Computing Annual Report

2015-2016 Academic Year

October 20, 2015
Thank you for taking a few moments to review the work of the Computing group during this past year. The 2014-2015 academic year closes as another in which we achieved many of the strategic goals we identified, and made significant progress on the others. The IAS Computing team concludes the year having been effective in delivering the anticipated levels of support, and also in introducing new or improved services to best meet the evolving needs of our scholars and staff.

Focused on many familiar themes on which we have worked in previous academic years, this past year our efforts were again directed at issues such as business continuity and disaster recovery, as well as IT risk mitigation, infrastructure, data security and the Institute’s web presence.

The first section of the report will highlight projects in these areas, and others that we feel may be of interest to the Institute community at large. Following that, the next section will outline our goals for the current academic year, and the rationale for those projects which will receive the largest share of our efforts. As always, if you have questions or concerns that are not addressed in this report, we encourage you to share those with members of our team.

2014-2015 Year in Review

Organizational Structure, Personnel and External Resources

The most significant change to the group’s organizational structure took place in December, when the Audio/Visual team was both expanded and renamed “Media Technology Services.” This new name better articulates the current work of the group, whose focus now includes video recording and post-production, media streaming, videoconferencing and other presence technologies, and the administration of the Institute’s Broadcast Center for live TV uplinks, in addition to handling the media needs for academic events and meetings. As part of the group expansion:

- Dario Mastroianni was promoted to Senior Media Technician, with responsibility for planning and managing the growing demand for media technologies in our community. This was a well-deserved recognition of Dario’s many years of dedicated service and exceptional support to the Institute.

- Samuel Venanzi was hired as a Media Technician, beginning in January 2015. Sam’s focus will be on organizing and providing support for academic events. Prior to joining the Computing team, Sam held positions at The Authority Group and Temple University, as well as working as a freelance videographer and video editor.

Beyond these exciting changes in Media Technology Services, other organizational changes this year included:

- Christopher Peterson began working as a Junior Systems/Network Administrator in the Network Administration group in April. Christopher will be responsible for management of the Institute’s central server and network resources, and developing tools to monitor, automate and improve the efficiency and reliability of our network services and resources.

- Throughout the year, we have had the good fortune to have several other talented professionals
and students support our efforts. Nick Helmstetter, Ryan Roberts, Alex Schear, Tyler Sapp and Alex Pinto have also served as student interns for parts of this past year.

A large part of Computing’s ability to accommodate organizational changes, such as those described above, is due to our adoption and use of management tools, such as RT, our “ticket system”. The RT system itself underwent a significant upgrade this past May. Moving to the latest version has provided Computing with improved tools for supporting our users, identifying root causes to systematic problems, and building knowledge-bases and documentation for future use.

With respect to external resources, this past year Computing partnered with Windstream Communications to provide technical support and off-hours coverage for the campus telephone system. This function had previously been fulfilled by Shared Technologies. The shift in vendors was able to save the Institute money, while still providing improved coverage, access to more knowledgeable technicians and guidance in planning the strategic direction of our telecommunications infrastructure moving forward.

Data Security, Business Continuity and Disaster Recovery

- **Lights-Out Datacenter.** As expected, Computing collaborated with the Facilities Management team and a set of outside consultants to complete a needs assessment, identify appropriate space on campus, and develop a set of construction plans for the proposed Lights-out Datacenter. It is anticipated that by the end of fiscal year 2016, the space will be online, providing the campus with generator-powered network services. More about the future plans for this space will be discussed later in the report.

- **Email Gateway Upgrade.** A major upgrade was performed to the email gateway that sends and receives all email to and from the campus. The upgrade to the Proofpoint Protection Server allows for the use of all modern and cutting-edge anti-spam and anti-phishing technologies, as well as simplifying the email routing process. These changes result in a safer email environment, with improved performance, while offering Computing additional tools to proactively detect and diagnose problems before they impact users.

Infrastructure

- **Network Infrastructure Improvements.** As in most years, upgrades were again performed on the network hardware that supports the campus. The paramount concerns for this year’s work were redundancy and reliability for this critical service. Improvements were made to the logical topology of the network, reducing complexity and facilitating enhanced monitoring and management capabilities. Upgrades were also performed to increase the speed of the campus network backbone to 10Gbps, as well as to ensure all academic buildings are redundantly connected to the campus network core. Together, these changes have resulted in improved reliability and stability for the campus network.

- **Directory Services.** Significant work was done this year to improve the LDAP directory that underlies much of the campus authentication and authorization infrastructure. This service was moved to upgraded servers, and at the same time was consolidated to provide for optimal flexibility. In the process, five additional LDAP directories were eliminated, greatly reducing the complexity and management burden for administrators. These changes paved the way for
several projects that were completed this year, and many more scheduled for the coming year. The completed projects include:

- **Authenticated SMTP Server.** A new, centralized authenticated SMTP server has been rolled out for the campus. This new system replaces similar services offered previously by each school. The new server provides for a common policy across all users, and simplifies the configuration of end-user devices.

- **Central Authentication System (CAS) Implementation.** Focusing on web applications, the D&I team, the Network group and ITG collaborated to roll out a new CAS authentication service. This service provides for single sign-on access across websites, as well as serving as the underlying technology that supports many other campus authentication requests, such as the eduroam and IAS-Scholar networks.

- **Other Infrastructure Improvements.** Several additional infrastructure projects were completed in this past year. These include:
  
  - **Simonyi Hall Cabling.** The network cabling in Simonyi Hall received an extensive overhaul. The improvements bring the building cable plant up to modern specifications capable of sustaining the 1Gbps throughput of our current office computer systems. Similar projects are planned in the coming years for Fuld Hall and West Building.
  
  - **Member Housing Switch Replacement.** The refresh of network hardware in many areas of Member Housing was completed. At the completion of this effort, all member housing apartments are now connected to campus at 1Gbps speed, and have broad access to the campus Wifi networks.

  - **Investment Office Networking.** Networking for the remote location of the Institute’s Investment office was designed and rolled out. This design includes site-to-site VPN access and telepresence for intra-office communication. It also serves as a pilot for VoIP-based phones.

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**World Wide Web, Campus Databases and Data Integration (D&I)**

- **Enterprise Resource Planning (ERP).** The complete overhaul of the Institute’s administrative and financial computer systems was executed as anticipated this year. This was a significant project, involving a collaboration between the Comptroller’s Office, Human Resources, Administrative Services and Computing. The effort was completed on schedule and on budget, and met all operational milestones and key deliverables.

  Foremost among those goals was mitigating identified risks and improving the business continuity for these critical systems. The move to cloud-based systems has greatly reduced the potential impact of environmental threats. The move to a modern, documented platform has improved access to trained support resources, eliminating supportability risks inherent in the old system. Lastly, the move to open platforms has importantly enhanced our ability to integrate our core systems with other campus information systems, reducing redundancy and lessening
the likelihood that data errors are introduced.

Beyond continuity, the work completed this past year provides for several improvements for staff as well. These include:

- **Employee Self-Service for Human Resources.** In a first for the Institute, much of the Human Resources workflow has now been moved online. The chief tool for this is Employee Self-Service. This system allows employees to manage their information, see paystubs and PTO balances, and request benefit changes during open enrollment periods.

- **Improved Recruiting and Onboarding Tools.** In addition to Employee Self-Service, the new HR systems also provides tools for online recruitment and employee onboarding. These capabilities modernize our employee recruitment processes and simplify interactions with successful candidates as they join the staff.

- **Electronic Timecards for Administrative Staff.** Another new feature of the system is the introduction of electronic timecards for administrative staff. The new system provides time tracking and real-time PTO balances.

Details of the continuing work planned for these new systems in the coming year will be covered later in this report.

- **Institute Website Redesign.** As part of a partnership with the Office of Communications and Bluecadet (the web design firm selected for this project), the D&I team has been actively working to redesign the Institute’s website. This work has included defining audiences, specifying needed functionality, and developing back-end systems and data integrations to best support these new functions. Still a work in progress, the new site is expected to roll out in the first part of 2016.

- **Online Application Enhancements.** A series of software and user interface enhancements were made to the online application for membership at IAS. These changes were aimed at improving the experience for applicants, providing them with detailed, contextual help throughout the process, as well as streamlining the look and feel of the site using a modern application framework.

- **‘Continuous Integration’ and other Process Improvements.** Aimed at improving the quality of their software, and increasing the development speed, the D&I team has adopted the Continuous Integration methodology for their work. This involves the combination of automated code testing and frequent deployment of improved code to accomplish these goals. In addition, this past year, the group has improved code test coverage and adopted new frameworks for their software development efforts. Taken as a whole, these process improvements make the Institute’s custom software more maintainable, more reliable, more secure and more portable.

- **Open Source Projects.** As heavy consumers of Open Source products and technologies, IAS Computing feels it is important to give back to the Open Source community as well. This has been done in several ways. Through our financial support for key projects, such as Drupal; our participation in hosting and sponsoring local open-source related events and trainings; and our contribution of useful code to the open source community at large. Our Open Source projects
High Performance Computing (HPC)

High Performance Computing remains an important and growing part of Computing’s service catalog. After the successful installation of the 3rd generation Linux cluster and a high-performance parallel file system, the HPC environment saw consistently heavy usage throughout this past year. The performance of the system has also been as anticipated, with the parallel file system measuring sustained data reads at 5GB/s, and sustained data writes at 4GB/s.

Media Technology Services (MTS)

- **White/Levy Room Upgrade.** Among the first projects for the reconfigured MTS team was to tackle upgrading the audio and visual components in the White/Levy Room. Completely re-envisioned, the new setup includes a high-definition projector that is mounted to the room’s front piece (no longer on the table); a state-of-the-art video distribution and switching system that allows for multiple inputs to be projected using the under-table mounted input ports; a new high-definition projection screen and whiteboard, which also has magnetic capability; integration with the videoconferencing endpoint in the room; and built-in audio amplification.

- **Expanded Videoconferencing Services.** Building on last year’s expansion of room-based, enterprise video endpoints, this year MTS was also focused on desktop video. To satisfy this growing need, the group has deployed a Vidyo portal. Vidyo provides users a Skype-like interface for their device, while also providing a high-quality interface with our room-based systems.

- **Assisted Listening Systems.** Wolfensohn Hall and the Dilworth Room have both been outfitted with assisted listening systems. These systems provide for personal audio amplification through the use of a small receiver that can be requested by audience members in these spaces. Please see the MTS staff member supporting an event in these rooms for more information or to request a receiver.

School-Specific Projects

- **Information Technology Group.** The ITG team completed another busy year of workstation and server refreshes. In addition, the group successfully upgraded their email platform to the latest version of the Zimbra collaboration suite, and rolled out the new Remote App service for remote access to licensed software packages. The group also remained extremely active in their support for applications in use within Dining Services, Administrative Services and the Comptroller’s Office.

- **School of Natural Sciences.** SNS Computing completed planned upgrades to OS X Yosemite and Springdale Linux v7. The group also expanded the number of computational servers available to their scholars, including expanded access to the high performance parallel file system. The team also made significant contributions to the management of the enterprise storage and virtualization environments, as well as to the directory services initiatives described above.

- **School of Mathematics.** Math Computing also completed another round of server and workstation upgrades this past year. In addition, the team has been working toward completing
an expansion of their data storage environment, and expanded the availability of “loaner” equipment for members of their school. Math Computing staff made significant contributions to the Directory Services initiatives, as well as several other projects already described above. In addition, they continued to provide guidance, support and coverage for Media Technology Services when needed.

Although it is by no means an exhaustive account of all projects completed, the above list represents the important areas on which the Computing staff focused the majority of their project-based efforts in the past year. As in all years, our paramount objective is to support the IT needs scholars and staff of the Institute. We feel the projects identified above, and their strategic focus on improved operational efficiency and manageability, directly increase our ability to provide the necessary resources to meet this over-arching goal.

2015-2016 Goals and Objectives

For the 2015-2016 academic year, Computing will again be dedicated to maintaining and evolving the services that we offer to our scholars to ensure they continue to meet changing needs. As always, we foresee projects related to infrastructure expansion and transformation, focusing on continuing the adaptation to a fully “bring your own device” capable campus. We will continue to be engaged in large-scale projects, namely the ERP software implementation, the Institute website redesign process and bringing the Lights-out Datacenter online. In addition, great focus will continue on critical areas including business continuity, reliability and manageability. All of these projects and others are described in greater detail in the following section.

Infrastructure

- “Last-Mile” Fiber and Improved Internet Connection Redundancy. Working with our Internet provider NJEDge, this year we will be replacing the older of our two campus Internet connections. The new connection will provide a second fully fiber optic connectivity path to the campus, growing the total bandwidth capacity between IAS and NJEDge to 500Mb/s. This new connection, provisioned by Lightower, will link the Lights-Out Datacenter here on our campus to the NJEDge datacenter in Philadelphia.

- Enterprise Storage and Secure Backup. A major upgrade is planned for the Institute’s enterprise storage system, which provides disk space to all Computing-managed file servers and databases. The upgraded system will provide close to 1 petabyte of storage for Institute scholars and staff, while delivering a dramatic improvement in performance for most users as well. As part of this effort, Computing will also be re-engineering our data backup process. Without altering any of our existing data retention policies or practices, through this upgrade we expect to expand self-service access to data recovery tools and improve the flexibility and security of our offsite data storage. The latter of these goals will be achieved by utilizing a new cloud-based, encrypted backup engine.

- Princeton University Library Gateway Improvements. To address the evolving
requirements for providing IAS scholars with access to electronic library resources through Princeton University, this year Computing will be improving the PULibGateway system that has been in use for the past several years. The change entails shifting from the network-based WCCP protocol to client-based WPAD protocol, as a means of directing traffic toward the appropriate path for accessing the requested resource. This change reduces the number of situations that will require use of the VPN for gaining access, and provides for more extensible and configurable management by Computing and Library staff.

- **Upgrade to Campus-wide Virtual Private Network (VPN).** As part of the ongoing equipment life-cycle process, this year Computing will be investigating a replacement for the current campus VPN server. The upgrade will aim to address the known limitations in the current service, including client stability and mobile device compatibility.

- **Upgrades to Campus Cable Plant.** As noted earlier, this past year an upgrade was completed on the cable plant in Simonyi Hall. Similar upgrades are being planned for this coming summer for both Fuld Hall and West Building. More detailed communication on these projects will be provided to affected users as the time approaches.

- **Telephone System Upgrade.** In order to remain in a secure and supported configuration, this coming year the IAS telecommunications team and Windstream, our telecommunication support partner, will upgrade the campus phone system to the latest software revisions. Once again, further details will be provided on the specifics of this project as they are finalized. More broadly, this upgrade will position the campus phone system in a stable, supported configuration for at least the next three to four years. During that time, a strategic plan for the future of campus telephony will be developed.

**High Performance Computing**

- **Parallel File System Software Upgrade.** This year, SNS Computing staff will be upgrading the high-performance parallel file system to the latest version of its operating system.

- **HPC Consortium.** In addition to maintaining our on-premises installation, we will also be evaluating our continued participation in an HPC consortium with Princeton University and Princeton Plasma Physics Laboratory, among others. As is always the case, we seek through these arrangements to provide access to HPC resources beyond the capability of our on-campus resources.

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

- **Enterprise Resource Planning System Implementation.** In continuing the implementation of Netsuite and Ascentis, goals for this year include:
  - **Open-Enrollment via Employee Self-Service.** This November’s open enrollment window for benefits changes is, for the first time, being conducted online via the
Employee Self-Service portal.

- **Electronic Time Tracking for All Staff.** Following the administrative staff, this year the remainder of the Institute staff will be moving to the NovaTime electronic time tracking system that is integrated with Ascentis.

- **Greater Access to Reports for Managers.** Another goal for this coming year is to improve access to regular and ad-hoc financial reports for budget managers.

**IAS Website Redesign.** It is anticipated that early in calendar year 2016, the Institute’s newly redesigned website will be released. The new design will prominently feature high-quality academic content, improved usability and searching tools, and a modernized look and feel. As part of this project, several other steps will be taken as well. These include:

- **Video Hosting Moved to YouTube.** To better facilitate the use of video on the new site, IAS will be moving the storage of its video library to YouTube. This move will improve device compatibility and playback performance for video viewers. In this new setup, videos will still be primarily accessed through links on the new Institute website.

- **Improvements to UpdateMe Tool.** UpdateMe, the Institute’s online information collection tool, will be expanded to collect additional sets of information. These include data for the Community of Scholars section of the website, as well as new details about email forwarding and campus network access.

- **New Online Directory.** As part of the site roll-out, the Databases and Integration team will also be publishing an enhancement to the online directory. This tool provides improving searching and integrated photos.

**Email Forwarding for AMIAS Members.** Fulfilling a request by the AMIAS Board of Trustees, this year Computing will be rolling out a new email forwarding service for members of AMIAS. Through the UpdateMe tool, AMIAS members will be able to arrange for an email identity “@amias.ias.edu”, which will forward email to their registered address in perpetuity.

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

- **Lights-out Datacenter (LODC).** Following the completion of last year’s planning process, this year Computing will aim to bring the LODC online. This space will provide generator-powered datacenter space for critical network services, with the aim of being able to continue providing service to the campus even if the Bloomberg Hall C4 datacenter is offline. Current plans call for hosting a campus Internet connection, all critical network services, authentication systems and wireless network controllers. Computing will also be assessing plans for moving additional critical services into the space (e.g. email), as well evaluating the role of all of our business continuity assets, including the co-location facility at Montclair State University.
• **Cloud-based Website Hosting.** In concert with the roll-out of the new Institute website, and the previously discussed move to YouTube for video hosting, Computing is also evaluating options for moving the hosting of the Institute’s websites to a cloud-based hosting provider. This move would greatly improve the continuity of the sites, and also improve access times for global users of our online content.

• **Protection Against Distributed Denial of Service Attacks.** Working once again with NJEDge, this year Network Administration staff will be developing tools and techniques for mitigating the potential impact and disruptions caused by distributed denial-of-service attacks from the Internet. Attacks of this nature attempt to overwhelm the available resources of network servers, as a means of denying service to legitimate users of those services.

• **Pilot Implementation of Two-Factor Authentication (2FA).** Also this year, a team of Computing staff will be evaluating ways that IAS can begin to embrace two-factor authentication within our environment. 2FA technologies improve security over traditional password-based access controls, by basing the authorization for access not just on knowing a password, but also being able to provide an additional means of identification.

**Media Technology Services**

• **Expansion of Videoconferencing Services.** Videoconferencing continues to be an extremely high-demand service on campus. In recognition of this, MTS will continue to identify new locations that can be equipped for this service, as well as update existing endpoints. They will also be continuing the deployment and rollout of the Vidyo desktop videoconferencing portal.

• **Audio Improvements for Wolfensohn Hall and Simons Hall.** MTS staff will also be working to improve the audio systems in key campus spaces this year, namely in Wolfensohn and Simons Halls. These improvements will include expanding the number of microphones available, as well as improving amplification.

• **Large-Scale Campus Events.** Continuing the trend begun in recent years, MTS will be providing diverse media technology support for large-scale campus events, including November’s “GR@100” event, and other multi-day workshops. Typical services for these events include video recording, online streaming, digital projection, digital signage and more.

**School-Specific Projects**

• **Information Technology Group.** In addition to the standard cycle of refreshing workstation and server systems, this year ITG will also be leading the efforts within Computing to expand the training curriculum that we offer to the IAS community. In addition, ITG will be taking the lead on developing new methods for supporting scholars working in the emerging field of Digital Humanities.

• **School of Natural Science.** In the coming months, SNS Computing will be focused on several
equipment upgrade projects. In addition, they will be moving to supporting Windows 10 and OS X El Capitan for members. SNS Computing staff will also be playing key roles in the LODC, enterprise storage and high-performance computing projects described above.

- **School of Mathematics.** During the year ahead, Math Computing will be rolling out a new Terminal Services service for remote access, as well as taking the lead in evaluating virtual desktop technology for the campus. They will also be investigating the expanded use of “smartboard” technology in academic settings.

**Conclusion**

The projects identified above are not a complete listing of all work that will take place, but rather an attempt to highlight the most meaningful areas on which we will be focused in the coming months. Thank you again for spending a few moments to familiarize yourself with the past activity and upcoming projects in Computing. Great care and effort goes into the planning process by which we develop these projects and plans, and into prioritizing them accordingly. Nonetheless, if there are any areas that you feel should also receive attention that were not addressed by this listing, please reach out to a member of the Computing staff, and we will work with you to incorporate your needs into this roadmap.