2007-2008 Year in Review

This section will review many of the accomplishments by Computing staff which impacted the entire campus during the past academic year. Overall the group had an extremely successful year, meeting many of the aggressive goals laid out in last year's report. The highlights of these accomplishments include:

Physical Space

- **The move to the Bloomberg Hall Extension.** In late-January of 2008, The Networking, Information Technology and Database & Integration Groups physically relocated their offices to the Bloomberg Hall Extension. By June 1st, the groups completed the relocation of their respective server rooms to the new Bloomberg Hall Server Room, also located in the extension. This entailed the relocation of over 100 servers and was completed with minimal disruption to the Institute community.

Organizational Structure, Personnel and External Resources

- **Decadal Review.** Computing prepared a comprehensive statistical report documenting the previous ten years, during which the IAS campus saw substantial growth in the use of Information Technology, as part of the Decadal Review process. In additional, all Computing staff members took part in group sessions to provide staff feedback into the process.

- **Telecommunication Support.** In March of 2008, the Institute partnered with a new vendor for supporting the campus phone system. Shared Technologies, who replaced Black Box Voice Services, was awarded the contract following a lengthy Request for Proposals process. The new contract provides significant benefits over the previous one, most notably the inclusion of 24x7 remote monitoring, and improved capability for disaster recovery.

Infrastructure

- **Connectivity to Internet2 and full Internet redundancy.** In February of 2008, the Networking Group established connectivity from the campus network to the Internet2 (I2) high-speed research network. Traffic from IAS to other I2 sites is now seamlessly routed over the high-speed network. Further, this additional link now provides the Institute with full Internet connection redundancy, with our network connected to the Internet through two discrete service providers, Sprint and NJEdge. The design of these connections ensures that should a failure occur on one of the links, the Institute does not lose connectivity to the Internet.

- **Campus Networking – Cisco Implementation Phase II.** The first phase of the Cisco implementation was completed in May 2008. The second phase began in June 2008, and will be completed by October 2008. At the time of this report, 10 of the 12 switches planned for Phase II have been installed. This includes all of the networking for Fuld Hall, Simonyi Hall, A Building, D Building and much of Bloomberg Hall, including the Extension. At the completion of Phase II, the entire academic campus will have been converted.

- **Anti-Spam efforts and the installation of Proofpoint Protection Server.** In October of 2007, the Networking Group deployed Proofpoint Protection Server (PPS) as a new tool in the
fight to protect users from receiving unsolicited emails, or Spam. The deployment of PPS centralized the identification and scoring of Spam messages, and provided improved tools for email administrators to track and manage incoming email. In September 2008, the second phase of the PPS project was implemented. This phase saw the quarantining of known Spam messages on the PPS appliance, rather than offering them for delivery to the Schools. Instead, each day users receive a digest containing a listing of their quarantined messages for their review.

**Enterprise Storage.** In a significant project, this year saw the implementation of a campus-wide enterprise data storage strategy. Working with our identified storage partner, Network Appliance, data storage devices in each school were installed or upgraded. In addition, a central storage depot offering over 60TB of disk space was added to the Bloomberg Hall Server Room, providing each of the schools the ability to replicate their storage devices automatically. This design provides many benefits. Among them, the schools now have online copies of their data which offers the fastest and most reliable recovery should there be a data loss or system failure on a primary device. Additionally, the new device provides a centralized point for tape backup, and simplifies the process for offsite tape storage. As a signal of the challenges that enterprise storage presents for many institutions, and the significance of the implementation described herein, Computing has been asked to present on this effort at the 2009 Educause Mid-Atlantic Regional Conference, in January 2009.

**Phone Switch Upgrade.** In August of 2008, the campus phone system underwent a major upgrade. The switch was upgraded from a Nortel Option 61c to a Nortel CS1000. On the software side, the system was upgraded to the latest release of the Nortel system code, v5.5. These upgrades, the first in over five years, were performed largely to ensure that the switch remains in a supportable condition, but do also provide new features for the campus which will be rolled out throughout the coming year. In addition, the Institute is now subscribed to the Nortel Software Subscription service which provides access to system updates in a more timely and cost-effective manner.

**Video Conferencing.** A portable video conferencing “codec” was created, allowing IAS faculty and members to take part in video conferences as necessary. Five successful conferences were conducted using the setup this year. With this infrastructure in place, the cost of videoconferencing is significantly reduced, as Schools no longer need to contract with outside vendors for service. This will continue to be an area of focus in the coming year.

### High Performance Computing

**SNS High Performance Computing Cluster.** Although final implementation has been delayed into October of this year, much work was done to facilitate the arrival of the new SNS Linux Cluster. A group of Computing staff, Faculty and Members worked to develop a specification, review proposals from several vendors, and award the bid. The group selected Dell Computer as the vendor, and the new cluster will possess 64 nodes, each containing dual quad-core AMD Opteron processors, with 16GB of RAM per node. The nodes will be interconnected using high speed Infiniband connections provided by Cisco. The cluster will also be connected via high-speed link to the enterprise storage system identified above.

**IBM Cluster decommissioned.** The IBM p655 computing cluster from the Simon’s Center for
Systems Biology was decommissioned in June, 2008. The six p655 nodes, no longer of use to IAS, were donated to the University of Georgia Research Computing Center where they are now part of a 38-node cluster installation.

World Wide Web, Campus Databases and Data Integration

- **People Database (P3).** Several ongoing campus-wide projects have benefited this year from the data and processes related to P3. The new campus ID cards, the establishment of a new emergency notification system, the “Facebook” publication and the Community of Scholars are some key examples where data from P3 has played a noteworthy role. In addition work has continued at a speedy pace on the P3 system itself. This year, historical databases from the School of Mathematics and School of Social Science were subsumed into P3 proper. Additionally, the full *Community of Scholars 1930-1980* publication has been loaded. On the process side, a new “wizard” connects the data from the Online Applications system to P3 for the Administrative Officers, and reduces down to zero the number of times IAS staff needs to manually input information into the system.

- **New Video Website.** In collaboration with the Public Affairs Office, an updated website has been designed to advertise and manage the presence of video content made available online by IAS. The new system, implemented using the Drupal content management system, greatly improves the look and feel of the old site, eliminates complication, improves searching and presents a user interface more in line with popular multimedia websites such as YouTube and Flickr. On the back-end, the site also streamlines the process for posting new videos.

Data Security, Business Continuity and Disaster Recovery

- **Network Security and Performance Upgrades.** Much focus this past year was on upgrading the network security and network performance tuning systems. New campus firewall servers were implemented in December, 2007. Following that, upgrades were performed on the Intrusion Prevention System and packet shaping devices which protect the Housing network. These upgrades eliminated a previously existing bandwidth bottleneck, allowing the Housing network to now have access to the local area network at full Gigabit speed.

- **Secure Certificates.** A new system was built, a collaboration of the Networking Group and the Database & Integration Group, which manages all requests on campus for secure certificates, the tools which provide for secure traffic between a server and a client. Additionally, a new agreement was reached with a certificate vendor, SSLDirect, offering IAS excellent pricing on commercially signed certificates. The availability of cost-effective, commercially signed certificates will help to reduce the confusion caused by web browser error messages triggered when they encounter a self-signed certificate, such as those previously used for internal websites.

School-Specific Projects

- **School of Natural Sciences.** In addition to the Cluster efforts described earlier, SNS Computing continued to upgrade their server infrastructure to provide 64-bit computing options to their members. In addition, the group completed an upgrade of their main tape backup
hardware so they can continue to manage the growth in data storage. As planned, computing support for SCSB was moved to the SNS Computing group, as SCSB moved into the Bloomberg Hall Extension. The partnership remains a work in progress, as the needs of the Biology group continue to evolve.

- **School of Mathematics.** The main focus for the Math Computing group this year was on the Simonyi Hall Server room. Equipment in the room was consolidated into 5 racks to make more efficient use of power and cooling resources. A new Uninterruptable Power Supply was installed to provide the appropriate amount emergency power to the server room in the event of a power failure. The group also installed a new Network Appliance storage device as part of the campus-wide enterprise storage project. Outside of Simonyi Hall Server room, many workstations throughout the campus were upgraded. The School’s website was converted to use the Drupal content management system, and their online video library was integrated into the IAS Video website, providing better organization and archiving.

- **Information Technology Group.** ITG undertook several large upgrades this year, including the replacement of workstations throughout the Schools of Historical Studies and Social Science, as well as the implementation of Windows Vista for their PC clients. This year marked the first time Macintosh desktops were offered as well. ITG Staff oversaw server upgrades being performed in the HS/SS Library and the telephone system, and implemented a new Network Appliance file server as part of the campus-wide enterprise storage initiative. ITG also continued to provide campus-wide IT training on many subjects, and resurrected their monthly newsletter which provides useful computing tips.

Although the section above does not list every project or accomplishment, it is clear from just those which are identified that tremendous progress was made this past year. This is a testimony to the commitment of the entire Computing staff who shouldered lengthy project lists, while in many cases having their offices relocated, and continuing to support users on a daily basis.

**2008-2009 Goals and Objectives**

Building on an extremely successful year for Computing at IAS, the new operating year will be no less busy. Upgrades are planned across a wide array of our systems and services. This section will outline many of these changes, and their intended impact on the Institute community.

**Organizational Structure, Personnel and External Resources**

Three planned changes in this area are of note.

- At the beginning of this academic year, Computing will now be responsible for campus-wide Audio/Visual (A/V) services. Dario Mastroianni, the campus’s A/V Technician, will continue in this role with support from the entire Computing staff. A full list of A/V projects planned for this year is discussed below.
As part of the Decadal Review process, the Institute will be conducting an external assessment of IT services provided on the campus. This engagement will be run similar to the visiting committees which surveyed the Schools during 2007, in which a team of respected academic peers is brought in to conduct interviews and collect information which is processed into a report. It is hoped that this report will be available in February 2009, and that the Institute’s response to that report will be available shortly thereafter. Nominations for the members of the visiting committee were provided through each school’s representative to the Faculty Committee on Information Technology.

A strategy will be developed this year to address the growing demands of regulatory compliance, specifically those regulations which pertain to electronic research data. This will be done as collaboration between the Business Office, and the Network Security office within the Networking Group.

**Infrastructure**

Infrastructure improvement remains a primary focus of Computing staff. This year, infrastructure upgrade projects include:

- **Cisco Systems Implementation – Phase III.** The third and final phase of the project to replace all of the campus networking devices with Cisco Systems gear will be completed. This phase will focus on the remaining Foundry Networks devices, which are located in non-academic buildings such as those on South Olden Lane.

- **Improved indoor cellular phone coverage.** Computing will be conducting a pilot project to improve the reception of cellular phone service within the academic buildings on campus. This will entail the installation of a distributed antenna system which will operate over existing fiber optic cabling in place around campus. Fuld Hall and Bloomberg Hall have been identified as the pilot buildings. Assuming the success of the pilot, coverage for additional buildings will be added.

- **Short-Term Academic Housing.** If construction plans continue on schedule, Computing will connect the new short-term academic housing complex to the campus network. This will ensure full wired and wireless coverage is available for guests once the complex is operational.

- **Secure Remote Access to campus computing resources.** Although some schools currently offer secure remote access through tools such as virtual private networking, no campus-wide standard exists. This will be remedied this year, and secure remote access to campus services will be available for all schools.

- **Princeton University Library Access.** IAS Computing staff members are working with PU Library computing staff to implement a new interface between the IAS network and the
electronic resources provided by the PU Library. The goal of the project is to simplify the current system, while making it more reliable and easier to maintain.

- **Web/Database Server Infrastructure.** New servers have been secured as part of a project to consolidate and update the servers used by the Database & Integration group to provide websites and applications to the campus. The new servers will add high availability to these critical functions, eliminate complexity from the current design, and take advantage of the available enterprise storage capabilities to ensure data protection and integrity.

- **Phone deskset replacement.** Continuing the process which began in 2007, over one third of the campus phones will be replaced this year with newer deskset devices. The new desksets offer improved functionality and are best positioned to make use of new features being implemented on the phone switch itself, such as an online campus dialing directory.

- **Cable plant upgrade planning.** With an eye towards FY10, the Networking Group will be conducting a survey of the campus data cable plant, and recommending those areas which require upgrading. These upgrades will be to ensure all desktop computers can connect via Gigabit speed; that all buildings are able to receive the cellular signal improvement described above; and to ensure that network redundancy is available in all locations.

**High Performance Computing**

The final implementation of the new Dell Linux Cluster within the School of Natural Sciences is expected to be available for use in late-October 2008. Additional features are also being evaluated for this year, including the installation of Graphical Processing Units on some nodes, and the addition of more high-speed storage.

**World Wide Web, Campus Databases and Data Integration**

- **Web Content Management Systems roll-out.** The Database & Integration group will be working this year to implement the Institute’s web pages in a new Content Management System, known as Drupal. Already in use on several smaller sites, and in some schools, Drupal has been identified as a campus standard for web content management, and will replace MidgardCMS. Drupal has been identified as superior to MidgardCMS in a number of important areas, including the ease of interaction for users, and in its ability to operate in a high-availability configuration. It is expected that this replacement will be a benefit to those sites currently managed under MidgardCMS, and simplify the transition for those sites not currently employing content management. Training will also be performed for those sites which are transitioned.

- **Community of Scholars.** Working with the Director’s Office, a plan has been established for creating an online version of the printed *A Community of Scholars* publication. This online community will provide a web-based portal for former members to remain connected to the
Institute, and with one another. By developing and offering former members a menu of services available through this system, we hope to engage them and through their continued participation ensure that our databases remain current and accurate. Proposed services currently include email forwarding, reference access to the IAS directory, access to IAS digital content and discussion groups.

- **Resource Scheduling.** Although originally intended to already be available, the group will aim this year to address a major issue by releasing a new system for reserving Institute meeting spaces, and associated services (such as facilities, audio/visual or catering.) Working with on-campus service providers, and administrative officers from each school, a new database-driven, web-based event calendar/room reservation system is being designed, which will include an engine to facilitate securing the appropriate campus services. The system aims to reduce the complexity in the current scheduling system, provide modern online public and private event calendars for the community, and ensure that any communications related to the scheduling and planning of an event are received as intended, documented and available to interested parties on demand. It is anticipated that the software will be rolled out in a phased approach, with the first phase taking place during the fall term, and offering a replacement for the existing system. The second phase, completed during the spring term, will offer the increased functionality.

- **P3 Database.** Development of the P3 database will continue to be a critical focus for the coming year. Projects currently slated include the import of remaining data from the Schools of Mathematics and Social Science, and the import of data from the School of Historical Studies. Additionally, a new system will be implemented for better categorizing the roles of individuals within the database. D&I staff will also continue working to integrate P3 into IAS business processes where applicable, as well as updating existing, and producing new training materials for the system. At the time of this writing, a “P3 Manual” was in the final stages of editing, and upon completion will be made available to all users of the database for their reference.

- **Online Applications.** An extension of the Online Application process is planned this year which would offer personalized “portlets” to each applicant. These secure drop-boxes would facilitate easy transfer of documents, photos and other electronic material between the Institute and future members.

**Data Security, Business Continuity and Disaster Recovery**

- **Server Load Balancing.** As the dependence on network services (such as email, web, or authentication services) grows, it becomes more important that these services be available to the community at all times. Although many of our services are run on multiple servers which provide redundancy, and as described earlier more will follow during this year, we do not currently have a failsafe way of ensuring an orderly transition of service should one of the redundant servers fail. This year, a new hardware load-balancing device will be installed by the Networking Group to ensure that the “failover” between the redundant servers happens seamlessly, and without loss of connectivity for our users. This is a critical component of a highly available architecture. This project had originally been slated for implementation this
past year, but was reprioritized to this year to be completed.

- **New Network Security Website.** The Networking Group will be rolling out an updated Network Security website as a resource for the IAS Community on IT security issues. The updated site will contain IAS policies, prudent notices and helpful tips for maintaining personal and organizational security online.

- **Cyber-Security Awareness Month.** Each year, October is recognized on many campuses as Cyber-Security Awareness Month. This year, the Institute will take part, providing a series of informational fliers and best practices to the Institute community during the month. In addition, a presentation on security awareness by Brian Epstein, the IAS Network Security Officer, will be offered as part of the Institute’s “Lunch and Learn” seminar series.

**Audio/Visual**

- **Lecture Recording/Classroom Capture.** A comprehensive approach will be developed this year to improve the capability of our A/V department to capture lectures and seminars taking place on the campus. As currently planned, A/V will be offering a multi-tiered approach to event recording, offering services from fully-managed recording to self-service video capture. The School of Mathematics has been selected as a pilot group for many of these techniques, and those which prove successful will be made available campus-wide.

- **Videoconferencing.** Building on the videoconferencing success of 2008, this year we will look to implement more permanent solutions for major conferencing spaces, such as the White/Levy Room. These installations will offer a more comprehensive solution for large meetings, and make the operation of the videoconferencing services easier to manage. To this end, we will conduct a series of product demonstrations and evaluate the results to find the best technology available which meets our current requirements.

- **Audio/Visual Infrastructure Improvements.** As part of the transition to Computing, we will be conducting a survey of A/V infrastructure needs and addressing them during this year. This includes our capabilities with respect to High-Definition video recording and playback, and improvements in audio quality in several spaces on campus.

**School-Specific Projects**

Though this report has mainly focused on projects with an Institute-wide scope, many exciting new initiatives are also taking place within the various schools. The highlights of these include:

- **SNS Computing.** In addition to the high performance cluster installation mentioned above, SNS Computing will also be upgrading their primary web and mail servers. They will do so utilizing the iSCSI networking standard to facilitate network storage of the user space files which will ease making these services redundant as well as bring them under the umbrella of
the enterprise storage infrastructure. Additionally, a project is underway to merge Windows and UNIX account management and authentication systems into a single entity. The MIT-developed Kerberos authentication system will be used for security; this will also pave the way for more secure file sharing from file servers to user desktops and other systems.

- **Mathematics Computing.** Work will continue this year on upgrading workstations throughout the school. In addition, a new blade server has been specified, and will be purchased and installed this year. As noted earlier, Mathematics has also been identified as the pilot school for many of the upcoming advancements in Audio/Visual services planned for this year.

- **Information Technology Group.** The main focus of the coming year will be on virtualization of secondary servers to reduce the number of physical servers housed in our server room. Virtualization will increase efficiency when upgrading processing power and building new services. ITG also plans to help schools and departments improve on how electronic documents are stored and managed. In the training area, ITG plans to record its in-house trainings for use as online training materials. Finally, ITG will continue with the plan to replace its current mail server with one that will reduce costs and increase flexibility.

**Conclusion**

The projects outlined in this report are strategic, targeted improvements to our infrastructure and service offerings designed to improve availability, simplify usage, increase efficiency and reduce costs. They are all being undertaken to ensure that we continue to meet our primary goal, that of providing excellent service to the Institute Community, for many years to come.
## Appendix A – Updated Decadal Review Metrics

### Decadal Review Operating Metrics

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### Decadal Review Metric Detail

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<td><strong>Computing Growth</strong></td>
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<tr>
<td>Number of desktop computers</td>
<td>109</td>
<td>131</td>
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<td>15</td>
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</tr>
<tr>
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