Faculty Senate Information Technology Ad hoc Committee Annual Report

January-May, 2015

Co-Chairs: Subra Bulusu and John Grego

The Faculty Senate IT ad hoc committee was formed in January 2015 and met ten times during the Spring 2015 semester. The committee is comprised of six faculty members, a graduate student representative, an undergraduate student representative, and five ex officio members. This committee first prioritized several issues related to the creation of a standing committee (SEE APPENDIX 1), academic computing, research computing, network/storage/big data and other issues.

At the April 28, 2015 general faculty meeting, faculty voted favorably for the Faculty Senate Information Technology Committee proposal drafted by the ad hoc committee. The standing committee will supersede the ad hoc committee in Fall 2015.

Meetings, invited guests and topics:

1/12/2015 Initial meeting. Formed subcommittees and set plan for the rest of the semester.

1/26/2015 Dr. Bill Hogue, CIO & VP for Information Technology, visited and briefed the committee on the USC-IBM contract.

2/9/2015 Mr. Todd McSwain, Director of Network Services and Executive Director of Communication Infrastructure, visited and discussed WiFi issues, particularly in large lecture classrooms.

2/23/2015 Dr. Helen Doerpinghaus, Interim Provost, visited to discuss classroom teaching, classroom enhancement and research computing issues with the committee.

3/2/2015 Vice President for Research Dr. Prakash Nagarkatti visited to discuss research computing.

3/23/2015 Prof. Juan Caicedo, Assistant Professor of Civil Engineering and Chair of the Provost's Banner Advisory Committee, visited to provide a status report on his efforts to create a "ticketing system" for reporting Banner-related issues and requests for improvements.

3/30/2015 Mr. Todd McSwain, Director of Network Services and Executive Director of Communication Infrastructure, re-visited and presented an update on WiFi improvements.

04/13/2015 Dr. Harry Ploehn, Vice Provost and Director of Academic Planning, Yancey Modesto, Facilities, and Bryan Jenkins, UTS, visited to discuss the Classroom Enhancement and Scheduling Committee's (CESC) approach to classroom enhancements—from the selection of rooms to be enhanced to the specific enhancements made to the rooms.

04/27/2015 Mr. Stan Lawrimore, Executive Director of Data Center Services, Mr. Mike Cathcart, Executive Director of Service Management, and Bryan Jenkins visited to discuss data storage, major changes to the software licenses for Adobe products, and additional discussion about classroom enhancement, respectively.

05/11/2015 Prof. Vitaly Rassolov, Professor of Physics and Chair of CAS's Information Technology Advisory Committee (ITAC), visited and discussed his department's recent experiences related to cyber security.

1. WiFi upgrade:

Todd McSwain reviewed the growth of wireless access points (AP's) from 700 AP's to 3450. The number of AP's is comparable to Georgia Tech. Todd indicated that current WiFi problems in classrooms are caused by a system built for coverage, not density. In theory, loads should be balanced across clients, but most client devices are "sticky", tending to use the AP nearest a main entrance of a classroom. Throwing more devices at the problem is not the answer; they will simply interfere with each other. APs with external antennas may focus coverage to reduce interference; this system can be tested for a couple classrooms.

Both faculty and undergraduates express concerns about the wireless network in the classrooms. Thomas Cooper Library, Callcott 011, Currell 107, PSC 210, the second floor of Swearingen and parts of 300 South Main were among the sites identified for immediate action. Coverage and service improved when new APs were installed in Callcott 011 and Currell 107, but additional improvements are still needed. Follow-up tests were done but no report is available from UTS.

Recommendation: At an estimated cost of $700/AP, campus-wide replacement could range up to $2.8M, though not all AP's would need to be replaced. Passive and active monitoring of the above sites will continue.

The Ad Hoc Committee also recommends an ongoing communication between UTS and the Committee with regard to the plans for and progress with upgrading service. In this way the faculty and students will know better what levels of service they can expect. They will also have a path (through the standing committee) for voicing concerns about services that fall below standards and have a concomitant negative impact on the educational process.

2. Research Computing and Data Curation

Many faculty and graduate students note the lack of progress in high performance computing and data curation. To remain competitive as an RU/VH (Research University/Very High activity), USC must develop capacities to process large data sets and durably archive research sources and results. Nowadays, many federal grant funding agencies expect universities to provide this infrastructure, and will not directly fund it. To date, central administration has not provided sufficient support for research computing. Previous efforts have been funded through EPSCoR, but this funding source has ended. At present, no resources are provided and there is no recurring funding. Interim funding is being provided to RCI (Research Cyberinfrastructure) by the Chief Information Officer. After his meeting with this committee on March 2, 2015, Vice President for Research Dr. Prakash Nagarkatti requested a white paper on research computing. On March 31, 2015, we sent our summary of RCI needs and funding estimates to the VPR (SEE APPENDIX 2).

Mr. Stan Lawrimore reported that the Data Storage Center is housed at 514 Main Street. We currently use Enterprise VMAX with 6 racks for Tier 0-Tier 3 storage (accessibility decreases with tier number). Support will end June 2015, and we will instead move to XtremIO VNX and Isilon. Isilon will be used for replicated and online archive file storage; it uses Viper SRM software to manage storage; its current capacity is 140 TB. XtremIO is for high speed Tier 1 block storage; its current capacity is 360TB. XtremIO is readily scalable with no downtime for added capacity (typically 10-20 TB at a time). It was purchased to support administrative services, but could support research computing as well. VNX has a current capacity of 240 TB and will be used as flash and disk storage for email; VNX's functions may well move to the cloud. This system was primarily designed to back up administrative data-- viz Banner, Peoplesoft and Exchange data are all stored there.

Recommendation: USC needs to support centers for academic computing and for research computing whose leadership can fundamentally engage UTS in a dialog on the research computing needs of faculty. We urgently need high performance computing clusters, a sustainable and cost-effective storage solution that can scale to several petabytes, and an off-site back-up scheme for disaster recovery. It is unclear whether the storage solution currently being implemented by UTS can accommodate research and academic computing needs. Lack of coordination in planning has thwarted the development of capacities and economies of scale; this must change if we are to make progress.

3. Classroom Enhancement

The CESC receives approximately $1M/year, with 40% provided by the Provost and 60% provided by Office Administration. The CESC collects info on all category 110 classrooms (regular classrooms controlled by the Registrar) and prioritizes renovations based on safety, AV needs, and finish issues. Recommendations are

sent to the Provost and CFO. Yancey Modesto noted that departments in buildings with 110 classrooms do get scheduling priority. There can be substantial carryover in addition to the $1M base allocation. CESC focuses on AV upgrades and other major maintenance, while the Provost (and Facilities) handles typical classroom maintenance. Many classrooms are full of old projectors and old screens, with few flat panels/smartboards. Upgrades should reflect customer (faculty) needs. CESC does not provide computers or software--colleges and schools provide these even though they do not control the scheduling of these rooms. There is no technology inventory for the category 110 classrooms.

This committee prepared a white paper that proposed establishing different classifications of classroom needs (APPENDIX 3). The white paper was submitted to Dr. Harry Ploehn on April 30, 2015.

Recommendation:

Faculty and instructors should get free instructional laptops every 3-5 years. The Classroom Enhancement plan developed by this committee should be used for planning next year (2015-2016) and beyond. The standing committee should have representation on the CESC to ensure that faculty and students will be aware of a transparent process of decision-making regarding the update of classroom technology. The current budget supports approximately eight classroom upgrades per year, which is clearly inadequate to maintain up-to-date technology in our classrooms.

Software and computing hardware for classrooms needs to be further discussed.

4. USC-IBM partnership

At the January 26 2015 meeting, Dr. Bill Hogue said the partnership will advance higher education and stimulate growth; it will create a national competency center for higher education, enhance USC services, and create a pipeline for students. The Center for Applied Innovation (CAI) plans to offer services to other universities and create 100 new jobs in 5 years (LSU's and Michigan State's centers each employ 500-700). IBM is interested in USC's competencies and our willingness to work with business and government. Benefits for USC include IBM's expertise at partnerships and cognitive computing, and opportunities for co-branding. Dr. Hogue read form Appendix X of the contract, which discusses Watson Foundation for Education, but contains no specific details on high performance computing; he noted that the physical presence of IBM could assist with partnerships and infrastructure grants. IBM provides USC with an anchor tenant for the Center for Applied Innovation, management talent, and global corporate services.

Recommendation: There is a need for greater coordination between the committee and IBM, including an IBM representative on the IT standing committee.

5. Software licensing

Mike Cathcart discussed the Adobe Cloud suite. The student technology fee is used to support Blackboard and Banner, not academic software, so UTS negotiates with vendors of academic software. In a recent change to their product offerings, Adobe now sells only Acrobat or a full suite of tools (called Adobe Creative Cloud), with nothing in between, and on a monthly subscription basis only; it is no longer possible to make a one-time purchase of software that can be used for years. A student solution would be too expensive ($2M-$3M/yr) for UTS to help support, so they negotiated a faculty/staff solution instead. Negotiations are based on licensing devices for all USC system faculty/staff. The initial price was $100/yr Acrobat and $300/yr Creative Cloud. After that negotiation, Adobe offered a Creative Cloud special of $240/yr, thus undercutting UTS, which UTS then had to match out of their own pocket. The price has now been renegotiated to $50/yr Acrobat and $200/yr Creative Cloud.

Software licenses, including free use of MATLAB, Microsoft Office (already available for free on devices purchased by USC funds), and Adobe Creative Cloud should be available for students and faculty. Adobe Creative Cloud costs $240 per license, which is an unreasonable price for students and faculty.

Recommendation: MATLAB, Microsoft Office, and Adobe's Creative Cloud suite should be available to all USC students and faculty for free or at reasonable prices (between $10-$20). Students already pay both a technology fee for each semester and lab fees (for lab-oriented courses). Some of these software packages are also essential for faculty functions, such as preparation of tenure and promotion files. Before negotiating the Adobe Creative Cloud contract for next year, UTS should consult with faculty and staff via this IT committee and seek subsidies from the Office of the Provost to offer Adobe Creative Cloud at a reasonable price ($10-$20/yr) to students and faculty. UTS should investigate open source solutions as well. The contract for Adobe can be renegotiated March 1, 2016.

6. Banner update

Software support by the Banner vendor expired, and Aaron Marterer, Registrar finds himself handling many support issues that lie outside his office's purview. Because not all Banner issues are software issues, there is a need for a ticketing system that involves several levels of gatekeepers and problem-solvers. UTS's Help Desk was not developed with this functionality in mind and cannot cost-effectively provide it. Instead, Prof. Juan Caicedo is developing software on his own to manage the ticketing system. This raises questions about responsibility to use and support Prof. Caicedo's software after its development.

Recommendation: Banner software issues, including a ticketing system, should be developed and managed by UTS, not by the Registrar or a faculty member. The ticketing system should be easily available to students, faculty and staff seeking to

report problems or otherwise find help. To solve user interface issues, USC should work with this committee to expedite completion of the "portal" that was initially planned to be part of this implementation.

A focus on responding to individual tickets diverts attention from larger issues, including a general review and evaluation of the overall usability of Banner. This critique applies not only to Banner, but to DegreeWorks, DataWarehouse and any other IT system used by faculty, staff and administrators to do their jobs.

7. Cyber Security

The committee discussed UTS' and the CIO's failure to participate in the discussion on cyber security. Mr. James Perry, USC's Chief Information Security Officer (CISO), could not participate in this meeting due to his travel obligations and none of his group participated in our cyber security discussions.

Vitaly Rassolov, chair of the College of Arts and Sciences' Information Technology Advisory Committee (ITAC) shared his committee's concerns on cyber security. Vitaly said that computers in Sumwalt had been hacked three times in the spring. Upon contacting UTS, he and others had followed UTS instructions carefully, including wiping the computers, but that had not prevented additional attacks. He would like a working relationship with the security team to find a solution, but that has not developed. ITAC felt that top-down solutions were presented that did not solve the particular problem at hand, and cited the implementation of Duo (a developer of MFA--Multifactor Authentication) as an example. Based on this experience, and with a desire to be proactive against future attacks, ITAC felt it had to ignore the security committee and instead use CAS resources and expertise to find solutions appropriate for all CAS computer systems.

Recommendation: USC's cyber security group should work with faculty on cyber security concerns. Division of Information Technology should look into more sophisticated technology and software to prevent any major attacks in USC. Faculty and academic entities will need to adapt any current practices that may present security threats, so as to decrease these security risks.

USC Faculty Senate Information Technology Committee

The Faculty Senate Informational Technology Committee provides a faculty voice in assessing and planning Information Technology (IT) services, resources, and infrastructure for administration, instruction, and research at the University of South Carolina. The committee shall consist of eight members of the voting faculty; one graduate student representative; one undergraduate student representative; and no more than six ex-officio representatives, typically one each from the University Technology Services (UTS), Research Cyberinfrastructure (RCI), the University Libraries, the Office of the Vice President for Research (VPR), the Office of the Provost, and the Office of the University Registrar. The composition of the committee shall reflect the need for expertise in the complex field of IT and general interest of the University faculty.

Specific charges to the committee are:

1) To survey annually faculty, staff, and students regarding the efficacy of IT resources including general services, resources and infrastructure that support the missions of teaching, research, and service.
2) To assess the adequacy of available IT services, resources, and infrastructure relative to the requirements of the University community.
3) To assess the compatibility of available and planned IT services, resources, and infrastructure with the University's ambition as a locally, nationally, and internationally-regarded teaching and research institution.
4) To ensure that faculty have a meaningful role in future development of IT at the University of South Carolina by: maintaining and publishing a list of all standing committees related to IT, providing a faculty voice on search committees for senior administrators whose responsibilities include IT, and receiving an annual report on current and proposed budgets for central IT resources.
5) To propose for ratification by the Faculty Senate, a "Faculty Bill of Rights for IT" specifying the IT services, resources, and infrastructure that faculty, as well as students and staff, should expect from the University, and to annually review this document for necessary revisions.
6) To make recommendations to the Faculty Senate for changes in IT services, resources, and infrastructure based on the information, assessment, and analysis resulting from the committee's work in points 1-5 above.

IT ad hoc Committee Members
April 1, 2015

Faculty Members (Voting Members)

 (1) **Prof. John Grego**, Statistics (Co-Chair)
 (2) **Prof. Bob Brookshire,** HRMS IIT Program
 (3) **Prof. Subramanyam Bulusu**, Earth and Ocean Sciences (C0-Chair)
 (4) **Prof. Duncan Buell,** Computer Science & Engineering
 (5) **Prof. Doug Meade,** Math department, IMI
 (6) **Prof. Mark Cooper,** Dept. of English

Ex Officio

(1) Mr. **Jeff Farnham,** Associate Vice-President for Information Technology, UTS
(2) Dr. **Phil Moore,** Director of Research Cyberinfrastructure (RCI)
(3) Mr. **Glenn Buntun,** Director of Library Technologies and Systems**,** Thomas Cooper Library
(4) Ms. **Debbie Kassianos,** Director of Information Technology and Data Management
(5) Mr. **Aaron Marterer**, The Office of the University Registrar

Graduate Student Representative
Mr. Joseph D'Addezio, Ph.D. Marine Science student

Undegraduate Student Representative
Ms. Tatiana Chin, College Of Hospitality Retail And Sport Management

Research Computing at the University of South Carolina
High Performance Computing, Data Storage and High-Speed Networks
An Investment for the Future
March 31, 2015

Introduction

The USC research community requirements for High Performance Computing (HPC), data storage and high-speed network resources increase significantly each year. To remain competitive, a solid administrative commitment in support of these areas not only meets the needs of new faculty for basic HPC capabilities, but also demonstrates an institutional commitment to future funding opportunities for all faculty. A viable solution at USC must satisfy two requirements:

1. It must maximize investments by sharing as many resources as possible and
2. It must avoid duplication of effort by integrating with existing campus enterprise infrastructure projects.

Satisfying these two requirements effectively decreases total cost and maximizes university resources.
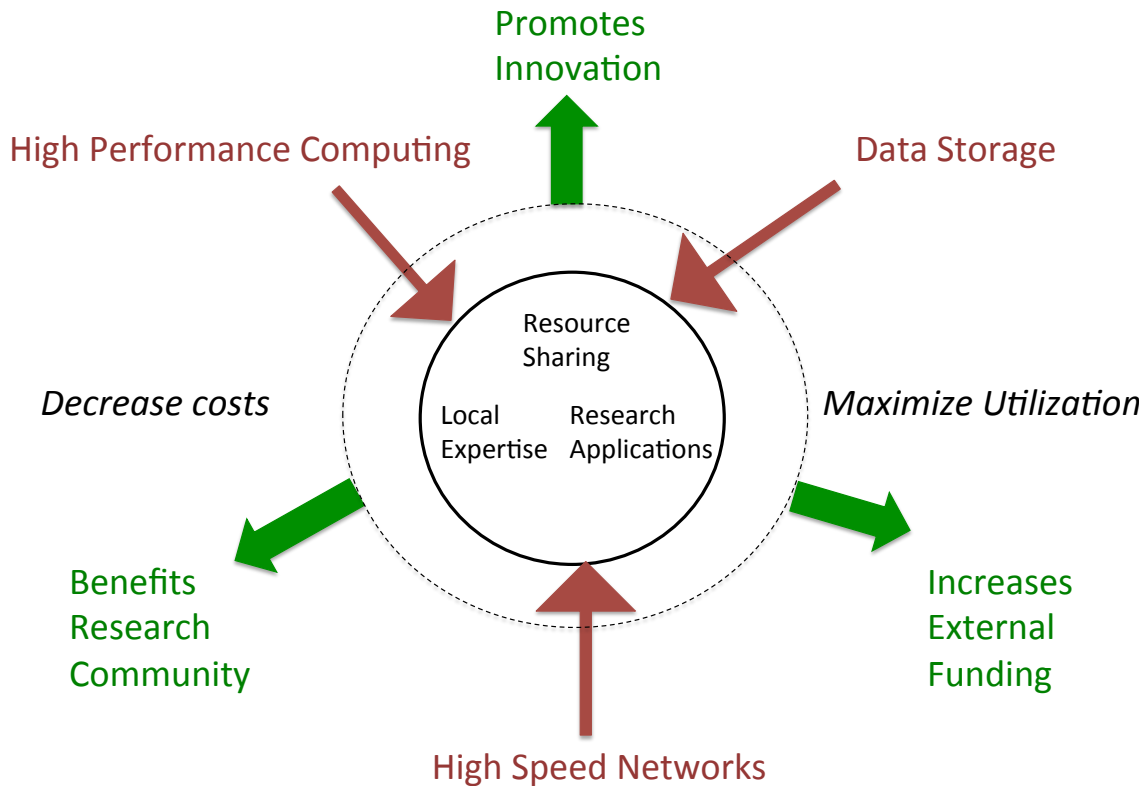

Figure 1. Research Computing Investments and Benefits

Research Computing Overview

High Performance Computing, data storage and high-speed networks have become a critical part of academic and commercial research activities around the world. To properly support these activities, the University of South Carolina must provide a coordinated campus-wide infrastructure with a sustainable organizational structure to unite all efforts. Although steps have been taken in this direction using previous NSF grant funding and some stop-gap funding to establish a new campus Research Cyberinfrastructure (RCI) group under the Office of Information Technology, research computing on campus has yet to become a long-term institutionally supported operation. A solid institutional commitment for research computing will enable USC to be competitive with other universities in support of specialized computational and data intensive areas that are critical for research institutions.

To meet minimum requirements for research computing at a Carnegie 1 institution, USC must develop the following capabilities:

- medium-scale HPC shared compute clusters;
- medium-scale shared-memory servers;
- tiered, networked storage with replication for disaster recovery;
- high-speed network connections between HPC and specialized storage systems;
- high speed connections from the storage systems to off-campus locations;
- support staff with expertise in HPC and research computing applications;
- support staff with expertise in enterprise data storage, high-speed networks, routing and cybersecurity;
- campus licenses for widely-used software applications needed for research;
- an ongoing commitment by the university to sustain this operation.

High Performance Computing

The strategy that best fits the USC research community and is most cost-effective is establishment of a robust local shared cluster design. This design, providing the basic computational infrastructure with staff support expertise, can be expanded by equipment purchases made by individual researchers or research groups. Mature and long-running production code with large processing, memory and data requirements should take advantage of national XSEDE facilities funded by NSF. A medium-scale shared cluster allows the ability to test locally and then scale up computations that use the national facilities; researchers cannot get to the point of having mature parallel code suitable for the national facilities without access to a medium-scale local facility on which to test their HPC programs.

Obtaining results from modeling and simulation calculations typically takes days or weeks. Taking advantage of the newest accelerator hardware where thousands of compute cores are placed on a single card offers a tremendous increase in performance vs. cost. This technology will be integrated into the HPC infrastructure at USC.

Data Storage and Curation

Data intensive research requires both short-term and long-term storage capacities. Current campus need exceeds capacity, and disaster recovery capacities are dangerously underdeveloped. Increasingly, funders across the disciplines expect research groups to include long-term data curation as part of data management plans. We can expect standards-compliance to become an issue in the near future. Fortunately, in this area economies of scale can reduce total costs while improving the standard of service.

USC needs a scalable, flexible approach to storage. In its initial implementation, this approach should drive major campus data users into a centrally provided solution by undercutting the current cost of ad-hoc solutions while reducing their risk. As demand and costs become predictable at scale, a usage-based structure can be built to increase capacity as demand increases. USC needs an incremental approach to keep options open with increasing data storage demands and incorporation of new technologies.

For instance, research data generated by modeling and simulation programs on clusters is automated and can increase very quickly. Intermediate results from calculations may also need to be saved long-term.

The ideal solution would add a lower-cost per TB tier to the new data storage capabilities currently under implementation at UTS. Cost sharing and taking advantage of existing campus infrastructure will be beneficial in the long-term. In any case, the storage architecture for research computing will need to have the key features of the UTS system: the ability to transfer data from high-speed storage tiers for currently active data to lower-cost and slower tiers for long-term storage and back again; the ability to define user access policies and rights and manage them efficiently over the campus network using campus login credentials already in place; the ability to assign replication and migration policies to data that needs to survive into future; network connectivity allowing data stored at USC to be easily transferred to and from the national facilities for processing. .

Campus research projects such as satellite oceanography, bioinformatics, film digitization, engineering simulations and fMri brain imaging need on-line data storage and access with replication, off-site disaster recovery. An ability to archive to tape media is dependent on immediate and long-term needs. It is recommended this capability be evaluated for future funding based on meeting specific needs and federally mandated data archival guidelines.

High-Speed Research Networks

Planning and connecting high-speed networks to critical research areas is an important part of any research computing infrastructure. Not only must networks be established, they must be reliable and monitored for performance and optimal routing. It is critical that USC exploit bandwidth available over the Internet2, high-speed connection to MUSC and Clemson and other locations such as national laboratories through Southern Crossroads in Atlanta. Currently, national 100 Gbit networks provide high data-transfer rates to access

datasets in many disciplines.

Staffing Requirements

It is to be emphasized that HPC is not yet a science--it is still an art. By its very nature, HPC is computing at the edge of what is feasible, and efficient use of resources requires an understanding of the balance between computation, communication, and storage on the particular devices and resources available and an expertise in the use of high-end software packages. HPC staff requires different skill-sets than IT staff who support IT systems and desktop computing. They are critical to effective use of the physical resources and must cover a number of support areas unique to the world of HPC. The current staff at USC includes four people. This needs to grow to five, augmented by several graduate and student assistants to support the infrastructure proposed here.

Campus Infrastructure Design and Implementation

The three primary components of a viable campus infrastructure design and implementation are identified in figure 2. These include housing of critical systems in the campus UTS datacenter, maximizing utilization of our campus Southern Crossroads (SoX) network connectivity and satisfying computational and data storage requirements of research activities across campus.

The UTS datacenter offers a physically secure and monitored environment for equipment. Its close proximity to the central 10 Gbit campus backbone, routers and firewalls ensures secure access and maximum possible throughput between local computational and data storage resources.

Our principal research connectivity is provided by Southern Crossroads (SoX) located at Georgia Tech. This 10 Gb connection from USC to Atlanta serves as a gateway to 10 and 100 Gb networks that connect to Internet2, national laboratories, and commercial providers such as Amazon and Google.

There are many research groups located at various locations on campus. Seventeen buildings are connected to a campus 10 Gb backbone network. One priority is to create a separate research network for research activities and secure funding that will increase the backbone speed to 100 Gb.
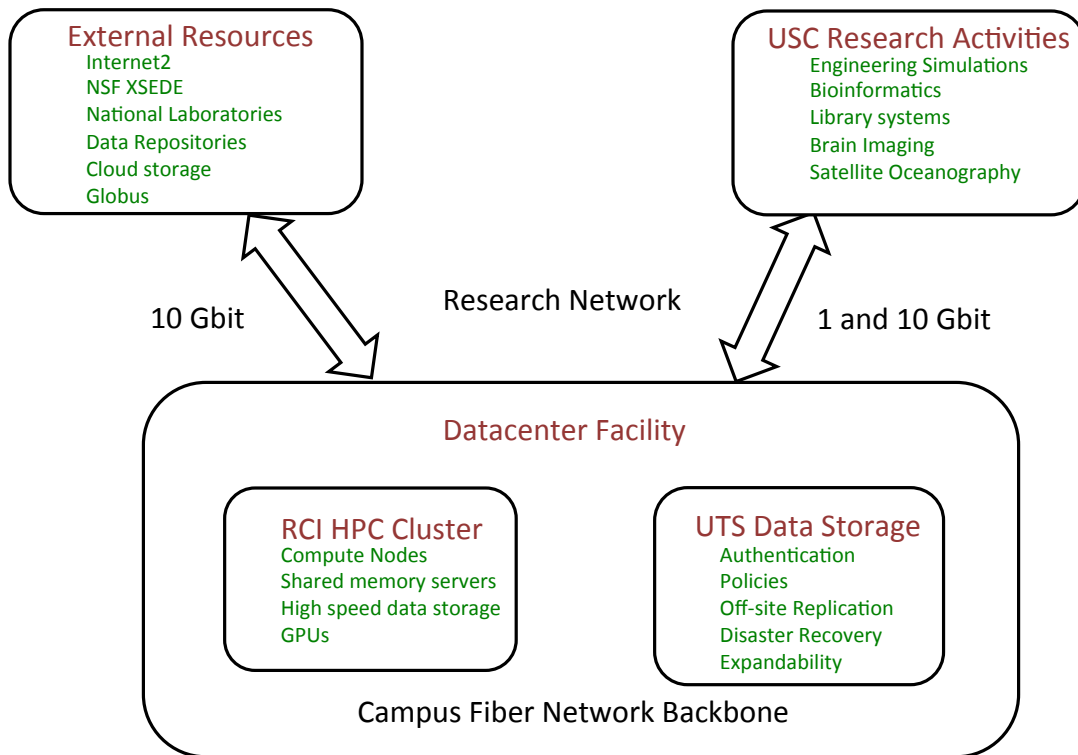
Figure 2. Research Computing Infrastructure

Summary

Strategic planning, funding and implementation for computational resources, data storage, high-speed networking, and support expertise is long overdue. Any initiative should not attempt to duplicate efforts at other universities, but should focus on USC's specific needs. The overall goal is to achieve an optimal balance among research demands, infrastructure, and cost effectiveness that ultimately leads to future grant opportunities.

Research Computing at the University of South Carolina
High Performance Computing, Data Storage and High-Speed Networks
Initial and Recurring Budgets
Initial Budget of $1.5M

The first four items listed under High Performance Computing are part of a very minimal shared cluster system currently in operation that can be expanded. Infiniband storage, purchased with EPSCoR cyberinfrastructure funding, serves as a high-throughput storage device for the compute nodes. This new shared cluster will replace two legacy clusters that have no hardware support and are approaching their end-of-life cycle.

High Performance Computing			
Item	**Notes**	**Percent**	**$(K)**
(9) compute nodes, 180 cores	Shared cluster system funded by VPR-CIO ($100K)	0%	
(1) 100 TB Infiniband storage	Scratch space funded by EPSCoR grant ($90K)	0%	
(1) 60-core 256 GB SMP server	Shared-memory server vendor evaluation ($40K)	0%	
(12) compute nodes, 240 cores	Compute nodes funded by research groups ($120K)	0%	
(80) compute nodes, 1600 cores	Expansion of shared cluster system	50%	$750
(1) 60-core 2 TB SMP server	Shared memory server	5%	$75
(1) 150 TB Disk SAN for HPC	User home directory disk space	5%	$75
Data Storage Infrastructure			
(2) Petabyte Capacity[1]	Provision lower-cost tier for UTS storage system	33%	$495
Network Infrastructure			
Research networks	Improvements to internal and external connectivity	7%	$105

Recurring Budget of $1M/YR

A recurring budget is necessary to sustain consistent operations. Site licenses for commonly used science and engineering applications such as MATLAB offer significant cost savings for the research community.

Item	**Notes**	**Percent**	**$(K)**
Salaries and operating budget[2]	Five applications and technical support staff	60%	$600
Hardware service contracts	HPC operating costs	6%	$60
Storage	Storage subsidy to sustain (2) PB capacity and incubate client-funded growth	24%	$240
Research Software	Software licensing and administration	10%	$100

[1] **Assumes that we will be able to provision a tier within the current solution that reduces recurring per-unit storage costs low enough to encourage major data users to buy in to this system. If we cannot, USC should develop a hybrid or parallel system capable of achieving this economy.**

[2] **Adds one to the current staff paid for by UTS which has not made a recurring commitment to this initiative. The University's research effort requires an ongoing commitment to staff this area.**

<p style="text-align: center;">**USC Faculty Senate Information Technology Committee**</p>

<p style="text-align: center;">**Classroom Information Technology Enhancement Plan 2015-2016**</p>

The Faculty Senate Information Technology Committee recommends the following overall strategies for the Classroom Information Technology Enhancement for academic year 2015-2016 and beyond:

1) Work with faculty to develop standard descriptions of the functions faculty can expect "smart" classrooms to perform, as opposed to the equipment they contain, and to match classroom upgrades with desired functions.

2) Encourage UTS, Facilities, and CESC to share information about room improvements with the Registrar so that standard descriptions of room technologies, and the year placed in service, can be included in the 25Live system.

3) Develop technology tiers to contain costs while accommodating a range of needs. For example, the suggestions below would allow CESC to upgrade 3 Cyclops rooms (which meet many instructors' needs) for every 2 Hydra rooms (which satisfy most instructors' needs and resemble the current basic configuration). Given a choice between a recently upgraded Cyclops room and an older "basic" room, we expect that many instructors would prefer the former. Although it may take a few cycles to set expectations, arrive at an ideal distribution of room types, and develop efficient ways of working with the Registrar's classroom assignment system, the need to stretch the budget militates in favor of this approach.

4) Encourage CESC, Provost, UTS, Facilities, and the Registrar to adopt a more aggressive enhancement cycle so that all classrooms have reasonably current technology.

5) Encourage UTS, Facilities, and CESC to work with Deans and the Provost to integrate the purchase, upgrade, and maintenance of presentation technology and information technology.

As a starting point, the Committee recommends the following tiers and functions.

Spartan

25 Live Description
Spartan rooms emphasize face-to-face interaction. Students and instructors will be able to use campus WiFi.

Cyclops

25 Live Description
Cyclops rooms emphasize improved image and sound quality. Instructors will be able to connect and playback from VGA and HDMI video sources and ⅛ inch mini (stereo) audio sources, as well as connect to broadband ethernet. These rooms are ideal for presenting

Powerpoint slides from a laptop; playing BluRay movies at native resolutions from a player brought into the room, connecting an AppleTV, and playing stereo audio from a portable mp3 player or other device. Students and instructors will be able to use campus WiFi.

Technical Specs -- Target Price $20,000
- Video projection or a flat panel screen to provide 1080p resolution, luminance of 14 FtL with the room lights off, appropriate contrast ratios and color calibrations for HD cinema as well as PowerPoint presentations. The system will allow adjustment of aspect ratios to accommodate 4:3 and 16:9 source materials.
- 20-20kHz +/-3dB stereo audio playback independent of a video source.
- Basic signal processing and switching to allow adjustment of room volume independently of the source--no additional inputs will be provisioned.
- A podium with HDMI, SVGA and ⅛ mini audio connections as well as an broadband ethernet port and 110v AC adaptor.

Hydra

25 Live Description
Hydra rooms emphasize versatility. In rooms placed in service after AY 2016, instructors will be able to connect VGA and HDMI video sources and ⅛ inch mini (stereo) audio sources, as well as connect to broadband ethernet. Instructors will be able to present video and audio content from a laptop, display materials using an in-room document camera, play DVD or BluRay movies at native resolutions from an in-room player, and connect to the World Wide Web using an in-room computer. Rooms placed in service before AY2016 may lack some of these capabilities. Students and instructors will be able to use campus WiFi.

Tech Spec (Post AY-2016) -- Target Price $32,000
- Video projection or a flat panel screen to provide 1080p resolution, luminance of 14 FtL with the room lights off, appropriate contrast ratios and color calibrations for HD cinema as well as Powerpoint presentations. The system will allow adjustment of aspect ratios to accommodate 4:3 and 16:9 source materials.
- 20-20kHz +/-3dB stereo audio playback independent of a video source.
- A Blu-ray player.
- A centrally configured PC that allows Web access only.
- The provided podium will include switching and single processing appropriate to managing these inputs.

NB: The committee recommends a change of practice with regard to PCs in Hydra rooms. Units requiring custom software configurations should either: a) specify a unique Chimaera room or b) provide laptops including the software. Documents using standard presentation software (.pptx, .docx, .pdf files) would be available through the cloud. The committee discussed a standard software suite for the Hydra configuration, and may revisit this issue in the future. Because many general purpose classrooms are used by instructors with different needs, because web access is a very common need, and because it is important for instructors to have

one number to call in case of problems, a basic web-capable computer should be installed in Hydra rooms by default. Resources will need to be provided for PC support and refresh; a standard campus-wide solution should be expected to contain costs.

Medusa

25 Live Description
Medusa rooms facilitate web conferencing. After certification, instructors will be able to use software such as Adobe Connect (the currently provided University solution), WebEx, or GoToMeeting to conduct classes with remote participants. Instructors will be able to connect SVGA and HDMI video sources and ⅛ inch mini (stereo) audio sources, as well as connect to broadband ethernet. Instructors will be able to present audio and video content via their laptops, display materials using an in-room document camera, and connect to the Word Wide Web using an in-room computer. Students and instructors will be able to use campus WiFi.

Tech Spec -- Target Price $45,000-$75,000 depending on room size and configuration
- Video projection or a flat panel screen to provide 1080p resolution, luminance of 14 FtL with the room lights off, appropriate contrast ratios and color calibrations for HD cinema as well as PowerPoint presentations. The system will allow adjustment of aspect ratios to accommodate 4:3 and 16:9 source materials.
- 20-20kHz +/-3dB stereo audio playback independent of a video source.
- A document camera.
- A PC capable of running web conferencing software.
- The room will include a web conferencing camera and one or more microphones.
- The provided podium will include switching and signal processing appropriate to managing these inputs.

NB: The committee recommends that CESC develop a plan to equip one Medusa room per general purpose classroom building. The rooms should be of various sizes. Because cost containment depends on training instructors to use the software and manage microphones, CESC should work with the Center for Teaching Excellence to develop a short-course certification program for instructors wishing to use Medusa rooms. Because the rooms will be few in number it seems reasonable to handle assignment to these rooms on a case-by-case basis. Certification should be a requirement for assignment.

Chimaera

25 Live Description
Chimaera rooms have been customized to serve particular needs. See details. (For example: seminar rooms equipped for web conferencing with table connections and smartboards; distance education studios; screening rooms; rooms with multi-screen projection.)

Tech Spec -- Target Price $20,000 - $200,000
- Varies based on requirements