but there are no doubt special cases that cannot be safely ignored. Richard Rauscher has very kindly offered this comment from the perspective of Hershey.
“There is a wide range of security requirements for high performance computation in support of research. Within the College of Medicine, there are several investigators performing computations upon data that are “regulated” in some way; the data may contain personal health information (PHI) or there may be a contractual relationship with the original owner of the data that requires a high level of security. Furthermore, there are increasing concerns in the academic community about so-called “de-identified” data (see Science 18 January 2013: Vol. 339 no. 6117 pp. 321-324) and their current treatment in research. This is just one example where the security requirements of research may exceed those of university administrative systems. An antipodal situation can be exemplified by reviewing the needs of security, operating systems, and networking researchers. For these scientists, violating the standard security policies is a requirement. Capturing and recording network traffic, purposely leaving computers in a vulnerable state, and intentionally attempting to thwart standard security measures is a key aspect of their research and educational efforts. There must be policies and technical tools that facilitate the broad scope of Penn State research.”

(4) Interchange and respect between faculty and IT staff. A number of people (both faculty and staff) have commented on what they perceive as lack of trust, explanations, and attempts to see an alternative viewpoint across the faculty/staff divide. Joshua Fritsch supplied the following comments on this problem:

As we face the challenges of building a world-class research enterprise, it is important to keep some key points in mind:

Many of the most frustrating IT support problems experienced by researchers are a product of Penn State culture. Specifically, the same unit/budget autonomy that permits such rich academic and research diversity often directly interferes with optimal execution of IT support functions. Communication is sub-optimal, there is a lack of trust between units both large and small, there is vast duplication of effort and low consistency of methodology. Creating a new network, a new support structure, will not resolve this cultural impediment. In fact, it may make it worse if we add more complexity to the situation without first resolving these issues.

The basic support that is impeded by this autonomy is the foundation upon which everything else will stand. Weak or confusing support options will cause even the most robust computing environment to fail. It is critical that a plan for addressing these issues *across Penn State*, not just in research, accompany any plan that is intended to enhance the research environment.

Faculty and IT staff have the same goal in this endeavor: World-class support for world-class research. Our success requires overt cooperation and respect. IT staff must respect the knowledge and experience of the faculty, and not try to dictate how teaching and research should be done. The faculty must respect the knowledge and expertise of the IT staff, and allow them to do what they do best…. build world-class networks and computing resources. It must be a true, collaborative partnership for this to work.
**(5) Cooperation and coordination issues.** A number of particulars are addressed in Appendix C, but some of the larger-scale problems are so critical that we want to give them special emphasis.

**First, the “common help desk issue.”** Back in the days of the mainframe of sainted memory and “CAC” (Center for Academic Computing), if you needed some help you walked out to the Computer Building and asked someone you had worked with “Can you do X for me, and if not, who can?” And if necessary you were directed down the hall to Tom Minsker or Bill Verity or Skip Knoble. This worked beautifully. The increased of scale and decentralization of research computing have completely messed this up. These days, even a lot of pretty connected people do not necessarily know where to go or whom to ask. Mark Linton has supplied the following observations:

Back in "the halcyon days of CAC," getting help was easier because there were fewer places to get help from. Today, 25 of 52 budget units maintain one or more service desks. The chances that the one you call will say "we don't provide support for that" are frighteningly high. I cannot imagine a universe in which it is reasonable to expect that all of the faculty, staff, and students have committed to memory and understand the complete organizational structure of each of the IT organizations at Penn State and which services are provided by which organization in order to know where to go for help.

This was recognized in the IT Assessment (see [http://it.psu.edu/strategies/pdf/IT%20Assessment%20Executive%20Summary.pdf](http://it.psu.edu/strategies/pdf/IT%20Assessment%20Executive%20Summary.pdf)) as one of the seven opportunities for improvement in IT at Penn State. Specifically, “to improve the effectiveness of technology and achieve more optimal balance of common and distributed IT services, the University should ... implement a common help desk system and knowledge base to improve the productivity of IT staff and the quality of user support services.”

I know this because I recently agreed to manage the next phase of the project in which we plan to prototype a number of systems for evaluation and recommendation. I will be working with the ITLC Shared Service Desk System Task Force (see [https://wikispaces.psu.edu/display/itcouncil/Shared+Service+Desk+System+Task+Force](https://wikispaces.psu.edu/display/itcouncil/Shared+Service+Desk+System+Task+Force)), as well as the ITS Change Management Team on this project.

My caution would be that "we don't want to embed a problem within the new structure" and my suggestion would be to make sure that whatever is proposed include "a structure where the Research IT Director and ITS have a direct line of communication" and that Research IT agree to participate in the "common help desk system and knowledge base."

While I cannot guarantee we will be completely successful in getting 100% adoption of the common help desk system and knowledge base, I can guarantee that if Research IT is not a part of it that "we don't provide support for that" will still be a phrase that researchers hear.

This help desk also seems like a potential home for those "gurus" who would have specialized knowledge about subjects of interest to researchers, allowing them to have a career path and
professional development supported by the "Chief" without having to duplicate existing administrative structures within Research IT under the VPR.

Second coordination point: Basic communication/cooperation. David Gindhart asks “Does the decoupling of research computing, planning, and governance from IT planning risk further breakdown of coordination activities and networks? The answer is yes, there is a very real risk here. Cordial collaboration, cooperation, and communication are vital. The Research Computing Chief needs to be working closely with the Vice Provost for Information Technology, and IT staff from various realms need to be represented ex officio on the Advisory Committee. Coordination of research computing activities is currently not working well, the cross-platform Research Institutes notwithstanding. Everyone needs to chip in and figure out how to make this work better.

“Research computing” and “Enterprise computing” are fundamentally quite different. The former tends to involve custom tailoring or even unique construction; the latter thrives on standardization and uniformity. This fact notwithstanding, the Research Chief must be in close touch with the Enterprise operation, and clear guidelines need to be drawn so there are not misunderstandings or arguments about who is responsible for paying for what.

Third coordination point: Linkages and cooperation with current IT units. The relationship between the newly structured research computing organization and current structures for core support and high-end computing is critical. We do not envision replacing distributed computing support based in Colleges and Departments with a centralized cadre of support professionals; we do not envision parallel infrastructure and physical networks for research; we do not envision a separate top-to-bottom research enterprise. Rather, departmental support and services will be critical to coordination and cooperation regarding research, teaching, and enterprise computing needs. And separate units with strong advanced computational capabilities must continue to be key players in the Penn State computing environment. However, we expect that actions “at the top” taken to support the prioritization of research computing needs will shape lower-level support decisions and policies. Such actions might include encouraging additional coordination mechanisms, developing and prioritizing common research-supportive policies, developing some research expertise (and certainly linkages) within distributed support groups, or facilitating connections from faculty to computing units that they might not have been aware of or formerly had access to. A clear emphasis on research computing as supporting research should “trickle down” from high-level planning to local support units through expertise and making connections. We believe that the separation and distinction of different linkage arrangements envisioned in Appendix B as “supporting,” “coordinating,” and “reporting” links will help this to be clear.