

GLOBAL IT SUBCOMMITTEE SUMMARY REPORT

EXECUTIVE SUMMARY

The NYU Information Technology Task Force (ITTF) was charged with the development of an IT strategy to support NYU's new campus in Abu Dhabi and aspiration to become a Global Network University (GNU). A Request for Proposal (RFP) was issued for an international consultancy team to propose the blueprint for an IT infrastructure for NYU – Abu Dhabi (NYUAD) to support a first class liberal arts undergraduate program with select graduate, professional and research activities (all connected to NYU's essence as a research university) and provide the technological basis for the connection between NYU-New York (NYUNY) and NYUAD as a backbone for a global network university that deploys the full assets of NYU's campuses not only in New York and Abu Dhabi but also in NYU's study abroad sites in Africa, Asia, Europe and South America and future sites. A subcommittee was formed to oversee the process, and IBM was engaged as principal consultant, with Cisco as junior partner, to define a Global IT strategic plan for NYU and to provide an executable blueprint to create and support all required levels of services for the GNU.

This report summarizes the recommendations of the ITTF Global IT Subcommittee based on the preliminary information provided by IBM and Cisco. For each area of technological infrastructure and service, the subcommittee had requested the proposed level of investment that would be needed to (a) launch a fully operational NYUAD campus by 2010-2012, (b) lay the technical foundation for becoming a Global Network University, and (c) elevate the overall quality of the GNU. In making its recommendations, the subcommittee has proposed the level of programmatic recommendation and investment that would best meet our goal of establishing an IT plan for NYUAD and creating the necessary infrastructure to support a truly global academic curriculum and to achieve integrated, uniform academic and administrative systems of the highest quality across the whole University.

Now that IBM has completed the initial design work, the subcommittee has asked IBM to develop a blueprint to establish the NYUAD requirements and a Global IT strategic plan and timeline for implementation encompassing the following recommendations:

- A plan for a **Global Network Infrastructure** that will establish the network requirements for NYUAD and connect the majority of existing sites; has the bandwidth to expand over time, since our aspiration is to integrate the whole University for high-quality and uniform connectivity across the system, and includes an Identity Management system that spans IT applications and services and enables a single sign-on access to services, files, and shared data. This meshed network should provide the underpinning to achieve the desired connectedness for creating a truly global community.
- A plan for investment in **Classroom Technologies and Videoconferencing** infrastructure that will meet the academic curriculum and programmatic requirements and aspirations

for NYUAD as well as the GNU, with the capacity to upgrade additional classrooms across multiple sites in the near future as programs mature to require additional capacity.

- A plan for a **Digital Library** that includes enterprise Scholar's Portal software and services as an integrated entry point for academic content and materials critical to the programmatic requirements of NYUAD, as well as sufficient digital content caching servers and digital storage to meet the existing needs for the GNU and the anticipated increase in demand that these new applications will generate. The Global IT strategic plan should also provide a phased rollout plan for an Academic Collaboratory that makes available a wide range of interactive Internet tools, such as blogs, wikis, conference sites, social networking, shared archives, etc. to the GNU.
- A proposal for basic investments for **High-Performance Research Computing is viewed as a potential differentiator** for NYUAD and a way to expand the capacity of NYU. While it is clear that to be a top-tier research university a significant upgrade of all our computing resources would be necessary, decisions about that upgrade are beyond the scope of the Task Force's charge.
- A multi-pronged approach for investing in the **Academic and Administrative Applications** needed to launch NYUAD on schedule, and to phase in similar services at NYUNY and throughout the GNU. The goal is to have integrated, high-quality systems throughout the network for seamless, uniform access by all NYU students, faculty and staff. The core academic and administrative applications include: Student Information Systems, Human Resource Systems, Financial Systems, Administrative Reporting Services, Public Safety Applications, NYU Email & Calendar, Learning Management System, and the NYUHome Portal.

The subcommittee's recommendations fulfill the IT Task Force's charge of creating an implementable IT strategy to support NYU's goal to establish a new campus in Abu Dhabi by 2010 and aspiration to become a Global Network University. In order to create a truly global academic curriculum and research environment, NYUAD must be integrated into a technology framework of a similarly high quality across NYU. It is therefore important to invest not only in the technology infrastructure required to launch NYUAD as a state-of-the-art facility, but to understand what level of investment is required to elevate the overall quality of the GNU. The subcommittee's programmatic recommendations are intended to guide IBM as they develop the NYUAD and Global IT strategic plan and an executable blueprint for the future IT investments that NYU must make in order to fully engage as a world-class research university.

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I. INTRODUCTION

The Information Technology Task Force (ITTF) was created in April 2008 to validate current strategic plans and develop a plan for information technology that ensures the success of NYU's mission and goals in the coming decades. The Task Force, under the leadership of its chair, Dean Richard Revesz of the NYU School of Law, and two vice chairs, Pierre Hohenberg, Senior Vice Provost for Research, and Paul Horn, Distinguished Scientist in Residence at the Courant Institute and the Department of Physics, and Executive-in-Residence at the Stern School of Business, was given a three-fold charge. One of the three chief objectives is the development of an IT strategy to fulfill NYU's aspiration to become a Global Network University.

NYU Provost David McLaughlin has described the vision of the Global Network University as follows:

“The global nature of our world today demands transformations in all of its institutions, including its research universities. New York University envisions transforming itself into a **global network university**, anchored in New York City, but with nodes of the network throughout the world. These nodes consist of sites of distinctly different categories ranging from exchange programs with other universities, to short-term/summer programs, to NYU global sites for semester study abroad programs, to branch campuses that award NYU professional degrees, to complete regional campuses that provide (within the graduate study/research environment of a research university) a full liberal arts education at the undergraduate level. NYU students and faculty will have easy access to the entire network of the university, and through that mobility, will take full advantage of the network's multiple components.

“This mobility will provide additional exposure to other people, cultures, perspectives, and modes of research and knowledge acquisition; access to NYU for talented students and faculty around the world; additional access for NYU faculty and students to research source material; additional opportunities for interaction with international colleagues; and thus, opportunities to further improve the ability of NYU students and faculty to address the social and scholarly issues of our time—so many of which are global in nature. In the future, the faculty and students of New York University will be members *of the entire network* rather than any single site, location, or campus. New York University will not only be ‘in and of the city,’ but ‘in and of the world.’”

The Task Force was formed not only to create alignment with the IT planning that is already underway but to leverage the technology required to facilitate this larger vision laid out by Provost McLaughlin and NYU President John Sexton. Therefore, the Global IT strategic plan has to be designed to support the University's transformation into and its operation as a Global Network University.

II. SCOPE OF WORK

In order to develop a Global IT strategic plan, NYU engaged as a partner an international consultancy team with proven experience in the global higher-education sector to propose the design of an IT infrastructure and services that would support a first-class undergraduate liberal arts program with select graduate, professional and research activities. The consultancy team's task was to describe the technological framework for the network and services to connect NYU-New York (NYUNY) and NYU-Abu Dhabi (NYUAD), as well as the additional investment that would be required to expand that network and services to be the backbone for the envisioned global network university (GNU). This network and related services should strengthen NYU's campuses in New York and Abu Dhabi, while also connecting NYU's study abroad sites in Africa, Asia, Europe and South America. NYU's goal is to leverage the technological infrastructure needed to connect the NYUNY and NYUAD campuses in order to enable faculty, students, and staff to seamlessly move, communicate, and access the activities and assets of the NYU Network (libraries, lectures, performances, courses, and research) across all of NYU's locations. The technology framework must also be flexible enough to enable the development of any regional campus anywhere in the world in the future.

NYU asked the consultancy team to:

- create an executable blueprint for all required levels of services for NYUAD, NYUNY and any other international campus locations, and
- outline the advantages of a global network and services, and
- make recommendations for leveraging IT investment in the “backbone” connectivity between NYUNY and NYUAD in order to expand the benefits, where feasible, to NYU's other international study-abroad sites and international academic programs.

The blueprint should present a vision for deploying leading-edge, state-of-the-art systems and services in support of a first-class liberal arts and professional educational and research experience for students and faculty at NYU Abu Dhabi and throughout the NYU Network.

In sum, our goal is an IT strategy that describes how to fulfill the mission of the GNU by building the infrastructure to support a truly global academic curriculum and elevating the whole so that NYU has integrated, uniform academic and administrative systems of the highest quality. The Global IT strategic plan should recommend the tools to enable NYU to fully engage as a world-class research university.

III. PROCESS

In April, an RFP was issued by NYU to several vendors to provide a Strategic Information Technology Plan for the GNU. A subcommittee of the IT Task Force was then formed by Dean Richard Revesz to oversee the process. The members of the subcommittee were chosen to represent the academic and research goals of the University, our campus plans for Abu Dhabi and other study-abroad programs, the Library goals and ITS. The members include Ulrich Baer, Vice Provost for Globalization and Multi-Cultural Affairs; Pierre Hohenberg, Senior Vice Provost for Research (and ITTF vice chair); Paul Horn, Distinguished Scientist in Residence, Courant Institute and the Department of Physics, and Executive-in-Residence, Stern School of Business (and ITTF vice chair); Carol Mandel, Dean of Libraries; Marilyn McMillan, Associate Provost & CITO (ex officio); and Jeanne Smith, Senior Vice President, University International Strategies. The subcommittee is chaired by Dean Revesz, Dean of the NYU School of Law (and ITTF chair) and staffed by Tom Delaney, Associate Dean & CIO, the Law School; Ben Maddox, Director Client Services; and Libby Rohlfling, Executive Director, Office of the Dean, the Law School.

After vetting all the vendor proposals, IBM was engaged as principal consultant and Cisco as the junior partner to develop the Global IT strategic plan for NYU. The IBM-Cisco team conducted a kickoff session with leaders from ITS, Libraries, Public Safety, Study Abroad, and the Abu Dhabi Executive Team outlining their methodology and what technical information they need from NYU.

Through the summer, IBM and Cisco representatives met with numerous members of the University community to learn about the academic and administrative goals that would determine the requirements. They delivered a “first-look document” on June 26, which was followed by requests for additional inputs, interviews, and technical assessments. On July 10, IBM delivered two documents, an NYU Global Infrastructure Report and an NYU Global Technology Outlook, and made a presentation to the Global IT subcommittee.

This was followed by a two-week review period that resulted in further requests for information and more analysis of the detailed assumptions that IBM used in reaching the recommendations embedded in the Report and Outlook documents. On August 8, a working session was held with key GNU academic leaders to make decisions about priorities and to select the levels of service needed to fulfill GNU Academic and Programmatic requirements and aspirations.

After reaching a clear consensus among core GNU academic leaders for IT functional requirements that best meet the academic program expectations, the subcommittee then vetted the remaining components and shared the recommendations with the IT Task Force at a meeting on August 20. The feedback received from the Task Force was then incorporated into the report, and additional recommendations regarding the academic and administrative applications were vetted with various University stakeholders, including members of the Administrative Applications Steering Committee.

IV. FINDINGS

The following summarizes the recommendations of the ITTF Global IT Subcommittee based on the Global IT Strategic Planning Outlook and Infrastructure documents and additional information provided by IBM and Cisco. The consultants covered all of the areas described in the scope of work in the RFP, and proposed the level of service and infrastructure that would be needed to launch an operational NYUAD campus by 2010-2012; to lay the technical foundation for becoming a GNU; and to elevate the overall quality of the GNU.

The subcommittee's recommendations were organized into the following core areas:

- Global Network Infrastructure;
- Classroom Technologies & Videoconferencing;
- Digital Library;
- Research Computing; and
- Academic & Administrative Applications.

Each section below outlines the objectives that NYU hopes to achieve, summarizes IBM's proposals, and presents the subcommittee's recommendations to IBM as they complete the global IT strategic plan and blueprint.

A. Global Network Infrastructure

In the RFP, the engagement team was asked to define the requirements and opportunities to use wired and wireless networking technologies to deliver and share information – unfettered and securely – within the campuses, within countries, and with other NYU sites.

IBM proposed that we invest in an Enterprise Network Architecture to underpin the GNU to provide network connectivity to any NYU user at any of NYU’s global sites – in an “anytime, anywhere” model – in a consistent, reliable, scalable fashion. This network strategy encompasses a desired future set of services that must be provided in order to meet NYU’s vision of a GNU, which would require the following elements:

- a network capable of providing a consistent level of service across all of NYU’s global sites, irrespective of the location, to foster a consistent global-university user experience;
- a network system that is capable of providing highly available, resilient services to support NYU’s mission-critical needs and global application requirements;
- a greater range of connectivity options, flexible device support, extensive use of both a private wide area network (“WAN”) and the global Internet for access and collaboration;
- the flexibility to enable NYU to respond to changes in new service-level requirements in an agile manner and to position NYU to add new and as yet unknown classes of multimedia, voice, video, data applications, and products;
- a scalable network architecture that would support the addition of new academic sites and organizational requirements, industry trends, and future application requirements; and
- a proactive environment to eliminate or reduce network disruptions and outages.

To the extent that NYU currently offers network services to our global sites, it is through a “hub and spoke” model that relies on connecting back to the hub in New York to connect to NYU resources. While strong, independent nodes have been created in sites such as TischAsia, Florence, London and Prague, they have been developed on an incremental, as-needed basis, and not as part of a comprehensive network plan. IBM has suggested that we now invest in a “meshed” network model that would create a second hub at NYUAD, and further extend the NYU-Net network to create multiple paths to our global sites, creating a web-like matrix with built-in redundancies to reinforce safe, secure, and reliable access to NYU resources from all of our global locations. The development of the NYUAD campus provides us with a unique opportunity to design and implement a meshed network to connect all of our sites.

Subcommittee Recommendation:

Our goal is not only to build a strong connection between NYUAD and NYUNY; it is to leverage that infrastructure to support the GNU vision and allow all members of NYU to access the intellectual and educational resources of a major research enterprise, including an international community of faculty and students, a state-of-the-art library, research databases, and visual resources. The GNU envisions innovative and robust technology lodged in the hubs of NYUAD and NYUNY but providing ample channels for academic exchange and joint classroom experiences across the Network's sites on five continents. This infrastructure is a predicate for the creation of NYUAD as a research university with a fully integrated liberal arts and science college, and therefore the selection of a robust network that would facilitate this goal is an important foundational decision.

It is important that the network is designed to fully connect the majority of existing sites and has the ability to expand in bandwidth over time since our aspirations to integrate and elevate the whole University will require a strong, flexible network. Initially, the subcommittee thought that at least eight global sites would need to be included, but after receiving feedback from members of the ITTF at the August 20 meeting, it was decided that we ask IBM to design the network to include as many of our global sites as possible, with the capacity to integrate future sites and to handle the expanding traffic of advanced collaborative applications that will exist in the future.

After careful analysis, the subcommittee recommends that IBM proposes the meshed network architecture that would allow us to fully integrate the GNU for high-quality and uniform connectivity across the entire system, while allowing for future flexibility as we add new technological services. IBM's plan should include an Identity Management system that spans the IT applications and services to include more standardized business guidelines and practices for the entire NYU community. This would enable faster assignment of NetIDs and single sign-on to all portal-based services and seamless access to files and shared data.

B. Classroom Technologies and Videoconferencing

An essential component of the GNU is an emphasis on student exchange in course settings. The new program at NYUAD was designed to offer interactive international seminars involving students in Abu Dhabi and New York that encourage the exchange of ideas, draw on the wide range of perspectives of NYU's international student body, and tap the educational potential of the GNU. The use of electronic and video media can significantly expand and enhance the education of students by offering additional lectures, creating virtual joint-seminar rooms, and giving sustained access to visiting faculty who have returned to their home campuses.

Implementing the GNU curriculum will require a well-designed strategic videoconferencing solution, as well as a high-quality network infrastructure to support capacity and integration across global sites. In a number of classrooms, we will need to invest in state-of-the-art PC camera and audio systems as well as sophisticated academic exchange software that is capable of standardizing a framework for both one-on-one and group exchanges with faculty. We will also need to provide content to students and faculty across the GNU if we want to create an integrated academic community for the exchange of knowledge. This will entail a standardized management system to distribute the content through the network and to be able to access and present it in the classroom in the most efficient and effective way possible.

IBM has recommended that we create a system for class materials and presentation management that fully integrates with NYU Learning Management and Digital Library resources; allows easy access to that material from any room(s), location, or display device via the network; enables an easy user interface for the presenter; and provides an audiovisual system in each classroom that offers complete control of all equipment in the room. They suggest that we standardize on a standard user interface in the classroom, so that regardless of content or equipment in each learning environment, the system utilized by all professors, teachers, lecturers, and guests be the same at all sites.

To enrich teaching, learning, and collaboration across different global locations, classrooms should have a greater display area for enhanced interactivity. As a requirement for interactive learning through videoconferencing, IBM recommended that NYU enable a Videoconferencing Reference Architecture to provide content to students and faculty across the GNU.

They offered two possible solutions for Immersive Technology. The first is telepresence, which is customized to fit the learning space and integrates audio and video for natural conversation and collaboration and enhanced experience. Telepresence allows us to shape the learning experience to achieve a face-to-face feel. The second solution takes into consideration that videoconferencing is increasingly moving to High Definition (HD). While HD standards have not been set yet industry-wide, IBM recommends building in the flexibility to upgrade to HD industry standards in the future and avoid getting stuck in a proprietary system. This requires implementing the HD infrastructure now to ease that transition, which would allow more classrooms to be outfitted within the budget and facilitate transition to HD and software upgrades.

The recommended architecture will allow sites and individuals with a wide range of technology investment levels to collaborate on a level playing field. Thus, for example, a dozen students and a faculty member in New York could conduct a seminar with a dozen students and a teaching assistant in Abu Dhabi using an immersive telepresence system that comes as close as possible to allowing everybody to feel as though they are in the same room, or alternatively both groups could assemble in front of large high-definition screens. The proposed videoconferencing platform is flexible enough so that students in global locations without video facilities can join the same seminar over the Internet by using a simple piece of software and a connected camera/microphone.

Subcommittee Recommendation:

Collaboration, interactivity, and communication are essential to our academic mission, and specifically to the curriculum at NYUAD and other global sites. Because the creation of GNU curriculum necessitates high-quality teleconferencing capability and the requisite camera and audio systems to enable it, the subcommittee concluded that building a high-level infrastructure will pay off in the long run as we look to expand academic exchange across global sites to create a truly robust intellectual exchange among students and faculty. High-quality video access to faculty and classes will enlarge the number of courses on offer in NYUAD and at other global sites. Also, the subcommittee recommends expanding capacity to classrooms in NYUNY, acclimating faculty and students here to this new teaching environment and better integrating our programs in New York with our programs overseas.

The subcommittee therefore recommends that IBM proposes a videoconferencing and classroom technology infrastructure that not only meets the academic curriculum and programmatic requirements and aspirations of NYUAD, but also addresses the broader needs of the GNU. According to the academic leaders of the GNU who were consulted, there is already sufficient academic programming in the pipeline between NYUAD and other global sites to warrant a substantial investment in classroom technologies and videoconferencing infrastructure; therefore the subcommittee has asked IBM to propose a plan for rapidly upgrading to high-definition in the near future at multiple sites. This will directly result in an increase in the academic spectrum of programming available in NYUAD and the other NYU GNU sites.

C. Digital Library

It was important to consider what computer applications and Web-based services and tools would be needed to enable seamless anytime, anywhere use of rich digital content for teaching, learning, and intellectual exploration in a technical environment that facilitates – and encourages – collaboration, community, outstanding pedagogy, and brilliant scholarship. The following elements were outlined by the academic GNU leaders as essential for achieving the goals of the global network academic plan:

- a *very* large and rich library of multimedia digital content;
- the hardware and software to store, manage, and deliver that content;
- the secure, fast, high-bandwidth network to carry it;
- the interactive, integrated software applications for students and faculty to probe and use it; and
- a wealth of easy-to-use and highly sophisticated applications for teaching, collaboration, and scholarly communication that are smoothly interoperable with each other and with the digital content.

While the digital content is integral to NYU Libraries continuing collection development, the proposals from IBM are focused on the hardware and software needed to store, manage and deliver that content and the interactive, integrated software applications for students and faculty to use it. The proposed Enterprise Digital Library Architecture enables movement, management and integration of high volumes of digital library content from multiple sources into academic applications and users' devices. It includes high-density data storage media, content management software, and a network of servers that move content quickly and seamlessly to users across the global network. Although NYU has been building an infrastructure for Washington Square, a new generation of infrastructure will be needed for global expansion and increasing amounts of content.

The Digital Library will also need to seamlessly integrate the Scholar's Portal, which enables researchers to discover, use (e.g., organize, analyze, annotate, repurpose), and share (with e.g., collaborators, classmates, teaching partners) digital content with fluidity and functionality, as well as the "extensible" Learning Management System (LMS), a new generation of Blackboard for basic course management and communication functionality. The first phase of launching the Portal involves replacing the Libraries' online catalog with a powerful discovery tool that searches across databases and brings contemporary Internet search features to scholarly content. The next phase will link a wide range of tools for managing and sharing resources. While the first phase is currently underway, it is clear that this process will move very slowly and will not be fully developed by the time NYUAD launches unless additional resources are provided.

Another key element of the Digital Library is the proposed *Academic Collaboratory*, which leverages the wide range of interactive Internet tools already available, such as blogs, wikis, conference sites, social networking, shared archives, etc., by making them easy to access, and thus encouraging their use. The goal of the NYU collaboratory is to bring this interactive work style squarely and seamlessly into the mainstream of everyday academic work. NYU is currently adding services in small, slow increments, but to introduce the kind of high-quality

Digital Library environment that should be available to NYUAD on opening day – and that will encompass the entire GNU – will require an additional investment of resources.

Subcommittee Recommendation:

The creation of an enterprise-class integrated teaching/learning portal for library resources and research tools is important to NYU's mission of becoming a world-class research institute. The GNU Digital Library needs to support easy access to all NYU's licensed databases and academic resources and a set of collaborative tools for academic work. The system should enable multiple searches simultaneously with one single set of results that can then be meta-tagged by users for future access. The criticality of the Digital Library, Scholar's Portal, and integration with the Learning Management System is consistent with the subcommittee's recommendation to invest in an enterprise architecture system at a level that allows optimum searching and storage capacity.

One of NYU's goals is to achieve vigorous research collaboration among faculty, research staff, and students across NYU's multiple sites and with trusted academic partners across the globe. This will require highly capacious, fast and secure data storage, processing, and exchange systems, including robust redundancies. A sufficiently strong and flexible baseline capacity will be necessary from the outset, and access to a suite of tools for collaboration among faculty and scholars is important to achieving the GNU vision.

The subcommittee recommends that IBM include a plan for investment in enterprise Scholar's Portal software and services, as well as sufficient digital content caching servers and digital storage to meet the existing needs for the GNU and the anticipated increase in demand that these new applications will generate. IBM should also provide a phased rollout plan for an Academic Collaboratory for the full GNU. The Academic Collaboratory should be linked to the Digital Library, the Scholar's Portal, the LMS, and general NYU enterprise software for seamless integration into the NYU GNU environment.

D. Research Computing/High-Performance Computing

In keeping with NYU's aspiration to be a world-class research institute, IBM was asked to consider the requirements for meeting that goal in high-performance research computing, and specifically for building research computing facilities and data repository systems at NYUAD that could be used by NYU faculty, students, and staff throughout the GNU. NYU envisions a substantial research enterprise at NYUAD that will attract a critical mass of scholars and researchers at NYUAD and a flow of talent across the GNU.

IBM offered recommendations ranging from modest (satisfying independent research computing needs) to bold (creating a super-computing facility in Abu Dhabi of sufficient quality to attract the world's top scientists and researchers in various academic specialty areas). In IBM's assessment, NYU can enhance its position as a leading research university by adopting a computational platform that will draw the best talent and researchers in their respective fields to the GNU and greatly expand research capability and knowledge.

IBM proposed that we consider investing in a highly visible supercomputer to attract the best talent, resources and partners to take advantage of the potential gains in joint-research activities. This would allow NYU to expand its research and faculty pool of talent, and to use the research computing environment as an incentive for leading scholars to work in either New York or Abu Dhabi. This would provide some obvious advantages: in computational power, the attraction of industry partners, the interaction of top talent and resources, and enhanced reputation, while also serving as a powerful incentive to draw research and computational faculty and support staff to NYUAD and NYUNY. Although NYU would not offer the only computational platform of this scale in the Middle East, NYU's will be the only platform of this scale that could potentially link to a global community of tightly integrated researchers.

Subcommittee Recommendation:

The subcommittee appreciates that high-performance computing can be seen as a significant potential differentiator for NYUAD, and an important tool in recruiting leading research faculty from around the world, as well as a valuable draw for internal recruitment. Supercomputing capacity could generate important incentives and a sense of excitement for existing NYU faculty to teach at Global sites or participate in the Global Curriculum. The subcommittee concluded, however, that this decision goes beyond IT requirements and is beyond the purview of the Task Force. It is clear that it would require a significant upgrade of all our computing resources, but at this juncture, we are asking IBM to focus on a proposal for basic improvements to enhance our existing research computing capacity.

E. Administrative and Academic Applications

The most complex and costly area the subcommittee focused on was the academic, administrative, and business applications needed to run the GNU. With an emphasis on the goals of mobility, interactivity, and efficient administration across the GNU, the applications area includes the tools and resources that enable us to function as an integrated, uniform system across global sites. In considering what applications would be needed to open NYUAD with state-of-the-art services, it became clear that those applications should be integrated seamlessly into the larger University system if we want to achieve the goal of becoming a GNU. Rather than create new and separate systems that would not mesh with NYU's existing infrastructure, we wanted to explore the options for implementing high-quality, uniform applications for student registration, financial aid, human resources, and financial management that would be used at all NYU sites.

In order to achieve that goal, IBM has proposed that all key applications, whether globally or locally hosted, be integrated using an Enterprise Service Architecture that will provide a consistent software application architecture for all data and information gathering and sharing. An enterprise system is standards-based and flexible to support many mediums, and would integrate the GNU using Service-Oriented Architecture (SOA). This enterprise model is a series of web services combined with business logic that can be accessed and used repeatedly by the GNU to support specific student, faculty, and administrative processes.

The application environment will focus on locally based applications between NYUNY and NYUAD for consistent performance and availability. NYU application systems will be available locally as a guiding principle unless a specific business reason forbids it. For example, a PeopleSoft user in NYUNY would use the NY-based system and an NYUAD user would use an AD-based system, but both systems will use data replication across the high-performance meshed network to achieve optimum performance and to integrate data into the central systems in NYUNY.

Recasting NYUNY's suite of applications to work in a seamless global environment is not a trivial task, and key strategic decisions will need to be made regarding the sequencing and approach to building these networks. For example IBM recommended that NYU's immediate areas of focus be making improvements within the network and PeopleSoft Student Information Systems ("SIS") upgrades. The Student Information Systems encompass all of the business systems required to support the academic and human resource services that NYU will offer to our global community of faculty, researchers, students, and administrators. In addition to the traditional SIS functions of course management, transcripts, and bursar functions, SIS also encompasses housing, classroom reservation, course evaluation, and other functions that directly benefit our global citizens.

Subcommittee Recommendations:

In order to implement the vision of a GNU, it is important that the service applications that integrate students, staff, and faculty in NYUNY, NYUAD, and global sites throughout the network have uniform and high-quality access to services from registration to financial aid. Since

these administrative applications are also responsible for identity management, it is important that they are fully integrated to achieve the goal of enabling NYU users to move seamlessly across campuses and throughout the network. Using a single enterprise portal for accessing aggregated Web-based applications and services would meet these goals and enable simple sign-on capabilities. This technology would also bring us in line with leading technical trends in higher education, which is to implement a full-featured commercial portal.

The subcommittee recommends that IBM present a multipronged and phased approach that would enable us to open NYUAD on schedule as part of a coordinated plan to expand high-quality academic and administrative services to the entire GNU. This would also require a phased-in process for elevating the Learning Management Systems, Identity Management, and Student System for NYU as a whole. The Subcommittee expects the IBM blueprint document to elaborate on the specific phases and scope recommended for NYUAD and GNU academic and administrative application tools, including Student Information Systems, Human Resource Systems, Financial Systems, Administrative Reporting Services, Public Safety Applications, NYU Email & Calendar, Learning Management System, and the NYUHome Portal.

In addition to the foundational classroom technologies and academic applications identified in IBM's work, the subcommittee anticipates that specialized instructional applications and other IT tools will be required for innovative programming in specific areas of study. It is premature to enumerate these specialized IT needs, because the curriculum for NYUAD has not yet been fully developed. To accommodate this anticipated need, the subcommittee recommends that IBM include in its blueprint and financial model an ongoing funding mechanism for Instructional Technology Innovation to serve as a resource for the faculty to tap for acquiring and making available specialized instructional applications and tools, as the curriculum is developed and evolves.

CONCLUSION

The subcommittee has shared its recommendations with IBM in order to guide them in the development of the IT requirements for NYUAD, a global IT strategic plan, and an executable blueprint. In each of the areas we considered, we think it is essential to invest in a level of infrastructure and services that will be required to establish NYUAD and fulfill our aspiration of becoming a Global Network University, elevating the overall quality of NYU. The blueprint should provide an implementation plan for launching an operational NYUAD campus with leading-edge, state-of-the-art systems and services in 2010-2012, along with a phasing plan and estimated investment cost for the corresponding IT infrastructure and services needed to elevate the overall quality of the GNU. In order to create a truly global academic curriculum and fully enriched research campus at NYUAD, it must be embedded in a technology framework capable of supporting the whole at the same level of quality. The subcommittee has therefore asked for the recommended investments to establish the network requirements needed to launch NYUAD and to connect existing and future sites, and to phase in integrated, uniform academic and administrative systems of the highest quality.

The next step is for IBM to present a Global IT strategic plan that lays out the vision and a tactical plan for the technology infrastructure and services required for NYU to fully engage as a world-class research university, along with an executable blueprint for building and supporting the goals of the GNU into the future.