

Information Technology Services
Washington State University

2015-16 Annual Report

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# Letter from CIO

### Hello Everyone,

It is with great pride and pleasure that we in Information Technology Services (ITS) bring our Fiscal Year 2016 Annual Report to you.

You will find that we have introduced new services like Kamiak, the high performance computing environment, as well as made improvements to our internal operating processes reflecting a renewed emphasis on customer focused service. To this end, we have instituted an employee awards program focused on both service and superior effort. The service statistics we have included in this report also speak loudly to this commitment.



Some items that are not included in this report are our request to create a modern Data Center for WSU and the design of the integrated Network Operations Center and Security Operations Center, scheduled to be operational early next year. We are actively planning for the migration of our email services to the Office 365 Cloud and in deploying Imaging as a WSU wide service. In addition, we are in the early stages of designing and deploying an intranet to connect all WSU campuses to help further collaboration and improve IT Security.

We have created a CIO Council with the all campus CIOs as members to facilitate solving problems and in deploying systems, services and solutions with a common approach across all of WSU. This is where differences in solutions are only considered if there is inherent value in diverse approaches.

In 2016, the IT Security team has deployed new tools to identify, mitigate and neutralize the large number of viruses, compromised links and other malware that come into WSU before our systems are compromised. This has not only improved our IT Security posture, but has saved countless hours required to sanitize compromised systems.

The Enterprise Service Group (ESG), working in close collaboration with the Provost's Office is getting ready to deploy the Academic Performance Solutions, the Student Success Collaborative and Guide which enable student retention and graduation. ESG keeps the Student Information System current and implements new features based on customer requests.

The Infrastructure Group keeps all of the necessary platforms operational from which we deliver many critical services including WSU email. In 2016, this group also recently deployed Skype for Business, which enables integrated voice, video and data collaboration among not only WSU employees but also with their colleagues outside WSU.

The Administrative and Financial Group has replaced 9 systems that track usage, inventory and billing into a single system. This has improved the accuracy of our inventory, streamlined customer requests and simplified billing. The Service Level Agreements with our customers have also been simplified so that our customers understand what services are being provided and at what cost.

Internally, we have created a Change Management Process that reviews all proposed changes to existing systems and services with prior notification to the customers. This is already reducing unplanned outages and helping customers better plan for these necessary changes. We now track projects with renewed vigor to ensure these are managed appropriately with the goal to deliver value in a timely manner and within budget.

Finally, we have increased our efforts to improve all aspects of our communications to customers so that they are informed in a timely manner of the current status and impending changes to any and all services we provide.

With these changes and more on the horizon, I am confident that we will continue to improve our services and earn your trust. As always, we are very interested in your ideas and comments to further improve our services to serve you better.

Go Cougs! Sasi K. Pillay

### Serving WSU Through Strategic Planning

Information Technology Services (ITS) aligns strategic planning directly with WSU's four major strategic themes and their supporting goals. ITS' strategic support moves the university forward from a technology perspective. The following ITS strategic goals are summarized. Full models are available upon request.



## Serving WSU Through Robust Business Systems

Enterprise Systems Group (ESG) believes that numbers tell a story, provide insight, and help measure success. In 2015-16, ESG offered support and innovation across multiple areas of WSU's business systems. The business of education requires healthy internal capabilities for human resources, payroll, accounts payable functions, records maintenance, and access to space for both academic and non-academic functions.



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### Serving Students Through myWSU



### **WSU Student Official Email Conversion**

Beginning in fall 2015, WSU communications to all students with an active academic program and class enrollment officially shifted to route only through their WSU-assigned email account. Enrollment Management also now has the ability to determine the point in each semester (fall, spring, summer) when new students will have their preferred email (indicated in myWSU) transition from personal email accounts to their new WSU student email account.

This change provides a consistency of service to all students, supporting the commitment of WSU and ITS to provide excellent communication to all students regarding enrollment, registration, financial aid, housing, and other critical university information.

### **Oracle Mobile Collaboration:**

2015 brought the implementation of mobile myWSU! The application installs natively on iOS and Android devices and is specifically geared towards students. Mobile myWSU allows students to see their schedule, grades, financial aid, student financials, and add / drop classes from their mobile devices, i.e. basic student needs.

Students can access myWSU anytime, anywhere they have data capabilities. Great news for trips home during the holidays and for summer management of class registrations.



### Serving WSU Staff and Faculty Through Improved Resources

### **Class Scheduler**

Through a combination of increased security roles available, and intensive training with colleges, departments and other campuses, academic schedulers now enter and edit their schedule of class information directly in myWSU using tools designed for their needs. Department and college schedulers can edit their class schedule, mark when complete, and communicate changes or other special needs directly to each campus scheduler.

Campus schedulers can now monitor and approve edits and changes directly in the myWSU system. Changes not requiring approval are made directly in the system throughout the semester by each department. This includes teacher assignments and class enrollment limits updates; both critical to undisrupted student learning experiences.

# ADVISING

Advising Notes 2.0 In 2015-16, myWSU offered a new utility to maintain Advising Notes within Campus Solutions. An advisor creates an advising note and decides whether or not to share it with the student. If the note is shared with the student, both the student and advisor are able to add additional notes and upload attachments. If the note is not shared, these functions are limited to the advisor. Advisors can also create and track the progress of action items related to the note. At the end of 2015-16, more than 15,000 notes had been created by 136 advisors with 3,000 notes updated by both the students and their advisors.



**Advising Report Review** Another significant project in 2015-16 consisted of reconciliation of the advising report within myWSU with the WSU Catalog and departmental degree requirement check-sheets. Over time, these three important data sources had gotten out of sync. ESG spent the majority of Summer 2015 working with representatives from the Registrar's Office and campus departments to bring these three data sources back into agreement. As a result of this project, ESG provided new students with a complete set of graduation requirements based on their specific academic interest whereas before these students were only able to see general certification requirements.



### Student Data Warehouse Buildout

In 2015-16, a new combined subject area for Student Records, Financial Aid, Student Financials and Student Demographic Information known as the Student Data Warehouse became a reality, thanks to the diligent efforts of ITS' Enterprise Systems Group. ESG partnered with WSU's Institutional Research Department and stakeholders across campus to identify necessary data elements to infuse into this new repository. ESG utilized the information gathered to build, test, and adjust the new data warehouse functionality. Once completed, the Student Data Warehouse allowed over 1,300 users access to develop more holistic reporting across multiple areas of a student's life at WSU this past year.

#### **Online Course Evaluations**

In spring of 2015, ESG introduced online course evaluations as а more dynamic, effective, long-term data resource for WSU. Fortyseven departments utilized this new teaching tool. In FY 2016, the number of groups software utilizing the continued to grow, with 71 WSU departments across the Pullman, Spokane, Tri-Cities, Vancouver, Everett, and Global campuses offering 180,000 invitations to students in almost 5,500 classes. Over 104,000 of those students completed those course evaluations, providing important program feedback.





# A note from Kimberly Green, Director of the Office of Assessment of Teaching and Learning:

Course evaluations are a particularly useful tool for collecting student feedback on their own learning experiences in WSU courses, and provide one important component to support and continuously improve teaching and curriculum. By spring 2017, all WSU courses will be evaluated (with online support), using instruments determined by each college. The benefits of transitioning to an online source evaluation system include:

The benefits of transitioning to an online course evaluation system include:

- Faculty have electronic records of their course evaluations, including comments.
- Student confidentiality is better protected online than as written comments on paper.
- Students have more time to complete thoughtful responses and provide meaningful comments.
- Students get email reminders to complete course evaluations.
- Students can use mobile devices to complete course evaluations, in class or outside of class.
- The new system allows for more flexibility in reporting and analysis, so the results can be more easily available to chairs, directors, and program coordinators, as well as the faculty themselves.
- Faculty who prefer to not schedule time during class for paper evaluations no longer need to do so.

ESG is coordinating...course evaluations with the Office of Assessment of Teaching and Learning, in particular regarding reporting results to instructors and chairs, and orienting instructors in colleges and departments as they move into the new system.

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Serving WSU Through CougTech Resources

#### WELCOME TO OUGTECH Help and Support Services for Washington State University Students, Faculty & Staff PARENTS & THIRD PARTIES CONTACT US FACULTY & STAFF STUDENTS Service Is Our Business 4,400 Average monthly phone and email customers In the past year, CougTech HelpDesk changed from a assisted fee for service organization to a teaching organization. Students can make an appointment online for one on one assistance at our CougTech office. No longer do we take in customer laptops for 85% Calls answered within service. Instead we sit with students and teach them first 15 seconds to perform needed maintenance, scan and correct viruses, or install software. In 2016, CougTech introduced their Facebook page to Δ the WSU community and is excited to develop and **Average Call Time** share information critical to customer satisfaction minutes and positive university experiences. CougTech also now offers a phone helpdesk satisfaction survey with 91% of current respondents 93% Successful resolutions to indicating 'Very Satisfied' with their CougTech student needs during first phone conversation experience. **CougTech offers loaner laptops for student** 361 Average monthly student visits to walk-in use with regular replacement rotation to helpdesk for assistance ensure students are provided robust equipment able to meet their needs. Almost 600 laptop loans took place during the 2015-20 2016 year, meeting student needs! Average time spent with minutes walk-in customers



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# Protecting the WSU Community, Information Security Services (ISS)

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### THREAT LANDSCAPE

"Ransomware crimes on all U.S. targets are soaring. In just the first three months of 2016, attacks increased tenfold over the total entire previous year, costing victims more than \$200 million." (NBC News, 2016)

The current threat horizon outlook for higher education institutions is as follows (FireEye, 2016):

- Those conducting research programs in areas with potentially high economic payoff, or those supporting sensitive government contracts, will face ongoing risks associated with Advanced Persistent Threat (APT) groups. These threat groups are also likely to continue seeking to compromise academic networks to mask and proxy their activities against secondary targets.
- Financially motivated threat actors will remain an ongoing threat, especially against colleges and universities, given that such institutions tend to contain large amounts of personally identifiable information, such as student and other administrative records (e.g. containing government identification numbers), and the perception that these targets have more vulnerable security postures.
- More general hacking threats and hacktivists may also show interest in academic networks that offer high visibility or due to the same perception of vulnerabilities in academic networks.

In July 2015, the FBI notified WSU of malicious emails originating from the WSU central Microsoft Exchange and Office 365



student email systems targeting high-ranking officials of the US Government and governments of close allies. WSU immediately worked with the FBI and external consultants to put a plan in place to identify the threat actors, assess the incident, and mitigate the compromised University IT environments, remove known attacker access points, and eradicate the known threat actor footholds.

It was quickly discovered that attackers had leveraged credential theft tools and other advanced malicious software on numerous occasions in pursuit of their objectives to gain and maintain access to, and control over, the university's

centrally managed email and Active Directory systems. Unfortunately, they were ultimately successful in gaining their highlevel administrative access objectives.

WSU, in collaboration with the FBI and external consultants, have designed and implemented several new security measures selected to aid Information Security Services in providing better detection, prevention, and/or response capabilities for the specific tactics, techniques and procedures (TTP) used by the attackers in this incident.

The following bulleted list represents data for May, 2016:

- Email security systems detected 355,744 individual messages with malicious attachments.
- Email security systems detected 14,241 individual email messages containing malicious links.
- 13.7 % average phishing click-through rate, however certain phishing campaigns spiked as high as 67%.
- ISS' email security systems successfully blocked 74% of attempts to access phishing URLs from messages where the URL was rewritten.
- 14,096,598 sessions detected at campus perimeter exhibiting signs of either active exploit attempts or presence of a vulnerability. 12.1% of these were rated as "high" or "critical" and blocked.
- 1,249,010 sessions detected inside the campus network perimeter exhibiting signs of active exploit attempts or the presence of a vulnerability.
- 405 instances of suspected account compromise.
- At least 698 instances of internal systems being exposed to malware not blocked by perimeter defenses.

The following graphs also represent actual compromised WSU systems for the month of May, 2016. They do not show threats that have been proactively prevented, as this incident data is summarized in the list above. The following graphs do represent data collected from the various protection and detection technologies deployed over this past year, to include data from firewalls, network scanning systems, and email protection services. Furthermore, these charts represent data where these tools have been deployed. We are still in the process of deploying some of these tools across other WSU campuses and colleges.



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ISS continues to receive reports of substantial, targeted phishing campaigns originating from compromised internal email addresses. These messages have been observed as universally having credential theft as their primary objective. Compromised credentials are then used to launch further phishing campaigns. This next graph shows Indicators of compromised WSU systems and/or user accounts resulting from phishing exploits. This data represents the number of users who "clicked" on, or tried to access, a malicious link received via email.



The following graph shows password resets on WSU Network ID accounts which generally occur under one of two conditions, both of which are indicators of a compromised user account:

- 1. The user's email account is sending out spam or phishing email messages.
- 2. The user's email account has email forwarding destinations set that are suspect or known to be malicious



As seen in the statistics provided in this annual report, WSU's Information Security Services team is always on duty. The ITS abuse queue had 43,092 tickets created during FY2016. Senior analysts on the Security Operations team were tasked with handling high severity or complexity incidents, working on law enforcement assistance requests, achieving Payment Card Industry (PCI) Data Security Standards (DSS) compliance for their services, and pursuing additional automation to handle incidents where possible in an effort to reduce the level of human effort required.

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Of the tickets created, the vast majority were the result of email based phishing campaigns and network based intrusion attempts. The increase in number of tickets created starting in January and peaking in May is largely due to a combination of an increase in phishing campaigns and the increased ability to monitor these types of events. Excluding the data from a security system evaluation in May, the drop off in ticket load between April and June is most likely due the departure of the student population after the semester ended.



The data shown in the chart helps to illustrate the resulting challenges from current network architectures. Unblocked malware downloads and command and control traffic represent a considerable risk of compromise in our environment. Currently, 97% of all unblocked malware downloads and command and control traffic occur where the true traffic source is obscured. In FY2017, ISS will be working with the other WSU campuses, colleges, and departments to gain more visibility into the network/user traffic in these areas.



Serving the WSU Community through Infrastructure Development

Infrastructure Services (IS) is an area within ITS devoted to providing and maintaining the foundational technologies critical to the day to day work of the WSU community. Last year, in collaboration with Information Technology experts spread across all of WSU, IS provided leadership and support of such infrastructure technologies as WSU's mainframe computing, virtual servers, and massive computing storage resources such as WSU's newest High Performance Computer (HPC) Kamiak, designed to provide WSU researchers broader access to a network of research support resources.

IS also worked in 2015-16 to maintain and improve WSU's network connectivity including wired and wireless access, email and calendaring, voice services and telephone systems. WSU's ability to connect each day for teaching, research, and collaboration rely heavily upon IS services, and this team spent the past year working hard to maximize all of our existing network tools and implement the newest technologies available, such as upgrading over 1,000 of WSU's aging wireless access points (each point's capability went from 2-3 megabits of data per second to 40-50 megabits per second).



86,000 unique devices were used to access wireless at WSU Pullman during fiscal year 2016.



Each person averages 3.5 devices to access WSU's wireless network.



Six 10-gigabit/second connections provide redundant service across WSU Pullman. This represents a 100-fold increase in connectivity in the past decade.)



WSU's first "condominium" style High Performance Computing (HPC) cluster (named Kamiak) enables researchers broad network computing and storage HARD while reducing responsibilities and risk. (See article on next page.) AT WORK Deployed for the first time in a WSU research facility: an entirely fiber opticbased LAN technology, known as Gigabit Passive Optical Networking (GPON). DATA CENTERS: New infrastructure (including much needed storage) to **MAKING A** support a requested secondary data center in Pullman. Also replaced aging DIFFERENCE datacenter switching, routing, and firewall infrastructure in ITS' primary data center. Completion of **Office 365** (Phase I) for students which unified login id and email addresses and gave them access to Office 365 ProPlus. **PLANNING FOR** THE FUTURE New server and network infrastructure serving the new Skype for Business, providing the platform for future Microsoft communications service advancements.





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# Kamiak

ITS made a significant infrastructure investment, along with other research and academic areas across campus, in support of institutional research computing in 2015-16 by participating in the acquisition and management of a high-performance condominium-style computational cluster affectionately known as Kamiak.

The strategic acquisition of Kamiak provides essential response to the needs of the university's research computing community. Such cutting edge computational hardware and professional support enable researchers to run complex computational simulations exponentially faster.

Kamiak currently contains 77 general purpose computational nodes (servers holding processors, memory, and local storage enabling more efficient operations and performance) providing 1,540 physical cores for high memory applications such as large genome assemblies, fast message passing in high-performance applications, 633 TB of fast, tiered data storage, seven compute nodes with dual Graphics Processor Units (GPUs) and one node with dual Intel Xeon Phi coprocessors. These GPUs and Xeon Phi are specialized processors that, together with the main CPU, allow researchers to accelerate the execution of their code through the use of massive parallelization. These systems can be used to support WSU research projects such as machine learning, molecular dynamics and genomics, and we are just scratching the surface.

Since its initial acquisition in 2015, Kamiak's infrastructure has already grown through the addition of both centrally funded infrastructure and investigator purchased compute nodes. Kamiak has the future capacity to support 144 nodes for a total of 2,880 physical cores. Purchase of hardware on the Kamiak cluster guarantees investigators on demand, immediate access to resources and priority access to any idle computing capability across the cluster. All of this supports ITS' Strategic plan of developing and sustaining the physical and technological infrastructure, resources, and expertise system-wide to support increased research and scholarly productivity, with particular emphasis on core laboratories and academic computing.

ITS Infrastructure team members are devoted to systems administration, outreach, application software optimization and training to assist with adoption and use of the cluster by on-campus researchers. It is also connected to the High Speed Scalable Research Core (HSSRC) network designed to allow researchers on Kamiak to move large data sets across the campus as well as to and from collaborating institutions across the nation.



Ribbon cutting in ITB 1010, L to R: AVP Tony Opheim, ITS; Dr. Doug Call, interim director for the School of Global Animal Health; Dean Daryll Dewald, CAS; President Daniel Bernardo; VP Sasi Pillay, ITS; VP Christopher Keane, Research; Dr. Kimberlee Kidwell, Acting Dean for CAHNRS; VP Ambassador Dr. Asif Chaudhry, International Programs; Dr. Jim Petersen, Voiland College of Engineering and Architecture

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### Information Technology Services, A Dedicated Community



Information Technology Services is a group of highly skilled and dedicated individuals working together to serve the needs of the Washington State University community within our four respective ITS areas: Administrative & Financial

Services (AFS), Enterprise Systems Group (ESG), Information Security Services (ISS), and Infrastructure Services (IS). The depth of team knowledge spans as much as 40 years of WSU technology changes, and that continued dedication is what powers WSU's Information Technology Services still today.

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**PCR-360:** In 2016, AFS and network teams quietly completed phase 1 of an important new work order system for numerous WSU services to improve user experience and efficiencies when utilizing ITS' service catalog. September online billing statements are one example of the changes users will enjoy, with a new format and associated training resources. Phase 2, slated for January, 2017, is just around the corner.



2015-2016 was a year of change as we welcomed Dr. Sasi Pillay into ITS leadership. During this transitional year, ITS developed opportunities for our customer community and



internal constituents to acknowledge excellent service and dedication. SPOT and STAR awards are now celebrated monthly and we welcome inquiries about how to nominate an ITS employee.

### **ITB Revitalization**

In February, 2016, AFS began the task of updating our building to provide staff with improved workspaces and to properly remove outdated, obsolete, or defunct project materials and office furniture that has collected over many years.

Numerous ITB offices are internal with no windows, so fresh paint, bright lighting, and noise-absorbing carpet will provide employees more comfortable, well-equipped areas. We are excited with the great progress, and anticipate completion by the end of the next fiscal year.