BROWN

# Brown University IT Strategic Plan

## 2008-2013

*A complement to the Plan for Academic Enrichment (PAE), this University technology plan sets a broad framework of goals.*

*Last edited 3/20/09*

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# The CIO's Perspective

In its recent history, higher education's IT strategy has been shaped by a series of focusing events that drew our attention and resources. These events in effect became our de facto strategies. First, the rise of the internet focused our attention on creating an infrastructure of high performing networks across and among our institutions. Then, the year 2000 and the rise of the modern ERP system drew our attention to the need to modernize the computing resources that supported our administrative services. Concurrently, the rise of web services drove many institutions to focus their efforts on creating portals and web self service applications to make it easier for students, faculty and staff to navigate institutional services. Each of these developments in technology was so broad in scale they in effect became our strategy.

Today, we face an environment that is richer in need, complexity and opportunity. No single opportunity can dominate our attention or define the path forward. Technology's use has become widespread in faculty research, student learning and campus services. It is the means that facilitates our collaboration down the hall and across the globe. Our success in using technology has made setting technology strategy more challenging and more essential.

I commissioned this strategic plan to provide the University with a framework for making choices. The possible avenues in which we might pursue technology initiatives and innovations far outpace our resources. Inevitably we must make choices and we want the choices that we make to bring the most benefit to Brown.

The planning effort was an opportunity to bring the University community together. Effective collaboration will be an essential element of our success today and into the future. We have too little time and too few resources to allow historical organizational boundaries and rivalries to paralyze us. The many individuals who contributed to this plan did so because they care passionately about Brown's mission and believe that we must employ appropriate technology to effectively carry out our mission. The plan that they have helped to create is not a CIS technology plan. It is a University technology plan.

As a complement to the Plan for Academic Enrichment, this plan sets a broad framework of goals. However, this plan must be guided regularly by input from our faculty, students and staff as we choose how to implement the goals of the University. The planning process has given us vision for our future and an impetus to work together to create it. Let's capitalize on this momentum as we move forward together.

Finally, I would like to thank Kara Kelly, John Spadaro and Phil Goldstein along with the working groups and the working group chairs for their efforts in making this plan a reality.

Sincerely,

Michael Pickett
Vice-President/CIO

# Introduction

Brown is in the midst of an ambitious undertaking to enrich its academic programs, building on existing strengths and establishing new targets for excellence in research, education and public leadership. The second phase of the Plan for Academic Enrichment (PAE) has just begun and the University recognizes the importance of acting quickly on the priorities identified in this second phase in order to take advantage of momentum gained through the initial phase of the Plan. The central question that drove the IT strategic planning process was how can technology help support and accelerate Brown's realization of the goals articulated in the PAE. Technology is viewed as an essential enabler of Brown's academic excellence.

Brown has made many important strides to improve its technology infrastructure over the past ten years. The campus network is more robust and reliable. We have begun to modernize our administrative systems with the implementation of new software to support research administration and student services. New technologies and services have been deployed to support faculty in their teaching and research as well. Each of these gains represents a significant investment of time and money and an accomplishment of our faculty and staff.

Unfortunately, the world has not stood still while we secured these gains. While we were working hard to catch up, other institutions have leaped ahead. Today, we find ourselves pressed to provide the technologies and services our faculty need to conduct their research and scholarship. We find that the gains we have made in the introduction of technology to support the learning environment are now just meeting the baseline expectations of students. As new needs and expectations have emerged, we have seen individual departments take unilateral action to fill the gaps that are emerging. Unfortunately, these actions serve only to optimize locally and lead to duplication and a widening disparity between have and have not departments.

It is imperative that the University acknowledge that the existing IT infrastructure, services and support are inadequate to the task of supporting the achievement of academic excellence. Our current environment consists of a very basic set of foundational services, which in many cases are duplicated in departments, and an insufficient and inefficient support structure, which is struggling in some areas and failing in others, to provide educators and researchers with the assistance they require. Maintenance of the status quo is not a sensible option. IT leadership on campus, however, must take the first steps in working collaboratively to reduce duplication and costs, share knowledge and solutions; and focus resources on the University's strategic priorities. This IT Strategic Plan is our initial venture towards these objectives. The intent of this plan is to establish a vision and set of recommendations which unite us in a cooperative agreement on how technology can support the PAE objectives and increase the likelihood of the University reaching its goals.

It is clear, from the work of the strategic planning groups, that providing the right technology tools, services and support to faculty is as important as giving them appropriate office and laboratory space. Technology is an essential enabler of Brown's academic excellence. The Research Computing and Support working group, which included ten members of the faculty concluded that 'the prominence and the impact of computing across a modern research university are now entirely comparable to that of research laboratories and research libraries, serving as an essential third leg in the pursuit of knowledge and innovation.'

## Planning Process

When Michael Pickett became the Vice-President for Computing and Information Services (CIS) & CIO in July 2007, he quickly identified the need for 'a coherent plan for ensuring that Brown gets the most out of our scarce technology dollars and that we approach our use in a strategic manner'. He has made it a priority to develop a 5 year technology strategic plan based on Brown's Plan for Academic Enrichment and driven by principles and values. As CIO, Michael has also emphasized the need for this plan to represent the issues and priorities of all IT staff at Brown, not just those in the central computing organization. Finally, he has consistently maintained that the voice of the community must be heard in this plan.

Seven working groups were formed to examine key issues for IT at Brown. A total of 95 IT professionals, faculty and staff participated in these 7 groups. 57% of working group members came from departments other than Computing and Information Services, fulfilling our objective of having substantial representation from other departments on campus. These working groups focused on the following core issues: Research Computing & Support, Teaching and Learning Technology, Enterprise Business Applications, Technical Directions, Collaboratively Managing the IT Service Environment, Support for Innovation and Funding & Governance. Additional information on the charge and membership of each of these groups may be found in Appendix C.

Through the strategic planning process, we have interviewed over 120 members of the Brown community in individual meetings, group meetings and focus groups. More than 70 of these conversations were with Brown faculty. We also received input from over 350 undergraduates and 30 graduate students through a survey conducted by the Teaching and Learning Technology working group. These conversations have informed all parts of the planning process. It is imperative, however, that these dialogues continue over the next 5 years and that this plan be revisited periodically and updated to reflect the current environment, priorities, issues and accomplishments.

This document sets forth a vision for information technology at Brown drawn from the work of the seven working groups and informed by feedback from individual interviews, focus groups and surveys.

## The Vision

The vision of a reasonably technologically equipped Brown University that can nimbly negotiate the research, teaching and reputational challenges in our future is a realistic one. It is a vision that requires close attention to the choices we make and to the way we deploy our precious resources. Technology can provide us innovative tools to achieve our goals. This plan is intended to help us achieve the agility needed for success.

## Description of Plan and Next Steps

The following **Executive Summary** identifies the broad recommendations pulled from the working group reports and identifies a number of Year 1 goals. The goals will be reviewed and reprioritized annually.

The final section of this plan presents a set of **fourteen principles for IT** that are intended to guide our decision making over the next five years. A good bit of our general IT vision is exposed in the principles as well as the working group reports. The **appendices** include additional details regarding the recommendations of the working groups, information about the planning methodology, the membership of the working groups and an acknowledgement of the many contributors to this plan. The **complete working group reports** include additional vision, details and proposed initiatives. These complete reports may be found on the IT Strategic Plan wiki at: https://wiki.brown.edu/confluence/display/itstrategicplan/Working+Group+Final+Reports

The next steps are to ensure that the needs of the community are represented in the plan and establish the common understandings required for success. Over the fall term in 2008, this plan and the detailed working group reports will be shared with the university community for feedback and correction through a series of meetings including the Cabinet, Executive Committee, Faculty Executive Committee, department chairs, Computing Advisory Board, ITPRC and general faculty and student meetings. Each plan year we will repeat the goal setting and feedback process and make changes as needed. As is appropriate, the most up-to-date and complete version of the Brown IT Strategic Plan will be available over the web.

# Executive Summary of Recommendations

## 1. Invest in technology to achieve our academic goals

The most pervasive theme that emerged from the deliberations of the working groups was that Brown was substantially underinvested in the use of technology to achieve its mission and goals. We have tended to regard technology as an overhead cost rather than as a tool to achieve our highest institutional goals.

This underinvestment has a broad impact on the types and quality of research in which we can participate, our reputation and competitiveness in recruiting students and faculty, our effectiveness in teaching and learning, our ability to innovate and our global credibility as an institution of substance. We must identify ways to provide sustainable staffing and funding for our technology investments.

**Phase 1 Goals:**

a. Seek to establish a Center for Advanced Research with RI and other partners
b. Plan and pilot advanced video conferencing & global multimedia/new media services for faculty and students
c. Raise the baseline for support of the use of technology for teaching
d. Increase services, support and training for advanced computing
e. Create a proposal for a shared supercomputing service at Brown
f. Begin to extend division-specific support for teaching and learning to faculty
g. Extend network capability to 10gb to facilitate research data access

## 2. Ensure our ability to prevent disaster or carry on in the face of disaster

A single broken water pipe or electrical fire could make it impossible for Brown to access core systems and services including the network, class registration, grade reporting, research data access, financial aid, websites, and paychecks. If that disaster occurred today, it is likely that we would go without services for many weeks if not months. Over the years, Brown has automated many essential university functions and now we must focus on how to protect our access to those services. The solutions involve additional and offsite disk storage, remote computing resources, institutional data repositories, collaboration with other institutions and enhanced security tools. We must create a reasonable plan and funding to reduce the existing risks and to mitigate future risks to the university.

**Phase 1 Goals:**

a. Begin implementation of IT systems business continuity/disaster recovery plans
b. Review existing security status and create plan for services, policy and guidelines to address weaknesses
c. Add generator backup to existing data center
d. Pilot data repository and complete planning
e. Pilot use of 'cloud computing' services

## 3. Develop, sustain and periodically replace our core services

Technology services have a lifecycle and must be maintained and periodically replaced. We are at the end of the lifecycle of several key services or running out of capacity and must consider our options for going forward over the next five years. We are currently planning a replacement of our HR/Payroll system with an eye towards using the platform chosen as the basis for replacing our mainframe-based financial system within the next decade. Our current email platform goes out of maintenance in April, 2009 leaving us without access to the ever-more-important security updates. Our current course information system will be discontinued by the vendor within the coming year. We are quickly running out of disk storage space for email, enterprise applications, backups, departmental file services not to mention new uses such as the data repository and business continuity.

We need to regularly lay out the periodic maintenance, replacement and staffing costs for these types of core services and ensure that we make strategic decisions at each of the replacement opportunities. We need to ensure that ongoing as well as one-time resources are provided.

### Phase 1 Goals:

a. In response to the economic downturn we will implement projects to save money
b. Create and pilot shared data storage plan to add disk capacity for research, email quota, systems backup, data repository, departmental file services, video services and systems growth
c. Complete email system replacement plan and upgrade services
d. Complete planning to address data center needs across Brown
e. Upgrade telephone system to VOIP technology for rollout to new Brown buildings
f. Evaluate current course management system to ensure that we are providing a robust and cost-effective enterprise service that is useful across the largest possible set of users while serving as the foundation for more specialized services.
g. Complete HR/Payroll planning, software selection and begin project (THIS IS NOW ON HOLD)
h. Develop technical architecture and best practices guidelines to aid system decisions
i. Create plan for foundational services needed to sustain future institutional needs (e.g. ID management, authorization services, etc.)
j. Create broad inventory of existing and future enterprise services with estimates of service life cycle and begin budget planning process
k. Sustain and periodically replace core services
l. Develop new services

The detailed plans, vision and guiding principles developed by the seven working groups provide much additional detail around these three key recommendations. The summaries of the working group recommendations are included in Appendix A and the detailed working group reports are available on the IT Strategic Planning wiki.

# Technology Principles

Guiding principles are simple, direct statements which describe how an organization wants to behave in the long term. These principles are intended to establish a context for operational decisions in IT areas across campus. They should help translate operations and mission criteria into a language that all employees can understand. As with all parts of the strategic plan, they will require periodic revisiting to ensure relevance.

1. **University technology principles apply to all of Brown. We will seek to work together rather than to create duplicate solutions.**
   The idea behind developing principles at the University level is to ensure that all IT functions operate in the best interests of the entire user community. Brown's scarce resources should be focused on areas directly related to its core functions. It is not an effective use of Brown resources for multiple departments to be developing different systems which perform substantially the same function. Therefore, departments may have to compromise at times and adopt an enterprise system which provides the necessary functionality and can be supported at a lower cost. There are two main implications to this principle. Shared services and technologies must be developed in a consultation with the constituents it serves. Individual departments who knowingly duplicate one another's efforts will cause all of Brown to have fewer resources available to direct to strategic priorities. Failure to embrace this principle will result in continued growth of haves and have-nots and duplication of effort.

2. **We will employ open standards and best practices where feasible and define a university technology architecture.**
   We will favor technology options that embrace open standards and best practices rather than proprietary approaches. As a community, we will create a regularly updated technology architecture that will guide us in our decisions.

3. **We will promote an environment that provides protection from unauthorized or inadvertent access, sabotage or disasters and ensures the availability, integrity and confidentiality of information yet does not unduly hinder the university from conducting business as usual.**
   The teaching, research and scholarship of the Brown community are the University's greatest assets. The IT community has a responsibility to ensure that this collective investment is appropriately safeguarded from loss. We also have a responsibility to community members to keep personal data appropriately protected. Finally, IT must build business continuity into its service development plans in order that the most critical functions continue to be available in the event of a disaster.

4. **Technology in support of administrative functions should fulfill basic requirements and not result in additional administrative overhead for faculty and students.**
   The Plan for Academic Enrichment outlines Brown's strategy for strengthening its position as one of the top institutions of higher education world-wide and building upon its existing academic excellence. IT resources must be focused on efforts which directly support Brown's priorities in the academic arena. In order to optimize the use of scarce resources, needs not directly identified as priorities in the PAE will be met with technology that is adequate but not necessarily leading edge or best in class.

5. **We will provide and support tools and applications that facilitate electronic collaboration of the faculty, students and staff, over diverse locations, in line with university goals.**
   Brown's Plan for Academic Enrichment calls for the continued strengthening of the University's academic programs. One specific objective of this recommendation is to 'support the teaching mission of the faculty by providing increased resources for curricular development and collaborative pedagogy, including resources for multidisciplinary concentrations and innovative training in the sciences.' Brown's global aspirations necessitate that we facilitate the collaboration of scholars world-wide.
6. **Encouraging exploration of technology innovation is important to Brown.**
   Innovation frequently occurs closest to local needs. We encourage faculty, staff and students in departments and central organizations to evaluate new technologies and to involve others in those efforts. We will create a formal process that defines how prototypes or pilots can be supported, evaluated, how they might be adopted as enterprise-wide services and how older services and technologies will be retired. We will be alert for potential opportunities created by 'disruptive technologies' and create pilots to evaluate their usefulness to Brown.

7. **As a university community, we will adopt an IT service lifecycle process that provides robust and cost effective enterprise services.**
   We must focus our efforts; we cannot deploy every useful technology. In order to control costs, we will focus on deploying technology that is useful across the largest possible set of users, that can serve as the foundation and building blocks for more specialized services, and that is secure, stable, reliable, robust, well-documented, and easy with which to integrate. We must select technology tools that are cost-effective in both the short and the long-term and be rigorous about the processes by which we adopt, maintain and retire these tools.

8. **Access to all electronically available information necessary to accomplish one's job should be provided, regardless of either the physical location of the user or the information.**
   University work often takes place off campus and IT should facilitate, to as great a degree as is financially reasonable, secure access to this information from anywhere in the world.

9. **University data should be well defined and accurate. Wherever feasible, information will be captured once, as close to the authoritative source as possible, electronically validated and shared with those who need access.**
   The accuracy of university data is of great importance. To maximize data quality, several things need to occur. University data needs to be assigned to an owner or custodian who is responsible for its definition and accuracy. For each data element, the system of record and general means of access should be defined. Data integrity should be maximized by avoiding the re-keying of data. University data should be integrated rather than copied wherever feasible; however we should have robust and secure methods of sharing institutional data that can be useful in specialized systems at the local level.

10. **We will provide training and support all approved technology tools purchased by the university.**
    To accomplish its teaching and research goals, the University requires technology tools. Faculty and administrators who depend on these tools should be able to count on the availability of training and support. The level of central training and support will vary depending on the criticality of the function and the number of people that use the tool. In some cases where the numbers of users are extremely small, it will fall to the academic or administrative department to provide this training and support. We will have a regular process to retire the use of outdated tools and technology.

11. **We will consciously establish quality objectives for each IT service and measure performance against those objectives. We will proactively identify and efficiently resolve all issues associated with the quality of our services.**
    Users should understand what they can expect in terms of service availability and responsiveness. Service levels will vary depending on the classification of a service - e.g. pilot or production. In some cases, we may consciously choose that perfection is not the level of quality necessary and may seek 'good enough'.

12. **Academic and administrative users strive to communicate their needs and goals as completely and clearly as possible to their IT counterparts.**
    Technology projects are collaborative efforts between technology users and IT providers. Users must take their time to articulate their needs and goals in order that the selected technology supports the desired functionality. Providers must take the time to understand the needs and goals of users, and the larger context for them, prior to creating or procuring solutions. Projects should never be just about technology. Rather, they should be about the application of technology as part of a larger effort to improve a process or service or to enable a particular teaching or research activity.

13. **Highly routine manual processes will be automated when real benefits can be documented.**
    The purpose of IT is to optimize people's talent and time; we will focus people talents on relationships and knowledge based tasks. We cannot afford to have people doing manual work that technology can do more effectively. Unattended operation, cost-effective automation of routine tasks and automation of deployment and provisioning are top priorities in any technological design and decision.

14. **We will actively solicit input from users on product and service requirements and, to as great a degree as possible, will include their input in our technology decision making process.**
    The user community must have a forum in which to articulate their needs in order for tools and services to have the greatest possible likelihood of meeting those needs and being accepted by the community.

# Appendix A: Detailed Recommendations

## Enablers of Success

Achieving the goals established in the strategic plan will depend upon many factors/ Foremost among them will be the effort of the many talented IT professionals at Brown and the faculty, students and staff who collaborate with them every day. Brown must also pay close attention to three broad, supporting elements: innovation, governance and funding. Each of these elements embody both a philosophy of how Brown manages technology as well as individual tools and processes that make the implementation of strategy possible. The alignment of these elements with the strategic goals is essential to success.

## Innovation

*Goal: Create a set of widely understood and adopted principles and practices that the university community uses to communicate, encourage, pilot, evaluate and adopt innovative information technology practices and tools that can enhance our teaching, learning, research and administration.*

### Recommended Actions

1. Build support for innovation and collaboration at the departmental and central levels into the Brown technology service lifecycle
2. Provide online tools and face-to-face meetings to support Brown's ability to share ideas, problems, solutions and knowledge
3. Make it easy for faculty and students to engage in innovation and to enlist the assistance of information technologists from around Brown; communicate tests and pilots widely to enlist the aid of others around Brown in innovation
4. Use innovative technologies to advance Brown's stature as a major research university globally

Brown has long been perceived as a one of the most educationally innovative of the Ivy League universities. However, it has been decades since Brown has been widely noted as being innovative in the use of information technology for teaching, learning or research.

The importance of innovating using information technology to improve our ability to teach, learn, research, and to provide administrative support is well known to many at Brown. However the University lacks a shared vision of when it is appropriate to try out a new technology, how innovators get help or communicate about their work, and how technologies move into the mainstream and finally are phased out over time. This can create frustrations for faculty, staff and students who seek to solve problems and encounter resistance to innovation, find themselves reinventing solutions, find that their solutions are discounted or ignored, or find later that other innovators have been attempting to solve the same problem. This working group believes that it is important for Brown to fully utilize

the creativity and drive that exists among the faculty, staff and students as all seek practical solutions for the problems encountered in their work.

Over the next five years, Brown must build support for innovation and collaboration at the departmental and central levels into our technology service lifecycle by developing agreement on the role that innovation should play in the various university endeavors. Technologists will strive to clarify what they perceive to be useful innovation and some sense of how innovation can most productively occur at the departmental and central organizational levels of the university. They will aim to create a culture of appropriate innovation at Brown that centers around identifying solutions rather than focusing on reasons for failure.

The University should provide online tools and face-to-face meetings that support the faculty, staff and student's ability to share ideas, problems, solutions and technical knowledge. This will allow for the creation of a community of innovators that can be supportive of one another and also to provide critiques of each other's work that will improve the chances of success. These tools and practices, will create an "idea factory" that can provide fertile ground for good ideas to grow into widely adopted services.

Over the next five years, IT staff across the institution need to reduce existing barriers to communication about tests and pilots in which they are engaged. This includes an acceptance that there must be periodic testing of tools that duplicate officially supported enterprise applications. It is only through testing and piloting that one can know if the time in service lifecycle has come that new technology is worth adopting and that it is time to begin to retire an older, officially supported technology. The IT community must recognize that some of these tests will be failures. There needs to be a culture of collaboration at all levels of the University that does not see interest and innovation as competition, but as part of the lifecycle of services.

This IT plan wishes to engage the faculty, staff and students in the innovation process and to enlist the assistance of information technologists from all over Brown. A well publicized process to submit ideas, concerns, and complaints is needed and there should be well known process for delivering responses (and reasonable expectation setting).

Finally, over the next five years the IT community should strive to use innovative technologies to advance Brown's stature as a major research university globally. There are many advances that will aid the University's teaching, learning and research efforts in the local community, however some of these same advances many be leveraged to raise its profile on the national and international stages. Technologists should seek to understand the emerging tools that can assist in these goals and to engage the faculty, students and administrators that can provide the knowledge and messages that give these types of endeavors substance and worth.

## Governance

*Goal: Establish IT governance mechanisms that align technology priorities and policies with institutional goals in a manner that is participative and transparent.*

Effective governance will enable us to align our technology and services with the highest needs of the institution. It will provide us with multiple forums of discussion to debate our priorities and assure that the policies and practices that impact Brown's use of technology are responsive to the concerns of faculty, students and staff. Collaboration and focus are two of the most important by-products of good IT governance.

Brown must build on its existing structures to create more comprehensive and integrated IT governance. A table in Appendix E drafts an outline of the new responsibilities for existing governance groups, e.g. the ITPRC and CAB and new governance groups.
The groups described above will not exclusively focus on CIS and its technology initiatives. Rather, to realize the vision of the strategic plan and to cost effectively support the PAE, the groups must look at technology from an institutional perspective. To this end, the groups will also advise the library and other technology organizations (e.g., the computing organizations in Facilities and Development) on issues with institution-wide impacts.

The domains of each of the groups described above are not mutually exclusive. The nature of technology and the University demands that some issues be discussed in multiple places. For example, a project to implement a new identity management system would likely be discussed by the sub-committee for foundational technologies and services, the enterprise applications coordinating committee and the ITPRC. CIS leaders will work with committee chairs to coordinate these cross-group conversations and facilitate the necessary conversations. They will also share responsibility with the chairs to assure that recommendations reach the ITPRC in a timely manner.

### CIS Responsibilities

The governance structure is intended to foster consultation and to enable the most important decisions to be made with appropriate input from key stakeholders and University leadership. However, broader consultation cannot come at the expense of the ability to act nimbly. Not every issue and decision can be reviewed by the governance structures. CIS's leadership must be trusted to make day to day decisions that are aligned with Brown's overarching strategies and priorities. For example, CIS will continue to be responsible for prioritizing small and moderate sized projects. Typically, this will be done in direct consultation with the department or departments making the request. CIS will also be responsible for altering priorities or re-allocating resources among priorities to maintain alignment between how it invests its resources and the broader strategic directions provided by the ITPRC. The IT strategic plan will provide a framework for guiding these small and moderate sized prioritization decisions.

In addition, CIS will be charged with the ultimate responsibility for establishing technology directions and standards for the University. The CIS organization and the CIO are ultimately responsible for making decisions that provide a secure, reliable and robust technology infrastructure for Brown. CIS will consult as widely as possible before making decisions.

### Other Governance and Advisory Organizations

The groups described above will form the core of IT governance at Brown. In addition, the alumni led Information Technology Advisory Council (ITAC) will provide strategic advice on technology. CIS will continue to utilize their expertise to help identify and interpret changes in the external environment.

The CIO will bring technology policy recommendations, once they have been vetted by other governance groups, to the President's Cabinet for approval. Large individual projects will continue to form whatever governance groups they deem necessary for their success. For example, enterprise projects will continue to be overseen by executive sponsor committees and advised by project level steering committees.

## Funding

*Goal: Create sustainable sources of funding for technology that enable the University to adequately invest in the projects it pursues, sustains the performance of technology by supporting technology renewal and replacement and incents effective technology utilization through the use of subsidies and charge-backs.*

The importance of maintaining effective IT funding practices permeates many aspects of the IT plan. The issues around funding are far more pervasive and complex than the obvious need for investment to sustain the plan. Rather, it extends to how funding practices and policies meter demand for services or incent their adoption.

It also challenges Brown to view technology as an area of investment and not merely a cost center. We make no false promises that a dollar spent on technology returns a dollar in cost savings or new revenue. While such circumstances may be possible, they are elusive and rare. Rather, we encourage Brown to think more broadly about the strategic return on investment.

Funds invested in technology in support of teaching and research support successes that burnish the University's reputation and make it more competitive in the recruitment of faculty and students. Investments in technology in support of our business practices can make us more efficient and create a culture of evidenced based decision-making.

Finally, we must not let the practices of our internal economy dictate how we manage and provide technology services. The use of internal charge backs have their place in metering demand for scarce resources and allocating the cost to sustain resources that are disproportionately consumed by one segment of the campus. At times, the act of paying for a service makes the recipient value it more and the provider take greater care to meet expectations. On the other hand, charge-backs can also create a disincentive to the adoption of centrally provided services. We must be cautious to avoid

scenarios in which the pricing of a fully-loaded central service appears artificially more expensive than a locally provided version that is under no obligation to fully account for all of its costs. We must also remember that we are an innovation organization and must not let internal pricing stand in the way of broader adoption and experimentation with new technology.

The following set of principles has been developed to guide Brown's IT funding practices.

1. The decision to approve a project and the decision to fund its one-time and recurring costs should be made at the same time.
2. No significant project should be approved or initiated without an analysis of its total cost of ownership and a commitment from the URC to fund one-time (capital) and recurring (operating costs).
3. Core technology services should be "free" to all departments and individual users to encourage adoption, promote economies of scale and remove incentive to create shadow services within departments. The definition of core services needs to evolve and expand as needs change.
4. Departments consuming services beyond the core or requiring enhanced service levels should arrange for those services at their own cost and in consultation with the core service provider.
5. Brown must be able to see a better picture of its total cost of technology across the institution to support more strategic resource allocation decisions and to spot areas of inefficiency. Even though technology budgets are set by different committees (for academic and administrative departments), the senior level IT governance group and/or the cabinet should see an all funds view of technology spending and be empowered to intervene to correct strategic imbalances or to minimize inefficiencies.
6. Decisions about when to centralize a service to CIS or outsource it to another party should be made with an understanding of the total costs of providing the solution in the decentralized manner not the perceived costs borne by an individual departments (e.g., a research lab can run their own data center without paying for power, etc).
7. Technology is an area of investment that supports innovation in research and excellence in education.
    a. The costs of research technologies cannot be recovered completely from grants.
    b. The costs of learning technologies must be proactively invested in to maintain innovation and continue to meet student expectations for the quality of the learning environment at Brown.

## Research Computing

*Goal: Create a mix of virtual and physical spaces for research computing that fosters community among researchers, provides a vehicle to deliver shared computing resources and services in a manner that is easily discoverable by faculty, avoids unnecessary duplication of effort and sustains Brown's efforts to be a global leader in research.*

### Recommended Actions

1. Expand support for critical research applications and tools.
2. Provide a centrally managed but locally deployed staff of research computing professionals to support research hardware and software. Create a complementary corps of local "Technology Assistants" comprised of graduate students and a small number of specialized research scientists.
3. Expand the technology infrastructure supporting research including improved data center facilities, increased capacity to securely store, archive and manage research data and greater access to shared computing resources for computation, visualization and data manipulation.
4. Leverage the CCV to create a physical and virtual access point for research computing services and to foster greater community among researchers.

The impact of computing in a modern research institution is entirely comparable with that of research laboratories and research libraries. Computing is no longer just a tool to make labor intensive research more effective, it is a responsible for the development of new research ideas. Adequate research computing capabilities are not the exclusive concern of the sciences; it applies to the humanities as well. While support for the digital humanities community is less hardware and software intensive, it requires specialized staff resources for technical expertise, programming and project management.

Brown faces a significant gap between what is needed and what is available today. The current situation, with its severely lacking or completely absent support for research computing infrastructure and software support eventually is bound to have an adverse effect on research and educational activities across campus. Ultimately, it will severely impact what students and faculty can pursue in their quest for knowledge. It will create competitive disadvantages in recruiting of both faculty and students, an inability to teach students on the contemporary use of advanced computing in their discipline, and the inability to compete for certain types of large scale external funding opportunities.

Basic support services must be expanded. Key components of this support environment include Unix/Linux (*nix) desktop and cluster support and basic application support for the most commonly used research software packages. Brown requires more support staff with the skills required to support specialized research computing applications. A cadre of specialized IT professionals should be created and made available (perhaps on a fee-based system) to research departments. This shared resource should be complemented by a 'Technology Assistant' program for graduate students and a small number of highly specialized research scientists. This support structure could reduce the current technology overhead assumed by faculty in troubleshooting both hardware and software.

Supporting research also requires Brown to expand its technology infrastructure in several critical areas. The first is data storage and management. The research and scholarship of Brown's faculty and students is amongst the University's greatest assets. The safeguarding and preservation of that data demands a secure, reliable and centralized solution with plans for supporting organic growth and funding for periodic renewal. The second is access to adequate data center facilities to house the servers that store and manipulate research data. Brown's data center capacity must be expanded to support research needs for centralized computing, visualization and large-scale data storage /backup facility.

The final issue is one of community. Brown's researchers often don't know what's available, who to ask or where to go to get what they need. Both a better integrated, more intuitive presentation of services in combination with a virtual and eventually physical home for research computing activities would ameliorate this problem. The existing Center for Computation and Visualization (CCV) could be a foundation upon which to develop a broader support structure for research computing and, in a new location, a home for the research community. Such a place could give individuals both within the Brown community and outside of it, insight to the many activities, knowledge silos and application expertise on campus. It would also provide both a place and opportunity for faculty to seek information, interact with each other and develop new collaborations.

## Teaching and Learning with Technology

*Goal: Enable an academic environment which promotes collaboration, innovation and scholarship and facilitates the exploration and adoption of new teaching tools.*

### Recommended Actions

1. Make existing services (e.g., Blogs and Wikis) universally available to faculty and students.
2. Develop multi-skilled, discipline specific support teams to work with faculty on the integration of technology into the curriculum.
3. Place a premium on raising the technology capabilities of Brown's classrooms as part of the implementation of the recommendations of the Classroom Task Force.
4. Launch a focused planning effort to better manage the gaps and overlaps in technology related support services offered by CIS and the Library. Create an academic portal to blur organizational boundaries and create a single source of support for faculty.
5. Leverage technology (e.g., iTunes U, web pages) to promote faculty and student scholarship, teaching and research.

Having the appropriate technology available in the university environment is fundamentally necessary because of the nature of communication, collaboration, teaching, learning, social interactions today. The Internet has now become the central vehicle for individual and group creativity and collaboration in the 21st century. The second generation of the Internet, Web 2.0, is the experience of students coming to Brown today. These students have vast, international social networks and have contributed extensively to on-line content through blogs, wikis and YouTube. Their experiences should cause the University to reconsider its traditional definitions of 'public leadership', 'civic involvement', and

'community'. These terms must be considered in the context of the Internet which has always been a part of the lives of the young people currently on campus. Students, faculty and staff are arriving on campus with substantial technology expectations and are often struggling to find support in our environment.

The Teaching and Learning Technology planning group identified numerous areas in which existing services should be improved or expanded, e.g. simplify granting access to collaborative tools such as wikis to individuals outside the Brown community. Many of these recommendations are targeted at removing existing barriers to the broader sharing of information. That information might be about Brown courses - which could be improved through better integration between Banner and My Courses - or guest speaker lectures, the recording of which currently requires a fee. Guided substantially by the draft report of the Task Force on Undergraduate Education, the TLT group members have recommended the formation of a campus working group to explore the possibilities, needs and solutions which electronic portfolios might address, specifically how they might support the University's objective in improving the advising process.

Effective use of technology in teaching and learning requires competent technical resources with a consistent skill level across all academic departments to support faculty. Today, in addition to centrally managed support resources, faculty need access to more specialized support. Current organizations, e.g. the Scholarly Technology Group are effective but insufficient. Multi-functional, discipline-specific support teams should be deployed within individual or clusters of academic departments. This support would include basic support for the use of hardware and software, specialized support for employing technology in the classroom and the creation of digital resources, content area expertise with pedagogical experience, subject librarians and others depending on the disciplinary need.

Achieving excellence in the use of technology in learning also requires state of the art facilities. The University's classrooms were identified as an area where the existing environment was very much at odds with the premier position Brown aspires to amongst all colleges and universities. This was a popular topic at one of the graduate student focus groups where students who had attended undergraduate schools in Canada and Turkey contrasted the superior facilities at their undergraduate institutions with what was available at Brown. Many of these issues have been recognized by the Classroom Task Force convened in the summer of 2007. It would be beneficial to have the work of that group publicized more broadly on campus and for selected IT leaders to have a more participatory role in deciding which recommendations from that report are being enacted and how.

Services which support teaching and learning at Brown are scattered amongst different departments which often provide overlapping services and functions, resulting in confusion and general lack of awareness of what's available. More coordinated planning between CIS, the library and individual departmental resources should be commissioned to work through these gaps and overlaps in services. The creation of an Academic Portal where users could gain access to the information and tools that they need would also make organizational boundaries invisible to the recipients of learning support services.

Finally, Brown has a tremendous opportunity to fulfill its mission and support its global vision by showcasing its research, scholarship and teaching through a variety of distributive technologies such as podcasts. One example raised in this report would be to expand iTunesU to include public content. iTunesU is a partnership between Apple and Brown which allows instructors to upload digital course content to a server, content which students can then download to either an iPod or computer running iTunes Lectures could also be made more generally available through this mechanism to the general public through a website similar to National Public Radio's.

## Technology Support Services

*Goal: Create an integrated model of support services that optimizes the division of responsibilities between CIS and local technology groups and presents support services in a manner that is most intuitive to the recipient.*

### Recommended Actions

1. Create consistency in the position descriptions, titles, compensation and skill requirements for IT professionals across Brown. Take steps to further build community among all IT professionals.
2. Extend CIS's services to leverage local IT groups from providing potentially duplicative solutions and enable them to increase their focus
3. Charge CIS to work collaboratively with the community to establish standards and best practices to guide local IT decision-making.
4. Establish a consultative capacity within CIS to assist departments in planning and executing projects.

As technology has grown more ubiquitous and complex, Brown has experienced the creation of an increasing number of local technology support groups in its academic and administrative departments. Today, there are as many or more IT professionals who work outside of CIS as there are within it. At their best, local support groups meet unique needs of their faculty and staff that can't be served well by University-wide services. Unfortunately, the attention of local groups are too often diverted to compensate for a poorly performing central service or to create duplicative services due to lack of awareness of or confidence in central services. Local IT professionals have become too isolated. Their job descriptions are generally vague about their IT responsibilities, they don't know what services and support are available, what solutions already exist on campus, what expertise is possessed by their peers (or even who their peers are) and who to turn to as a resource.

Technology is changing in ways that favor the aggregation of some services to leverage economies of scale and the delegation of others to enable local tailoring to meet unique needs. To be efficient, Brown must adopt a flexible service model that embraces both central and local IT services. This will require action on several fronts.

First, there must be a more standardized definition of the role and skill requirements of a local IT professional position. To improve coordination and raise the level of professionalism there must be

greater consistency in job descriptions, titles, pay grades and responsibilities for IT professionals across campus. Today there is no true sense of a community of IT professionals; there are several groups of individuals with varying levels of IT responsibilities and skills. Having more standard descriptions of the responsibilities of IT positions and the necessary skills would be a logical first step in identifying a professional IT cohort. Increased opportunities for peer networking and professional training on campus are also essential. The creation of a simple directory of IT staff, expertise and services would contribute significantly towards reducing isolation and improving coordination as well.

Second, CIS must expand their service offerings to alleviate the need for departments to engage in duplicative efforts to create local services. A mix of fourteen infrastructure and user oriented services have been identified as having the attributes of service that could be operated more optimally as centrally provided, shared IT services. It includes things such as data back-up and archiving, desktop management, website development, database development and project management.

Third, CIS should be charged with providing leadership to all IT groups in promoting standards and best practices in technology management. This would include clearer recommendations regarding best practices for system configurations, asset management and preferred vendors. CIS also must serve as a clearinghouse of information alerting departments to on-going projects and innovations that may have universal applicability. Departments in turn must be more willing to share information with CIS about their local activities.

Finally, CIS should establish a consultative capacity to advise departments on the planning and execution of projects. Local IT professional staff could serve internships in this group to further their professional development and create broader relationships between CIS and local IT providers.

## Enterprise Business Applications

*Goal: Complete the modernization of major administrative applications with the minimal number of platforms required to meet critical requirements and invest in creating a workforce that is positioned to take optimal advantage of new systems.*

### Recommended Actions

1. Replace major enterprise systems which handle Human Resources, Finance and Identity Management; undertake complementary projects in the areas of reporting and data warehousing; card access and security; document imaging and workflow
2. Projects should not move ahead without a commitment to fund the recurring costs and sustain and operate the technology
3. Undertake a focused effort to align staff skills to take better advantage of technology
4. Ensure that all distributed enterprise systems meet a minimum set of standards for operations and maintenance

The University should embark on a multi-year effort to replace its human resources, financial and identity management system along with complementary projects in reporting and data warehousing, card access and security, document imaging/workflow. The three major enterprise systems are

significant parts of an aging infrastructure which hinders the University's efforts to manage people, projects and financial resources. As Brown pursues these projects, it should favor solutions compliant with Service Oriented Architecture (see technical directions section of this report) which would simplify integration with other applications and improving business data. Where economically feasible, the University should transition from overnight, batch database updates to real-time updating of databases.

To avoid the re-occurrence of deferred maintenance in systems, the resource commitment to ongoing operating support for enterprise systems must be incorporated in the project approval process and the University's financial planning at a coordinated level. Reserves should be accrued for periodic upgrading and renewal of all key administrative systems. No system implementations should be undertaken unless funding is also available to address the operating impacts of system implementation decisions. The failure to do so increases business risks.

The University has learned through the implementation of Banner student and COEUS for research administration that new enterprise systems have a substantial impact on staff job requirements. The University's hiring, position grading, salary structure and professional development policies should be adjusted to ensure that the workforce possesses the needed skills to succeed in this new environment.

The gap between new and old skills is made apparent by the dichotomy that exists between the University's reporting strategy and the skills sets of current employees. The current reporting strategy relies on administrative staff in departments either possessing the needed skill set or being trained to create reports at a fairly sophisticated level without a local professional development program to support these individuals. As a result, the intended benefits of CIS's work in building and maintaining data warehouses are not being fully realized.

Today, there are multiple instances of enterprise systems being managed locally (outside of CIS). The anticipated growth in the availability of vendor hosted solutions (software as a service) may make this a more prevalent aspect of Brown's enterprise systems in the future. The University has a legitimate business interest in directing hardware and software choices for core business systems, even if they are to be managed locally or by a third-party. In addition, enterprise systems managed locally should be audited by CIS to ensure proper management.

Finally, this group recommends that Brown consider outsourcing for applications which aren't integral to the existing web of administrative systems or where the work doesn't align with core staff competencies. Outsourcing to an alternate service provider should be considered when there is mature set of IT providers available and the business risk of delaying a replacement project is unacceptably high.

## Technical Directions

*Goal: Adopt a technical direction that supports the provision of shared foundational services built upon a widely agreed upon architecture, optimizes the management of data and creates an environment that can sustain critical services during a disaster.*

### Recommended Actions

1. Appoint a Technical Architecture Review Committee with membership from across the University to work collaboratively with CIS to establish and manage technical standards and best practices.
2. Document and make widely accessible Brown's technical architecture, standards and recommended practices (e.g., supported vendors, configurations).
3. Develop service continuity plans.
4. Establish standards and policies governing the use, management and preservation of institutional data.
5. Expand authentication, authorization and identify management systems beyond Brown's traditional boundaries through federation.

The development and publication of a technical architecture document that describes existing services and infrastructure available to and found within the Brown community, combined with a set of 'best practices ' documents for IT services, would result in substantial progress on many of the recommendations within this strategic plan.. It would increase the productivity of decentralized technologists, reducing the time that they may otherwise spend researching solutions, vendors, hardware and software which has already been evaluated by others. It would also provide clear guidelines for the IT environment at Brown, ideally reducing the number of different operating systems, databases, and applications currently deployed to a narrower set which can provide the required functionality and which are better matches for the skills of most IT professionals on campus.

Standards must be developed collaboratively and be proactively adapted as technology and needs evolve. To this end, a standing Architecture Review Committee with members from across the IT community should be formed to develop and periodically review architecture and best practices documents. A process must be implemented to review IT projects against established architecture and best practices. This process and the staff who support it will assist with planning IT projects and providing advisement on fit with architecture and best practice. The actual standards and best practices Brown adopts should be guided by the experience of others. The technical directions working group reviewed a set of standards and principles developed by Stanford University (http://www.stanford.edu/dept/its/vision/index.html ) and has recommended a modified version for adoption at Brown (see technical directions team report). A well thought out architecture is not enough. Brown must also take steps to improve manage the risks to continuity of services from a limited or regional disaster.

The past 7 years have provided numerous examples of why disaster recovery and service continuity plans are essential. The work of the Enterprise Business Applications group in identifying, at a high level, the criticality of various enterprise systems can be viewed as an early step in bringing business process owners together to think about the relative importance of business applications and recovery time objectives. This work would need to be significantly expanded under an initiative led by an outside professional with expertise in this area. The Technical Directions group is careful to note, however, that service continuity should go beyond foundational and business systems and include impacts to teaching/learning and research.

The importance of institutional data must be elevated - with the explosion of data that we've seen over the past several years - there is the expectation that it will be accessible, available 'forever', fully indexed and searchable and secure. In order to move closer to meeting these expectations, the University needs to identify a host of standards around the handling, storage and retention of data. Individuals or departments identified as 'data custodians' will have to consider the broadest possible uses of the data for which they are responsible, not just those of their particular office.

Finally, as other aspects of the strategic plan has acknowledge, Brown needs to think more broadly about its definition of 'community'. Collaboration in teaching, learning and research has moved beyond Brown's campus and we require a much easier process to provide shared access to electronic information and services. It is also clear that Brown's global ambitions will drive us to rethink our traditional definition of community. Our existing identity management system has its roots in Brown's university-college model and is increasingly burdensome as scholars and educators partner on projects between the hospitals and the campus, as well as around the country and the world.

# Appendix B: Methodology

Two of the objectives set forth early in the planning process were: 1. to have the resulting plan be inclusive of the perspectives of all members of the Brown community and 2. for it to reflect the objectives and issues of IT staff in both the central computing organization and at the departmental level. To those ends, we have employed the following tactics:

1. ***Individual Interviews***: Early in November, we identified over 40 individuals and groups to interview as part of the strategic planning process; 30 of those interviews were completed. Unless otherwise requested by the interviewee, notes from each of these meetings was posted to the IT Strategic Plan wiki so that everyone involved in the planning process and all IT staff had access to the materials.

2. ***Focus Groups***: There were 13 scheduled focus groups for faculty and 3 for graduate students through which we heard from a total of 67 faculty and graduate students. We also attended a Graduate Student Board meeting to discuss IT support, held an undergraduate student focus group and set up tables in Faunce House, the V-Dub and Ratty to talk to undergraduate students about IT.

3. ***Surveys***: The Teaching and Learning Technology group received completed surveys from 350 undergraduates and approximately 30 graduate students.

4. ***Open Office Hours***: For IT Staff, the project coordinator held "Office Hours" which staff could sign up to attend singly or in groups to discuss the strategic planning process; 7 CIS staff and 1 DCC participated.

5. ***Strategic Planning Group:*** Early in the planning process we identified a cohort of 19 CIS Directors and Associate Directors and 15 staff with substantial IT responsibility in departments which we envisioned as the initial strategic planning group. This group was exposed to high level issues at Brown, in higher education and technology through a series of presentations. Presenters were Dick Spies and Marisa Quinn on the PAE, Clyde Briant on 'Research at Brown', Gartner Group analyst David Clearey on 'Strategic Technologies' and independent higher education consultant Phil Goldstein on 'The Future of Higher Education'. Subsequently we had a day long retreat on campus in December. At this retreat, the strategic planning group plus two members of the IT Advisory Council - Elliot Maxwell and Elias Safdie - discussed opportunities and threats for IT at Brown, reflected on observations from the interviews and focus groups that had been held up to that point, and identified strategic questions which should be answered in the eventual plan.

6. ***Working Groups***: After processing the ideas generated at the retreat, the CIS senior staff - in conjunction with the external consultant working with us on this project - identified 7 key areas for further study by working groups. Retreat participants were able to select their preferred working groups. Members of the Research Computing and Support Group were nominated by Jan Hesthaven. For the Teaching and Learning Technology Group, we invited University Royce Faculty to participate. Members of the Innovation Support working group self-identified from an open call to faculty and IT staff across campus. More information about the working group members and their tasks are included in Appendix C.

# Appendix C: Working Groups, Members and Framing Questions

## Collaboratively Managing the IT Service Environment Working Group:

Supporting the technology needs of a diverse and complex University such as Brown is a collaborative effort. The professional development of IT staff across the University and communication between IT groups and with users were areas of emphasis in this domain.

### *Members*

Scott Thacher, Chair
***Director of Administrative IT Support***
***Campus Life & Student Services***

Chris Grossi
***Manager, Help Desk Level 2 Support***
***CIS***

Cliff Hirschman
***Director of Information Technology***
***BioMed Business Affairs/Computer Services***

Kristen Soule
***Systems Manager***
***Sociology***

John Bazik
***Senior Software Engineer***
***Computer Science***

Mike Enos
***Director, HR Systems***
***Human Resources***

Geoff Greene
***Associate Director, Database & Production Service***
***CIS***

Tony Allison
***Executive Director, Advancement Information Services***
***Development - A & D Information Resources***

Jed O'Connor
***Manager, Network Systems Applications***
***CIS***

Ray Stewart
***Purchasing Manager***
***Purchasing***

Rick Smith
***Network Manager***
***Bio Med Alcohol & Addiction***

Mark Nickel
***Director of University Communications***
***Public Affairs & University Relations***

Tony DeGregorio
***Director, Finance & Administration***
***CIS***

Monty Combs
***Director of Systems and Services***
***Facilities Management***

Bill Collins
***Coordinator, Computer & Technical Operations***
***Geological Sciences***

### Collaboratively Managing the IT Service Environment Framing Questions

- How can Brown create a culture that fosters more technology collaboration especially between CIS and other IT units?
- What should CIS core services be and what should distributed computing staffs provide?
    - How should service level agreements be used?
    - How should this service mix be managed and adjusted over time?
- What methods would improve communications among CIS and non-CIS staff?
    - How can we make services appear more seamless and unified?
    - How can we better share innovations and successful solutions within Brown?
- What initiatives or changes could be made in the first year of the strategic plan to foster greater trust between CIS and non-CIS IT staffs?
- How can we best leverage resident expertise in departments in providing university solutions?
- What steps should Brown take to improve its collective ability to recruit, develop and retain a skilled IT workforce?
    - What should CIS' role be in hiring and training all university IT personnel?

## Enterprise Business Applications Working Group:

This domain included the technologies and technology services provided to support the University's major administrative services. It included support for enterprise administrative systems (finance, human resources, student information, advancement, and research administration), decision-support, reporting and analysis.

***Members***

Donald Stewart, Chair
***Director of Academic Resources***
***Provost's Office***

Beth Gentry
***Director of Business and Financial Services***
***Business and Financial Services***

Bert Gordon
***Director of Human Resources Systems Replacement***
***Executive VP of Finance & Administration***

Mike Pesta
***University Registrar***
***Registrar's Office***

Michelle Ricci
***IT Project Management Consultant***
***CIS***

Don Schanck
***Assistant VP & University Controller***
***Controller's Office***

John Styer
***Director, Applications Development***
***CIS***

Regina White
***Associate Vice-President, Research Administration***
***VP of Research***

## Enterprise Business Applications Framing Questions

- What should our strategy be for maintaining integration among systems?
- In light of the Plan for Academic Enrichment and based on a critical assessment of existing services for learning (NEASC self-assessment deliverable), what are the highest priority needs for investment to improve or replace enterprise administrative systems?
- What standard development and project management methods should be adopted?
    - Are there more rapid, agile development methods (and teams) that should be applied to less mission-critical systems?
- How should Brown make software selection decisions?
    - How can the process become more transparent
    - What criteria should be used to make decisions?
    - Is there a better approach to prioritizing requirements among functional areas or users?
- What is the strategy for supporting reporting and data analytics?
- Should Brown make use of technologies familiar to students (e.g., Facebook) to engage them? (shared issue with learning technology) (I think this question to go to the learning group exclusively since the participants in this group are all administrators.)
- Is there a better model for supporting specialty/auxiliary applications (e.g., parking, dining)?
- When and in what areas does the University require 24x7x365 system support?

- When should Brown outsource an enterprise service (e.g., emergency notification, employment job site)? Are there any existing services that Brown should consider outsourcing in the next five years?

## Research Support Working Group:

This domain included technology and support services related to the conduct and dissemination of research. It encompassed areas such as simulations, remote instrumentation and computation.

### *Members*

Jan Hesthaven, Chair
***Professor of Applied Mathematics***
***Applied Mathematics***

Elli Mylonas
***Associate Director***
***CIS***

Jeff Hiris
***Systems Manager***
***Bio Med Gerontology Health***

Patrick Yott
***Co-leader, Integrated Technology Services***
***Univ Library - Digital Services***

Carolyn Denard
***Associate Dean of the College for Undergrad Teaching and Research***
***Dean of the College***

Ian Dell'antonio
***Associate Professor of Physics***
***Physics***

George Karniadakis
***Professor of Applied Mathematics***
***Applied Mathematics***

Mark Johnson
***Professor of Cognitive & Linguistic Sciences***
***Cognitive & Linguistic Sciences***

Marc Paramentier
***Professor of Geological Sciences***
***Geological Sciences***

William Curtin
***Elisha Benjamin Andrews Professor***
***Division of Engineering***

Mark Pitt
***Professor of Economics***
***Economics***

Benjamin Kimia
***Professor of Engineering***
***Engineering***

Julia Flanders
***Associate Director, Textbase Development, STG***
***CIS***

Constantine Gatsonis
***Professor of Medical Science***
***Bio Med Community Health***

Benjamin Raphael
***Assistant Professor***
***Computer Science and Center for Computational Biology***

## Research Support Framing Questions

- What is the standard set of technology and support services that should be available to all researchers at Brown?
- According to the VP for Research, Brown is targeting the following areas for growth. Do these areas have unique implications for technology and technology support?
    - Nanoscience
    - Proteomics and Genomics
    - Bioengineering
    - Energy and the Environment
    - Public Health
    - Simulation of Complex Systems
    - Population Studies/Demographics

- What level of access will Brown faculty require to high performance computing?
- How can technology best support external and internal research collaborations?
- How will teaching and research support tools inter-relate (shared questions with learning technology group)?
- What is Brown's strategy to store and curate digital content and knowledge bases? (shared issue with learning technology)
- What support can Brown technology specialists (inside and outside of CIS) provide to grant proposal efforts?
- In light of the academic enrichment plan and based on a critical assessment of existing services for learning (NEASC self-assessment deliverable), what should Brown's highest priorities for technology be in this area?
- What support should Brown technology specialists provide (either directly or through referral) to the use and teaching of specialized software?

## Teaching and Learning Technology Working Group:

This domain related to technology applied in support of learning. It included everything from classroom technology, learning management systems, support for distance learning as well as custom and commercial courseware.

### *Members*

Catherine Zabriskie, Chair
***Director, Academic Technical Services***
***CIS***

Sarah Bordac
***Instruction & Outreach Librarian***
***University Library - Gateway Services***

Andrew Ross
***Director***
***Language Resource Center***

Laura Hess
***Associate Director for the Humanities & Social Sciences***
***The Harriet W. Sheridan Center for Teaching & Learning***

Carolyn Denard
***Associate Dean of the College for Undergrad Teaching & Research***
***Dean of the College***

Kathy Takayama
***Associate Director (Life & Physical Sciences)***
***The Harriet W. Sheridan Center for Teaching & Learning***

Brook Moles
***Director, Registrar's Office Systems***
***Registrar's Office***

Tom Banchoff
***Professor of Mathematics***
***Mathematics***

Jean Rainwater
***Co-Leader, Integrated Technology Services***
***University Library***

Jan Tullis
***Professor of Geological Sciences***
***Geological Sciences***

Sheila Bonde
***Dean of the Graduate School,***
***Professor History of Art and Architecture,***
***Professor of Archaeology***
***History of Art and Architecture/Archaeology***

### Teaching and Learning Technology Framing Questions

- What new teaching/learning paradigms are emerging at Brown and how can technology best support them?
- Under what conditions does the best learning take place?
- How extensively will group/collaborative coursework be adopted and what implications does it hold for technology?
- How do we develop computing skills at the right level for students and faculty?
    - What expectations are consistent amongst new faculty that we can predict will be the norm in 3-5 years?
- What is the optimal method of organizing library specialists, learning technology specialists and departmental computing personnel to support faculty?
- How will teaching and research support tools inter-relate (shared with research technology group)?
- How could technology be used to enable members of the Brown community (including alumni) to access the academic resources of the University?
    - Should students have access to courses in which they aren't enrolled?
- What is Brown's strategy to store and curate digital content and knowledge bases? (with research technology)
- What is the smart classroom of the future?
- Should Brown make use of technologies familiar to students (e.g., Facebook) to engage them? (shared issue with enterprise applications)
- In light of the academic enrichment plan and based on a critical assessment of existing services for learning (NEASC self-assessment deliverable), what should Brown's highest priorities for technology be in this area?
- How could technology better support the advising process at Brown?
- What possible changes may be made to the curriculum with IT implications?
- What are the implications of Brown's aspirations of having a global presence- move toward internationalization?
- The PAE talks about attracting the best faculty and students- how do faculty make decisions about where they are going? If we could understand that process it might help in the process.
- How do faculty feel IT could advise the University's priorities as expressed in the Plan for Academic Enrichment

## Technical Directions Working Group:

This domain intended to set a vision for the desired technical architecture at Brown and identify what other standards (e.g. security) should be embedded in technology selection decisions. This group was also responsible for identifying the critical identity management strategies that Brown must implement.

***Members***

John Spadaro
***Director, IT Architecture & Outreach***
***CIS***

Linnea Wolfe
***Director, Administrative Technology***
***CIS***

John Dick
***Associate Director, Administrative Systems Services***
***CIS***

Bob Perreira
***Associate Director***
***CIS***

Paul Kelleher
***Director, Data Center***
***CIS***

Doug Wilkinson
***Manager, Network Technology***
***CIS***

Nancy Magers
***Manager, UNIX Systems***
***CIS***

Steve Carmody
***IT Architect***
***CIS***

Germano Silva
***Associate Director/Manager Web/Database Technologies Development - A & D Information Resources***

Tim Wells
***Director of Network Technology***
***CIS***

Mark Dieterich
***Systems Manager***
***Computer Science***

Don Rogers
***Systems Programmer/Manager***
***Psychology***

Jim Scheuerman
***Director of Engineering Computing***
***Engineering***

Sam Fulcomer
***Associate Director Center for Computation and Visualization***
***CCV***

Paul Koussa
***Director of Computing and Information Services***
***Population Studies & Training Center***

Chris Moore
***Lead Developer***
***CIS***

### Technical Directions Framing Questions

- What should be Brown's technology architecture direction?
    - What factors or criteria should influence our architecture (e.g., collaboration, mobility, continuity)
    - Should SOA or other standards be adopted?
    - How aggressively should Brown move to implement virtualization technologies?
    - What other standards (e.g., security) should be embedded in technology selection decisions?
    - What level of standardization should we seek to attain on the desktop?
    - What desktop operating systems should we be supporting in 5 years?
- What on-going process should Brown follow to review and evolve its architecture?
- What are the critical identity management strategies that Brown must implement?
- What should be the long-term strategy to provide data storage, file sharing and back-up?
- What should Brown's strategy be vis-a-vis open source?
    - When to adopt?
    - When to contribute?
- What standard databases and operating systems should Brown support? (shared with enterprise applications group)
- What additional plans and strategies should be implemented to provide for continuity of operations in the event of a disaster?
- In light of the academic enrichment plan, what should Brown's highest priorities for technology be in this area?
- In what areas is it important that we enable self-service rather than make people travel to offices?

## Support for Innovation Working Group:

This domain related to improving Brown's ability to support early adopters and experimenters with technology and encouragement of innovation. As part of this concept, the group faced the question of how Brown can more deliberately manage an 'idea life-cycle' from innovation to scaled production and retirement.

### Members

Michael Pickett - Chair
*Vice President/CIO*
*Computing and Information Services*

Kerri Hicks
*Research Programmer/Analyst*
*Computing and Information Services*

Stephanie Han
*Departmental Computer Coordinator/Editor*
*Applied Mathematics*

John Brougher
*Computer Education Specialist*
*Computing and Information Services*

Adam Chiodini
*Lead Systems Programmer*
*Computing and Information Services*

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### Support for Innovation Framing Questions

- How can Brown more deliberately manage an "idea life-cycle" from innovation to scaled production to retirement?
- How might Brown better leverage the skills of its IT staff which aren't necessarily employed in their job descriptions?
- How can Brown better support its early adopters and experimenters with technology (e.g., should there be a skunk works group or how do we do this with existing staff inside and outside CIS)?
- What additional steps should Brown take to seed innovation and/or capitalize on innovation that has already happened in departments?
- How can Brown's IT organizations get students and faculty increasingly involved in projects and pilots?

## Funding and Governance Working Group:

This domain related to the various IT governance bodies and what their specific charges should be. It also examined the processes related to planning and resource allocation to ensure that technology goals and investments are aligned.

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## Funding and Governance Framing Questions

- What is the optimal role and composition of the ITPRC, CAB and ITAC?
  - What are their roles and the scope of their responsibility
  - What projects and investments should it approve?
  - What criteria should be used to prioritize IT investment opportunities?
- Does there need to be an intermediate body established to prioritize IT projects too small for the ITPRC?
- What decisions, projects and priorities should be set by CIS? (Projects we're willing to fund on our own? Small projects?) What group in CIS should have this responsibility?
- What decisions and priorities should be decided by a larger group of IT leaders on campus, e.g. the strategic planning group?
- Should the Steering Committee (HR, Banner, Coeus, Finance) model be expanded outside of Administrative Computing? e.g. Network Upgrades? Academic Computing? In the existing model, Steering Committee recommendations inform ITPRC decisions.

- What is the appropriate governance relationship between CIS and decentralized IT staff? those with dotted line reporting relationships and those who do not. (overlap with Collaboratively Managing IT group)
- What should be the internal governance model for CIS?
- What's the role of the DCC Steering Committee? (overlap with Collaboratively Managing IT group)
- Does the University need a better mechanism to measure and manage its total technology investment (from all budgets)?
- Should planning and resource allocation processes be altered to ensure more alignment between technology goals and technology investments?
- What are the guiding principles around funding and what is provided for free and what should be considered in a charge-back model?
- Are there areas where Brown would benefit from the introduction of chargebacks for technology services?

# Appendix D: Contributors to the Report

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# Appendix E: Governance

| Governance Group | Primary Responsibilities |
|---|---|
| Information Technology Project Review Committee (ITPRC): University executive level membership | • Create strategic objectives for technology.<br>• Approve both one-time and recurring costs of projects as well as the on-going cost to sustain and renew the technology as part of the project approval process. ITPRC should allocate operating costs through the University Resource Committee. **NEW**<br>• Provide annual guidance to influence prioritization of smaller IT projects by CIS and other governance committees. **NEW**<br>• Monitor, with the CIO, the portfolio of activities and investments within CIS and direct any re-balancing as necessary to maintain alignment with institutional priorities. **NEW**<br>• Approve the adoption of standard practices that will pertain to all organizations on campus. **NEW**<br>• Direct the allocation of resources to support the operational implications of new technology. |
| Computing Advisory Board (CAB): Faculty Executive Committee Administrative Advisory Board comprised primarily of faculty with student and staff representation | • Advise the CIO as requested on major technology strategies and directions.<br>• Recommend revisions to the strategic plan on an annual basis.<br>• Provide feedback on changes to IT policies prior to their submission to the Cabinet for approval. |
| Domain Sub-committees **NEW**<br>• Research computing<br>• Instructional technology<br>• Foundational technologies and services | • Identify emerging needs for institution-wide services.<br>• Suggest pilot projects.<br>• Recommend projects to ITPRC for approval.<br>• Identify opportunities to better coordinate services and provide a forum for an on-going dialogue about the optimal division of responsibilities between central and departmental technology organizations.<br>• Vet standards and advise on technology adoption |

| Governance Group | Primary Responsibilities |
|---|---|
| | decisions (Foundational technology and services groups).<br>• Create a sense of community and a forum for communication among stakeholders in each domain. |
| Enterprise Applications Coordinating Group (members drawn from individual Enterprise Steering Committees) **NEW** | • Coordinate with CIS initiatives that will impact multiple enterprise systems and processes (e.g., upgrades).<br>• Recommend strategies to manage issues common to multiple enterprise applications (e.g., data management and the implications of new technology on functional staff skill sets).<br>• Recommend projects and priorities to the ITPRC that span individual enterprise application steering committees (e.g., reporting, identity management).<br>• Work with ITPRC to set priorities across enterprise administrative application domains (e.g., between academic systems and finance and human resource services). |
| Individual Enterprise Administrative Application Steering Committees<br>• Organized by clusters of related processes and services (e.g., student services, finance and HR services, academic support services)<br>• Exact number and composition to be determined | • Recommend large projects to ITPRC<br>• Prioritize requests for additional technologies and small projects<br>• Coordinate up with CIS the execution of maintenance projects with narrower impact (e.g., upgrade of a single module or system).<br>• Coordinate shared decisions within systems such as software configurations. |

# Appendix F: "Openness" at Brown

### "Openness" at Brown: Some Thoughts on the Effects of the Internet and Brown's Need to Respond - 08-14-08 - A Paper by Elliot Maxwell

The rise of the Internet and the increasing digitization of information, which contribute to, and are enhanced by, the ongoing tide of globalization, are changing every important institution in our lives. Higher education has not been immune to these changes. How are these forces likely to affect Brown in the future?

In the early days of the commercial Internet, many people praised its capacity for increasing access to information, likening its impact to the creation of a new version of the Great Library of Alexandria with an impossibly large collection. The Internet made new resources available to Brown and offered Brown the opportunity to share its own collections and intellectual capital.

Today, we have to come to think about the Internet differently. It still provides access to extraordinary amounts of information but it has now become the central vehicle for individual and group creativity and collaboration in the 21st century.

### OPENNESS AND THE INTERNET: SOME BACKGROUND AND DEFINITIONS

When I try to understand the impact of the Internet, it has helped me to think about how the Internet is facilitating greater "openness" in information, processes, and institutions. What do I mean by openness? First, openness is not binary. Information, processes and institutions are neither open nor closed. They can be placed on a continuum between being open and closed.

Their degree of openness can be assessed by looking at their "accessibility" and their "responsiveness." If an individual, for example, can obtain information without restrictions based on price, status, or access to a particular technology, that information is more open than if, for example, a subscription is required to obtain access or the information is only available using a particular software program. This is the accessibility aspect of openness---very similar to what is sometimes referred to as "transparency". But accessibility or transparency refer to only one aspect of openness. If an individual can make his or her own contribution to the information, and can use his or her unique insights and experience to modify, repurpose, and redistribute it, that information is more "responsive" and thus more open than if the information is "read only."

This increase in the "accessibility" and "responsiveness" of information, processes, and institutions resulting from the rise of the Internet (and the fact that a billion people are now connected to it) has led to new ways of thinking about, and created new possibilities for, higher education. Some of the possibilities, such as the opportunity to reach a student body numbered in the billions, as well as to allow those billions to respond, are breathtaking. But how has the potential for greater openness actually been affecting higher education?

## HOW IS HIGHER EDUCATION RESPONDING TO GREATER OPENNESS?

There are signs of change, although higher education is adapting much more slowly than other sectors that deal primarily in information such as finance or entertainment. We can see signs of greater openness in MIT's making freely available course materials on over 1,800 of its courses (with translations appearing in multiple languages), U.C. Berkeley's posting of video lectures on YouTube, and the video and audio streaming of lectures and colloquia by some universities to members of their on- and off-campus communities. It was greater openness at research institutions that underlay the worldwide collaboration that resulted in decoding the human genome with scientists posting research results immediately, accessible to anyone interested. On a more mundane level, greater openness can be seen in the social networking communities such as on Facebook that link undergraduates and alumni of an academic institution.

There are signs of increased openness at Brown as well. For example, Brown's own DecameronWeb http://www.brown.edu/Departments/Italian_Studies/dweb/dweb.shtml permits faculty, students, and even self-learners around the world to develop and share resources. Brown is creating new centers for collaboration across departmental lines and accepting new and innovative courses. The Library is working on posting e-dissertations and engineering syllabi; in a related area consideration is being given to a digital repository for research conducted at Brown. The CIO is incorporating greater openness in the IT strategic plan. The VP for International Activities is looking at opportunities to use greater openness to increase Brown's international presence.

This list is not exhaustive-- I am at a disadvantage as I'm not on campus. But my understanding is that there is no thorough, systematic, and comprehensive effort under the auspices of Brown's leadership to look at the opportunities and threats resulting from Internet related greater openness.

## WHAT MIGHT GREATER OPENNESS MEAN TO BROWN?

I believe that it is critical, as part of Brown's strategic planning (and due diligence), to understand how these technologies are likely to affect Brown. And there are other trends that I think increase the need for Brown to better understand the costs and benefits of greater openness.

The pool of potential applicants for which Brown competes is declining and its composition is changing. Most of today's potential applicants were "born digital," having grown up with the Internet, and in an environment rich in computing devices and connectivity, alive with multiple social networks

and virtual communities where the sharing of information and experiences is a commonplace. The number of baby boomer alumni who claim an interest in life-long learning is swelling. Knowledge continues to explode, fraying the boundaries between disciplines, while our capacities to aggregate, analyze, and reformulate data continue to grow. The distinctions between formal and informal education are eroding, as are the barriers between the university and its surrounding communities. Globalization increasingly requires that Brown view itself as part of a worldwide community---a community in which new and well capitalized competing institutions are emerging in the Middle East and Asia, hundreds of millions of young people still have little chance for a quality higher education, and self-directed learners turn hungrily to new sources for their own education.

Among the results of these trends is that Brown has great new opportunities, but it also faces increasing competition. Competing for the best faculty and students with institutions with five or ten times the per-student resources requires that Brown work smarter and be more innovative to stay in the very top tier. If possible, Brown should try to change the very nature of the competition to one in which it is advantaged. It should differentiate itself.

Brown has done that before. Because Brown embraced change in 1969 (and at many other decision points since then) it is now in an entirely different competitive position than it was in 1968. The Brown "brand" is now a major asset standing for a distinctive student centered education and allowing Brown to stand out among America's elite institutions.

I believe that embracing greater openness and collaboration offers Brown the best opportunity to renew and extend itself and to redefine the terms of the competition it faces, while at the same time allowing it to better serve its goals of promoting excellence in teaching and learning, creating and disseminating new knowledge, and serving the community. The new technologies facilitating openness are disruptive, and as Clayton Christensen has pointed out, even when they are recognized as valuable, they are not often embraced by institutions that consider themselves to be successful. Brown, with its recent history of successful innovation, and its adoption of a student-centered educational model, is better positioned than its principal competitors to examine the possibilities for openness and collaboration thoughtfully and to adopt them where beneficial. One could even say that increasing openness and collaboration are natural outgrowths of the path Brown has followed for the past 40 years.

I believe that greater openness is often the right thing to do. A more open university increases the dissemination of new learning and promotes innovation. Greater openness allows an institution to demonstrate its strengths, creating more opportunities for both faculty and students. Greater openness facilitates an institution's efforts to discover and remedy weaknesses in itself. It equips students and faculties with the collaborative skills necessary to succeed in an increasingly interdependent world. The list of positive aspects of openness for me goes on and on, even though I recognize that greater openness is not always good. We can get overwhelmed by the flood of information, we may be unable to evaluate information and its sources, privacy and security issues need to be addressed etc. The optimum amount of openness will always depend on the purpose to be accomplished and the context, but I am convinced that Brown should generally be moving in the direction of greater openness.

Brown should look carefully and thoroughly at the costs and benefits of providing greater openness in various aspects of university life. Where can Brown best use greater openness in accomplishing its multiple missions? Where might greater openness be valuable, and how, in teaching and learning, in research, and in service to the community? What are the pitfalls and how can they be avoided? Does Brown have the infrastructural capability -- from IT capability to rules governing tenure and the availability of research, to the culture of Brown's faculty/students/staff-- to increase openness? What would have to change?

I have listed below some issues that might be explored in thinking about openness and Brown. I have included some examples of greater openness at other institutions of higher education to suggest areas where Brown can learn from the experience of others. The list is suggestive, not exhaustive; in particular it doesn't reflect any rigorous effort with regard to costs and benefits.

### With respect to providing excellence in teaching and learning and in support of Brown's becoming a more global university:

- Should Brown make available online all or parts of its course materials such as provided by MIT http://ocw.mit.edu/OcwWeb/web/home/home/index.htm  and members of the OpenCourseWare Consortium .http://www.ocwconsortium.org/ ? Brown need not commit to making all of its course materials available but might seek to post materials from courses that are considered to be "world class."
- Are there are new curricular opportunities for Brown and Brown students due to the online availability of courses from comparable institutions? Just as Chris Anderson's "Long Tail" analysis showed that there are viable electronic markets for music and books that only a few people value, there may be curricular offerings that Brown does not presently offer that might be of great value to some of its students http://www.johnseelybrown.com/mindsonfire.pdf. . For example, Brown does not offer a polymer chemistry course; might Brown encourage a chemistry student and faculty member to use MIT's online polymer chemistry course materials for an independent study filling this gap?
- Should Brown's policy be that course syllabi be available online to all (or at least to Brown students, staff, and faculty) throughout the year? Should this continue to be left to individual faculty decisions which have resulted in far less openness? I believe that this is a debate which should take place now.
- Should Brown formally establish digital repositories (e-portfolios) for work done by students while they are at Brown? This greater openness might be extended so that students' e-portfolios would remain open to them to deposit their creative works even after they leave the university although this would raise issues of security etc. (Doing this might strengthen links between alumni and the university.)
- Is Brown adequately prepared for the digital expectations of its incoming students who blog and podcast, and continuously share? Is Brown supporting enough R&D in collaborative pedagogy and in using new technologies and devices for teaching and learning? Is it

budgeting enough to provide support for faculty (digital immigrants as opposed to their born-digital students) who might want to integrate new technologies in their courses?

- Should Brown do more to integrate formal and informal education (an issue raised in Harvard's recent report on general education http://www.fas.harvard.edu/~secfas/General_Education_Final_Report.pdf)?  Has Brown's planning incorporated a scenario for a future where the boundaries of the formal educational experience are far more permeable than they are today? Where 28 courses are not the norm? Where students spend far less time on campus in Providence?
- Should Brown's policies regarding course materials be re-examined to encourage the use of more open access materials, given the dramatic rise in the costs of textbooks and the lack of choices for students? Should Brown collaborate with other universities to encourage content providers to make their materials more readily available for use online; getting clearance for the use of copyrighted materials is now the greatest obstacle to posting course materials online.
- Is Brown doing enough to educate members of the Brown community about their rights and responsibilities under intellectual property law, including sharing of materials over peer-to-peer services? I have seen the notices about copyright that appear on the Brown network and I believe that Brown should make clear that is opposes unauthorized appropriation of the creative works of others. But Brown should also vigorously defend "fair use" rights and support balanced intellectual policies that recognize the importance of creativity but also the values of openness and sharing. (The recent Higher Education Act amendments reflect, I believe, a continuing and unfortunate movement away from such balanced policies and place additional burdens on universities.)
- Should Brown's Medical School be collaborating with the Hewlett and Clinton Foundations in providing open medical education materials to assist caregiver education in Africa and elsewhere?

**With respect to becoming a world class institution for the creation and sharing of knowledge and in support of Brown's becoming a global university:**

- Should Brown makes its faculty's research more available by requiring that an electronic copy of faculty research be deposited in an electronically searchable institutional repository such as the one being developed by the Brown library? The faculty of Arts and Sciences at Harvard has recently established such a policy rather than leaving to individual faculty all decisions about the availability of their research; individual faculty can still choose not to make their research results electronically available but the "meta-data" of the research will be available so that other researchers can learn of its existence and avoid duplicative work. Policies regarding research are of fundamental importance to the faculty but this is a topic which should be debated given the fundamental mission of the university to create and disseminate new knowledge.

- Should Brown encourage and support faculty publication in open access journals in order to provide more choices to researchers and to make their research more accessible globally? This could be accomplished with little expense by subsidizing publishing costs, encouraging researchers to add publishing costs to their research proposals, or exploring new subscription models being established by open access journals.
- Is Brown doing enough to educate its faculty about the rights that they retain when publishing their research in proprietary journals? In many cases faculty members are unaware of rights that they can retain to share their research freely even if they choose to publish in proprietary journals that limit access to their subscribers.
- Should Brown's tenure processes be reevaluated to foster collaborative authorship, open access publication, and rapid disclosure of research results such as in database science www.SciAm.com/science2point0? Young faculty, in particular, may be reluctant to freely and immediately share their research if they believe they must withhold it in order to have it published in prestigious proprietary journals in order to get tenure or achieve professional recognition. Recognition of online publication for tenure or hiring or funding decisions by Brown, other elite institutions, and research funders would help level the field.
- Should Brown seek to increase collaboration in faculty research at Brown and between Brown and other institutions, reducing the "winner take all" competition for faculty and research support? Brown traditionally has been relatively open to interdisciplinary collaboration; are there still barriers to collaboration at Brown? Are there or should there be increased incentives to collaborate within the institution and beyond it? Has Brown adequately explored opportunities for collaboration with foreign institutions?
- Should Brown engage more directly in the study of collaboration (among students and faculty at Brown and elsewhere) to learn what works and what doesn't? To embrace collaboration suggests the need to also study collaboration. Should Brown encourage the creation and/or use of new tools to allow faculty, staff and students to share ideas, problems, and solutions?
- Does Brown's medical school require the disclosure of outside support for research or consulting in order to allow detection of conflicts or perceived conflicts of interest?

**With respect to Brown's relationship to the expanding number of communities in which it participates:**

- Should events on the Brown calendar generally be available online to all or at least to members of the Brown community, including alumni? Some faculty talks are being podcast but that is just a start. It seems to have been a missed opportunity not to have a commencement cam streaming video for friends, family etc. Similarly the emeriti executive committee has recommended that the President's report and other parts of the Corporation open meeting be available to emeriti trustees via password protected streaming video just as it would be if they came to Providence for the Corporation meetings.
- Should Brown reevaluate its role in the lifelong learning of its alumni and others? Brown has, in the past, conducted alumni education programs but it might be time to re-evaluate this market as the number of boomer alumni and their interest in lifelong education increase.

- Will Brown take advantage of new technologies to play a different role in the Rhode Island community?
- What role should greater openness play in supporting the goals of Brown's internationalization initiative, and for addressing the lack of availability of higher education and the needs of self-directed learners around the world? Making courseware available and encouraging open access publications are easy examples of how to bring about greater openness, but a systematic examination of the connection between openness and internationalization is likely to produce many other examples.

**With respect to Brown's internal operations:**

- Will Brown expand its role in collaboratively developing, utilizing, and sharing open source software, including enterprise software, for academic institutions?
- Has Brown established a clear preference for open standards and interoperability in its IT and communications environment?
- Do enough Brown classrooms support new forms of teaching and learning?
- How is Brown incorporating the potential for online education in developing its space projections for the future?
- Will Brown encourage the role of students in developing or customizing software for use at Brown, as has recently happened with the Brown Banner project? Would a "prize" or some other form of recognition for best student contributions help encourage a greater participation? Are those offices within the administration that deal with outside groups, such as Admissions, involving students in evaluating Brown's online presence? Might a Brown Facebook-like application ( or a joint venture with Facebook) bring incoming students together more quickly?
- Is Brown's IT infrastructure capable of supporting high-performance computing, collaborative scientific research, and greater openness including new forms of teaching, learning, and research enabled by new technologies? What are the long term plans for evolving the infrastructure?
- Has Brown found the right balance in its intellectual property and technology transfer policies between encouraging innovation, patenting, and increased university licensing revenues versus encouraging the widespread dissemination of research, the promotion of competition through non-exclusive licensing, and the establishment of special provisions regarding technology transfer to developing nations? When was the last time these issues were examined? Have significant changes taken place, such as the rise of open access journals, that suggest a need to review the policies?
- Are internal documents such as financial reports routinely posted online to be available to Brown community members?
- Is Brown adequately monitoring online sites that are increasingly important to potential applicants, donors etc.? Coverage in the New York Times is important but Brown needs to know, and have a strategy for dealing with, what is happening on YouTube, Facebook and other sites.

- Should Brown collaborate with Google or Microsoft to provide personal health records for Brown students facilitating better healthcare treatment for these students at a point in their lives when they are just beginning to take responsibility for their own health? (This reflects greater openness by giving students more information about their health and by allowing caregivers to have access to more information and to electronically add results of tests to the records etc.)

## RECOMMENDATIONS

We will not know how, or whether, greater openness will affect higher education for many years. But I am convinced that there are major opportunities now available, and Brown cannot afford to ignore them. The opportunities---to provide greater access to information and to enable contributions from all the members of the Brown communities- are consistent with Brown's student centered philosophy. Seizing these opportunities would be consistent with Brown's history of embracing change and may allow Brown to strengthen its brand and gain an advantage in the competition for the best faculty and students. Greater openness can, I believe, improve the processes of teaching and learning and would certainly facilitate a greater global contribution by Brown.

I believe that Brown should embrace greater openness and collaboration, but I also realize that there is much about openness that is not well understood. I do not believe that Brown faces an immediate crisis but at the same time, other institutions are taking strides toward greater openness. While there are some openness initiatives at Brown that I applaud, Brown as an institution has no reason for self-satisfaction. There is no systematic examination of which I am aware about the costs and benefits of greater openness or even about how and whether the Internet will affect Brown's future.

There is a role for first movers, just as there is a role for fast followers and even cautious adopters. But there is no reason to ignore very serious trends, particularly by an institution that in the past has benefited from being hospitable to change. There is no reason to believe that fundamental and destabilizing changes will not occur, whatever Brown chooses to do or not do. And there is no reason to believe that it will take many decades before higher education feels the disruptive impact now being felt by other sectors.

The openness initiatives at Brown today only hint at what might be done if Brown embraced openness as an institution. What Brown does about openness depends on the leadership of the university. I would very much appreciate the chance to discuss these issues with any members of the administration or any of Brown's governing bodies or as part of a public dialog about openness.

One can't flip a switch and become "open". Institutions can, however, become more open. One way to begin would be to undertake a small number of initiatives/experiments that would allow Brown to better understand the costs and benefits of greater openness and collaboration and the willingness and ability of Brown's culture to become more open. A list of experiments/initiatives that could be undertaken relatively easily, yet with considerable impact, and which could draw from the experiences of other similar institutions might include:

- Review existing curricular offerings and identify a small number of world class offerings that would be made open in conjunction with the Open CourseWare Consortium with a preference for those not duplicative of existing open offerings.
- Require all Brown syllabi to be open online all the time to students and faculty.
- Establish a committee to make a recommendation as to whether Brown should require that all faculty research results be deposited in an open electronic Brown repository and, if so, under what conditions, as well as what steps Brown should take to ensure the preservation of materials created at Brown.
- Encourage all faculty research funding proposals to include funding for publication/dissemination/data sharing that would support publication in open access journals. Establish a small fund to support open access publication of Brown research deemed to be of greatest interest to developing countries.
- Establish a faculty committee to examine whether hiring, tenure, and funding decision processes inhibit collaboration, the development of database science, and the use of open access journals.
- Establish a faculty, staff, and student committee to study the potential for student e-portfolios.
- Charge the Emeriti Trustees, in conjunction with the relevant campus organizations, to undertake a survey of Emeriti and alumni interest in having access to streaming media feeds of campus-based activities.
- Continue the survey of incoming students' experiences and expectations in using digital media and devices. Publish the results and invite student suggestions for new teaching and learning applications. Establish a formal mechanism for student (and faculty) participation in open source software development for educational purposes. Given the increasing attention being paid to graduate students, find new ways to involve them in educating the faculty about new digital possibilities for teaching, learning, and research.
- Charge the CIO and the Vice-President for Research to report on the capabilities of Brown's IT infrastructure to support collaborative research and high performance computing with recommendations for the long term evolution of the infrastructure in light of the plan for academic enrichment and the increased potential for openness and collaboration.

Brown should begin a systematic effort involving different elements of the Brown community to look at the costs and benefits of increasing openness and collaboration at Brown. I would expect that such an effort, whatever the outcome, would be of significant value to the Brown community, animating the same interest and excitement that marked the curricular discussions at Brown 40 years ago.