2012-2013 Year in Review

The 2012-2013 academic year closes as another in the recent string of productive years for Computing. It was a year in which we have been successful at meeting the majority of our project goals, aimed at improving and expanding the services we offer, at the same time as we have continued to deliver the anticipated levels of support to our scholars and staff. It was, unlike previous years, however, in many other ways. Much of the year was spent addressing the cascading effect of recent staff promotions and the need to back-fill their vacant positions. In addition, in late-October and early-November, the campus was forced to deal with the significant impact of Hurricane Sandy, which left the Institute without power for almost five days, and subsequently re-focused the priorities of Computing and other administrative entities in its aftermath.

Although Computing has long been focused on business continuity and service availability, this past January and February, a number of new continuity initiatives were introduced to ensure that events which compromise the campus power and cooling systems, weather-related or otherwise, no longer have the dramatic effect of shutting down IT service entirely. As a result of this effort, we emerge at the beginning of the 2013-2014 academic year with more robust and reliable services, and a strengthened focus on ensuring that critical IT functions are available when needed. The specifics of these improvements will be outlined below.

In addition to staffing and continuity, dozens of other projects were completed or moved forward by the Computing team this past year. The highlights of this work, and the impact they have on the academic and administrative environment here at IAS, is further outlined in this section of the report.

Organizational Structure, Personnel and External Resources

As noted above, the shape of the Computing team began to change dramatically with a series of promotions in 2012. This movement continued into 2013, and much of the year was spent recruiting new staff, and integrating them into our environment. Since last year’s annual report, the following staffing changes were completed:

- Kevin Kelly was named the Computer Manager for the School of Mathematics beginning on January 1, 2013. Prior to this promotion, Kevin served for over a decade in the Information Technology Group (ITG), supporting scholars in Historical Studies and Social Science, as well as the Director’s Office and others. In his new role, Kevin will serve as a senior technology leader on the campus, overseeing all aspects of IT for the School of Mathematics, as well as representing the school on the Strategic Planning Committee for Computing.

- Theresa Arzadon-Labajo was promoted to Senior System Administrator, also within the School of Mathematics, on January 1, 2013. Theresa has served in the School of Mathematics since 2002, and her promotion was in recognition of her many years of dedicated service to the school, as well as her role as a senior technologist within Computing. In addition to this, Theresa also assumed the leadership role in the ongoing Springdale Linux project.
• In February, Daniel Franciscus joined ITG as a Windows System Administrator, filling the spot opened by Kevin’s promotion. Prior to joining IAS, Dan had served in a similar role at Monmouth University.

• In July, Michael Paloti also joined ITG as a Linux System Administrator. Michael filled a spot that had been opened due to the retirement of Hong Tian in March. Michael comes to the Institute with a diverse background including both academic and corporate IT support.

• In the Network Administration Group, Joshua Zenker joined the team as Junior System/Network Administrator in November filling the vacancy created when Lee Colbert transitioned to Natural Science computing the previous year. In June, Martin VanWinkle joined as Junior System/Security Administrator. Both bring knowledge and experience in large-scale, enterprise IT environments to the Institute.

• In addition, throughout the year, we have had the good fortune to have several talented student workers support our efforts. Joshua Weinstein began as Junior Web Developer in Databases and Integration, beginning in March. Joseph Kelmer, Nick Helmstetter, James Reiner, Sean Andalcio, Ryan Roberts and Weiman Li have also served as student interns for parts of this past year.

Although ten staff members have moved to new roles or joined the Institute within the past 24 months, we have continued our commitment to maintaining and improving the quality of service that we provide to our community of scholars. Our ability to deliver in this regard would not have been possible without the work that has been completed in recent years focusing on the maturation of our technology infrastructure and the work on IT policy and procedure that followed.

Data Security, Business Continuity and Disaster Recovery

• **Email Continuity System.** This past January, the Computing team implemented a new service that provides IAS scholars and staff access to their incoming email messages in the event that our primary email servers are offline, such as in times when the Institute’s power is out. The Email Continuity Service uses a 3rd-party, cloud-hosted tool known as MXSAVE, and can be accessed using IAS login credentials from any email client, smartphone or from our own webmail system, located at https://mxsave.ias.edu.

• **Improved Internet Access in the Housing Activities Building During Power Outages.** Again, in response to Hurricane Sandy and the potential for future disruptions of that magnitude, a tertiary Internet access connection was installed in the Housing Activities Building in Member Housing. This area typically serves as a hub for information and services during campus closures and power outages. The improved Internet access will supplement the use of this space for device charging and network access, providing over 20Mb/s of connectivity, while using the existing Wi-Fi infrastructure to allow for convenient configuration and access. It is anticipated that this connection will be robust enough to support Skype sessions, online video streaming and scholarly research during periods when the primary and secondary Internet links are offline.
• **Telephone Switch Emergency Power Generation.** An emergency power generator has also been procured to provide additional power backup for the campus telephone system. The generator supplements the existing 40-hours of battery capacity. Working together, the batteries and generator will provide unlimited runtime for the switch in the event the campus power feed goes offline. During this time, the generator will ensure that on-campus and local communication is able to function as expected, and that emergency notifications from the Connect-Ed system are able to reach their intended recipients.

• **Campus Power Generation.** Although the three previous items are all intended to provide a significant improvement in the availability of critical IT resources in the event of a power outage, the ultimate solution to the problem is still the installation of a power generator capable of operating critical IT systems even during campus emergencies and closures. The process of engineering such a solution for the campus has been initiated between Computing and Facilities staff, working with outside experts and vendors, and we anticipate it taking 1.5-2 years to complete. More information on the developments around this project will be provided in future annual reports.

**Infrastructure**

• **Internet Connection High Availability.** Building on the improvements to our campus Internet connectivity reported in the 2012-2013 annual report, the Network Administration group completed a project this year to ensure that our redundant links to the Internet are performing load balancing and practicing high availability. Load balancing requires our links to efficiently balance traffic among themselves to ensure the highest possible throughput is available at all times for our scholars while simultaneously ensuring that the fastest routes are being used to move traffic to and from IAS across the Internet. High availability reflects the fact that either of our independent links is capable of automatically replacing the other should a problem disrupt proper operation on the latter. These changes have been accomplished utilizing the Location/Information Separation Protocol, or LISP. Working with our Internet Service Provider, NJEDge, LISP also allows us to seamlessly expand the reach of our local-area network, allowing us to integrate distant sites such as our co-location facility at Montclair State University or Marquand House.

• **Member Housing Switch Upgrades.** This past summer the Network Administration team completed the first phase of a two-phase upgrade to the network switches that service the Member Housing campus. In total, ten of the twenty-five switches were replaced. The remaining fifteen switches will be upgraded this coming summer or earlier, as construction schedules may allow. The upgrades ensure that these critical components of the network infrastructure will remain capable of providing the highest quality of connectivity for both wired and wireless traffic throughout Member Housing.

• **Additional Installations/Upgrades.** Beyond the major projects identified, Computing staff completed work on a host of additional projects and upgrades this past year. These included:

  • **CasperSuite for Macintosh System Management.** Across Computing, this past year teams began utilizing CasperSuite for management of Macintosh assets, bringing them functionally in line with the management of Windows and Linux assets that has been in place for some time. The new software allows administrators to develop standards and
perform necessary upgrades with ease, without inconvenience to users.

- **Outdoor Wireless Network coverage.** This past year, continuing the ongoing project to enable outdoor workspaces across the campus with Wi-Fi signal, the Network Administration group improved signal in the green behind Fuld Hall, as well ensuring proper signal in the Birch Garden between Simons Hall and the West Building.

High Performance Computing (HPC)

- **3rd Generation High-Performance Cluster Planning and Purchase.** This past summer the SNS Computing team completed the configuration and procurement of a new high performance computing cluster, the third generation of such an installation at IAS. The new cluster is made up of 64 compute nodes, 1024 Intel Xeon-based cores, and 2TB of RAM (32GB per node.) In early testing, the new system achieved Linpack computational speeds in excess of 10 TFLOPS. In addition, the cluster is configured with the FDR Infiniband high-speed interconnects between the nodes, and the latest compilers and queue management technology. The IAS’ investment in HPC remains primarily used by scholars in Natural Sciences, but is available to all members of the Institute community.

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

- **Upgraded Video Website.** This past summer, the D&I team implemented the latest version of the Institute’s online video repository, video.ias.edu, significantly improving the speed, functionality and organization of the site. The upgraded site also serves as a model for the pending upgrading of other Institute websites, based on the Drupal 7 platform, and uses a theme supporting a mobile-device friendly responsive design.

- **Current Member Profiles.** Building on the functionality of the Community of Scholars system and in collaboration with the Public Affairs Office, this past year a new set of online profiles featuring the research interests of current members and visitors was rolled out. Representing content similar to the Faculty and Members print publication, the new site gives current members a permanent location from which they can cite their time at IAS on other sites, such as their social media profiles or professional websites.

- **Online Timecards.** Working with the Business Office and Human Resources, Computing completed the roll-out of the online timecard system for all bi-weekly salaried and non-salaried employees. This system replaces the paper timecard system that had been previously used with an electronic workflow system that properly routes submitted timecards through the approval process and into the payroll system. It provides employees with an accurate and up-to-date view of their available paid time off balance, as well as the opportunity to view or print archived time reports.

- **Website Analytics.** In an effort to better understand the usage of our website, and better position the growing cache of content available online, the D&I group began working with site owners to implement Google Analytics across our sites. Using these industry-leading analytic tools, we are able to get significant insight into the usage and effectiveness of our web-based communications. Google Analytics has also been expanded to include tracking the
effectiveness of our email communications, such as the monthly IAS eNews newsletter. In addition to helping deploy the tool, D&I also established a well-attended working group of web professionals from across the organization within which issues around web analytics and best practices are actively discussed.

- **Email Communication with ConstantContact.** This past summer the Institute began utilizing Constant Contact, a well-known email marketing tool, to facilitate large email distributions, such as those to members of AMIAS or announcements of public events taking place at IAS. The move to Constant Contact ensures that our messages remain compatible with the growing spectrum of email readers and platforms, and ties in nicely with the analytic measurement described above.

**Audio/Visual**

- **A/V Infrastructure Improvements.** Work continued on modernizing the Audio/Visual infrastructure this past year. Work focused this past year on a number of areas including the Bloomberg Lecture Hall, the Simonyi Lecture Hall and the Dilworth Room, as well as on our capability for outdoor amplification.

- **Recording Campus Events.** The A/V team has been diligent in video recording public events on the campus and making them available on the IAS Video website. All Institute-wide lecture series, several seminar series within the School of Mathematics, and the Prospects in Theoretical Physics are just some of the events that have been recorded this past year. The IAS Video website now boasts over 2000 videos for viewing. The IAS e-newsletter routinely directs readers to video highlights and the Institute’s website regularly advertises prominent videos on its homepage. This past year, the move was made to recording our lectures in full HD, and in concert with the update to the video website, we now have the capability to embed or stream these videos directly.

**School-Specific Projects**

- **School of Natural Sciences.** The SNS Computing team completed a number of important upgrades this past year, including the introduction of new servers for email and web serving. In addition, the school continues to evolve its enterprise storage capabilities, providing state-of-the-art data access technologies to scholars and expanding their available storage capacities.

- **School of Mathematics.** As previously reported, the Math Computing group underwent a leadership transition beginning in January. It nonetheless completed a number of important projects for Mathematics scholars, including upgrades to more than 30 workstations and the continued move to virtualized servers to ensure flexibility and availability of services. In addition, a major upgrade to the Springdale Linux project, version 6.4, was released.

- **Information Technology Group.** In the past year ITG completed their migration to the Zimbra Collaboration Suite. The group revamped their website content and coordinated over a dozen training seminars through the Computer Training Program. In addition, they provided critical support to many administrative offices throughout the Institute as they upgraded to or introduced new software or systems in their environments.

Although it is by no means an exhaustive account of all projects completed, the above list represents
the important strategic areas on which the Computing staff has focused the majority of their efforts in the past year. It is these areas that we feel are most beneficial as we endeavor to continue to provide the service and support necessary to ensure satisfaction by our members and faculty.

2013-2014 Goals and Objectives

As we move into the 2013-2014 academic year, two major strategic themes will underlie most of the projects on which the Computing team will focus. The first continues from previous years -- an emphasis on business continuity and emergency preparedness within the realm of our IT services and assets. The second major theme, responding to the phenomenon loosely described in the industry vernacular as “bring your own device” or “BYOD”, will require development of new flexibility and capabilities within our existing service offerings. A series of BYOD projects are planned for this year ranging from developing new mechanisms for convenient wireless access to services to embracing emerging technologies in the mobile and cloud-computing realms. Furthermore, we will strive to eliminate complexity in the policies that govern our campus IT environment to encourage collaboration, while at the same time continuing to focus on security, privacy and availability. The details of many of these projects are outlined in the sections that follow.

Infrastructure

- **Bring Your Own Device.** The current model for delivering IT service at IAS -- providing users with a desktop computer connected to our secure, wired network -- is nearing the end of its viability, exercised by the combination of the explosive growth of mobility and the comings and goings of members and visitors. Computing will be investing significant effort through this academic year to develop new models that continue to offer the most flexible and appropriate computing resources to our scholars:

  - **Authenticated Wireless Network.** With the goal of bridging the current gap between the wired and open wireless network, Computing will be rolling out a new authenticated wireless network, from which scholars will be able to access a greater number of services without needing to utilize the VPN or similar secure connectivity tools. This will allow scholars who prefer to work from the convenience of their wireless-enabled devices to do so, in a fashion more similar to the convenience that is available on traditional wired devices.

  - **EduRoam.** In addition to the authenticated wireless changes here on the IAS campus, IAS will also be joining the EduRoam consortium (http://www.eduroam.org), providing for wireless Internet access for our users at any other EduRoam-participating campus throughout the world. For IAS scholars who are traveling, this will provide convenience in not having to register for guest networks. For collaborators who are arriving at IAS for short visits, they too will gain the convenience of not needing to pre-register for access to the IAS network, in favor of using EduRoam.

  - **Bonjour Network Management.** The Network Administration team will also be
investigating options for managing and securing the use of Bonjour networking throughout the academic and Member Housing campuses. Bonjour is typically utilized by Apple devices for wireless connectivity, such as AirPrint and AirPlay.

- **IP Address Management.** In a project that remains from the previous year’s project list, Network Administration will continue to remodel the way in which the Institute manages information related to networks and devices on the campus. To this end, we have licensed the market-leading IPAM tool, Infoblox, to assist in reworking the current IPAM policies to best fit the needs of the campus environment once it is transformed by the “BYOD” projects outlined in this section.

- **Begin Supporting Internet Protocol version 6 (IPv6).** In addition to IPAM noted above, the Network Administration team will also begin to accommodate network communication utilizing the next generation IPv6 protocol. Earlier in 2013, the Institute was officially assigned our first block of IPv6 address space, and as needed, this block will be utilized initially to support connectivity to IPv6-only networks that may emerge, and later to accommodate other network configurations that would benefit from the features offered by IPV6 over the current IPv4.

- **Member Housing Switch Upgrades.** This year the Network Administration team will be completing the second and final phase of the two-year upgrade of the Member Housing switch infrastructure. These new switches ensure the highest quality of connectivity across both the wired and wireless networks within Member Housing.

**High Performance Computing**

- **New Cluster Rollout.** As noted earlier, this past summer we completed the configuration and purchase of the next generation of on-premises HPC resources for our scholars. This Fall, the new cluster will be moved into production, and made available for high performance computation to scholars throughout the Institute. We do not anticipate any interruption of service, or the need for existing code to be refactored or recompiled as jobs migrate from the 2nd to 3rd generation clusters.

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

- **Drupal 7.** Building on the success of the current Drupal 6 platform for our websites and online applications, the D&I team will continue the project of upgrading our infrastructure to Drupal 7 that began last year. The new version of the system provides additional features and greater integration tools, including several to benefit our mobile initiative described above. This year, we expect that all remaining Drupal 6 sites will be converted, including the Institute’s main site as well as the school’s websites.

- **New Dining Services Website.** In addition to the Drupal 7 upgrades that are occurring, this
year a new website for the Dining Services group was also implemented. In addition to a renewed design and user-friendly information architecture, the change also coincided with the implementation of the OpenTable system for dinner reservations. OpenTable is a market-leading online reservation system, and provides all of the requested functionality for a modern reservation platform.

- **New PiTP Application Website.** Another newly implemented website rolled out this term is a new online application process for the Prospects in Theoretical Physics conference conducted at IAS every summer. This new website, similar to those in use by the schools for accepting applications for membership, guides interested applicants through the process of applying, and provides a system for the application reviewers to submit their feedback digitally.

- **Time and Effort Reporting for Members.** The D&I team, supporting the Business Office’s response to a new federal requirement for time and effort certification within schools that receive federal grant funding, will be implementing a new web-based effort certification system for members and faculty. Those scholars who will be using this system will be notified by the Business Office or their school’s administrative officer.

- **Enterprise Resource Planning.** As part of the ongoing analysis and planning effort related to the Director’s new four-year strategic plan for the Institute, a team of administrators and Computing staff will be investigating the impact and potential efficiency gains that could be achieved through the implementation of a comprehensive enterprise resource planning system, in lieu of the distributed and/or homegrown systems that currently manage much of the Institute’s administrative data and electronic workflows.

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

- **Lights-out Datacenter.** As noted earlier, the Institute’s capital plan includes a project to provision additional power generation capability for the campus’ IT infrastructure to function independently from the public utility power provided to the campus by PSE&G. To this end, Computing staff will be working to design, assess and potentially implement a “lights-out datacenter” to host this environment. The space, either remodeling the existing Bloomberg Hall C3 datacenter, or utilizing newly identified space as appropriate, will provide a location where critical IT systems can be operated in an environment free from dependency on the Institute’s power and cooling systems.

- **Continued Expansion of Co-located Services.** Simultaneously, having successfully operated the Montclair State University-based co-location facility for over a year now, Computing will be working this year to further develop our capabilities for hosting co-located services within this space. In addition to hosting web services and the Email Continuity System, we also envision directory and authentication services being co-located, as well as replicas of critical database systems and data backups.

- **Secure Enterprise Password Management.** As more services move to online models, the use
of passwords to access these services is growing. Many of these passwords are valuable institutional commodities that are shared amongst necessary staff members, and further for backup/coverage purposes. To stem the growing tide of this potentially dangerous practice, Computing will be rolling out the LastPass Enterprise service to staff throughout the campus. More information will be provided by the appropriate IT helpdesk as the implementation progresses.

Audio/Visual

- **Broadcast Center.** This fall, in conjunction with the Public Affairs Office, Computing is proud to rollout the new IAS Broadcast Center. Located in room 102 in 310A South Olden Lane, the new center, based on the ReadyCam product by VideoLink, provides a facility for live network broadcast uplinks with virtually every network across the globe. In addition, the broadcast center can be utilized to support standardized video recording projects, such as interviews and oral histories. For more information, please contact readycam@ias.edu.

- **Immediate Posting of Lecture Videos.** As part of the recent upgrade of the IAS Video website, changes have been made to the lecture capture process to make recorded lecture video available online within minutes. Interested users can now typically locate the raw recording of the previous talk within ten minutes of the end of the talk. It will still be the practice of the Audio/Visual group to provide an edited and titled version of the video within 48 hours.

- **Expanded Videoconferencing Services.** Throughout the coming year, the A/V team will be installing videoconferencing end-points in additional locations throughout the campus. We hope to cover all of the main lecture halls within this year, and bring the total number of locations on campus that can support a videoconference up to six. This setup will also facilitate bi-directional, high-definition communication between these spaces, as when they are utilized as overflow rooms for campus public events.

School-Specific Projects

- **School of Natural Science.** SNS Computing will be participating in many of the projects identified above, most notably the implementation of the new HPC cluster. In addition, SNS Computing will be moving their websites to Drupal 7, providing support for MacOS X Mavericks, implementing a new logging server and investigating upgrades to CasperSuite, Crashplan.

- **School of Mathematics.** Math Computing will also be working on Drupal 7 upgrades and continuing the end-user system refresh that was started last year. In addition, they will be upgrading the enterprise storage system to provide users additional storage capacity and deploying new servers in support of configuration management, monitoring, printing and terminal services. Work will also begin this year on replacing the aging SunRay installation with new thin-client technologies.

- **Information Technology Group.** ITG will continue its efforts at virtualizing their servers and
applications, as well as move to an upgraded enterprise storage platform. In addition, this summer ITG will begin an upgrade to the multimedia monitors in use by their members.

**Conclusion**

The projects described in the sections of this report are designed to ensure that we have the tools and processes in place to continue to meet our primary goal, that of providing excellent service to the Institute community. These projects represent the best efforts and intentions of the Computing staff to outline and act on the steps we see as necessary to maintaining and continuing to develop the information technology infrastructure and services necessary to support scholarship on the level at which it is conducted at IAS. Nonetheless, the staff remains eager to discuss additional improvements or ideas that may better facilitate the research or experience of any single member or visitor, and enthusiastically welcome such conversations.