Gillings School of Global Public Health Computing Resources

The school's technology approach has been to leverage as many campus services as possible provided by central Information Technology Services (ITS, see above), including networking, telecommunications, common applications and information security consultation/incident response in order to invest its more limited technology budget in value-added and differentiating computing services at the School level. These services are mainly provided by the school's Instructional & Information Systems unit, in some cases augmented by department-specific services, especially for direct support of specific research data management needs. In addition, Gillings uses the campus enterprise Tableau environment for Institutional Reporting, and the Strategic Analysis and Business Intelligence (SABI) unit maintains access and data sources with assistance from IIS.

Instructional and Information Systems (IIS) provides central computing systems for the administrative, instructional, and research activities of the school and manages the provision of desktop computing services. IIS also coordinates data management and information technology needs between the schools, wider campus services and beyond. IIS's central technology infrastructure includes twenty physical and virtual servers running Red Hat Enterprise Linux and Microsoft Windows Server housed securely in two central campus data centers.

Data security is governed by a set of campus information security policies and standards, and managed via a set of formal information security liaisons assigned to each department and unit. These professionals respond to incidents and provide expert consulting to faculty and staff regarding proactive protection of university data, including research data, first-line incident response, and connection to Campus Information Security.

Strategic Analysis and Business Intelligence (SABI) provides substantive, accurate, and understandable data, information, and services to 23 internal (Include departments and CAU units) and external stakeholders (ASPPH, CEPH, Provost's office, etc.) to support strategic planning, evaluation, and decision-making across the School. SABI is endowed to maintain the integrity, consistency, and clarity of the institutional research data across all units and departments of our College. SABI maintains access and institutional data sources with assistance from IIS. SABI uses mainly SAS, SQL, R, Python, Qualtrics and Tableau among other applications for data management, data analysis, statistical modeling, and report generation. SABI admins, updates, and grants access to more than 50 dashboards created by the unit for institutional reporting. SABI advises, orients, and recommend on best practices about how to use Tableau for Institutional Reporting. This environment is rated for Sensitive Information. SABI grants Tableau Explorer licenses for institutional reporting on a project basis.

The School's **Department of Biostatistics** performs a large quantity of statistical computing and simulation for research and teaching purposes. As a result, the computing landscape in the department is varied and wide. Currently the department consists of several different work

units with varied needs and varied equipment. The equipment is spread over various networks and two computer labs that are interconnected via the campus backbone.

The Department of Biostatistics' network presently operates from 73 integrated servers: 5 Open Enterprise Servers (OES), 60 SLES Linux 11 64-bit, 3 SLES 10 32-bit, 1 Windows 2008 server, 2 Windows 2003 servers and 2 VMWare ESXi servers for hosting virtual machines. Two of the OES servers host the department's core services (websites, file storage, print services). Two of the OES servers host the department's logon nodes in our high-performance computing cluster (HPC) and LSF Master which schedules and dispatches all jobs submitted to the computing nodes. The 60 computing nodes run SLES Linux 11 64-bit, and are responsible for processing jobs that are submitted from the logon nodes. The Windows 2003 servers operate as a Symantec Antivirus Server for monitoring antivirus clients, Windows Update Server, used to centrally manage Microsoft patches, and a storage facility for ghost images. The final 3 SLES 10 servers run various websites and wiki's as well as data backup services and Zenworks to deploy applications to desktop clients. All servers with the exception of the computing nodes are running RAID-1 disk arrays. All departmental data is hosted on a flexible and redundant storage cluster from the manufacturer Isilon and currently has 18 TB of space for data storage. In addition to the Isilon storage cluster, the department also has an additional 8.5 TB of disk space on a Storage Area Network that is used specifically for the High Performance Computing Cluster for databases and scratch space. Data from the Isilon cluster is mirrored 24/7 to a separate storage location for Disaster Recovery purposes and a Tape Library is used to backup and restore all departmental data. All department desktops are connected to the network using 100 MB and 1000 MB Ethernet, all laptops are connected to the network via 100-MB and 1,000-MB networking or 54-Mb wireless. The local network consists of several switches connected by fiber optic cable and connects to the campus backbone and maintains 10-Gb transfer rates.

The department currently uses a very wide range of statistical, imaging, GIS and genetics applications used to analyze data. Applications include Arcview GIS, CART, DBMS Copy, Dchip, Fiber Tracking, Fiber Viewer, FSL, Head Circumference, IRIS, ITK-SNAP, GenePix, JMP, Map Maker, Map Manager QTX, Mathematica, Matlab, MRIcro, MRI Watcher, nQuery, Qtlcart, R, S.A.G.E., SAS, ScanAlyze, Slicer, SNAP, Splus, Stata, StatXact, Sudaan, Treeview, Valmet and Winbugs

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