IS supports shared clinical research vision

UMass Medical School (UMMS) and UMass Memorial Health Care have a shared vision of advancing health care and developing therapeutics through clinical research. The IS Department is playing a key role in making that vision a reality.

In order to perform clinical research, patients must be recruited and biologic samples such as blood and tissue must be collected and analyzed and made available for research. Such biologic samples are vital to the study of disease. One of the challenges to build a "biorepository" is safeguarding patient privacy and anonymity while maintaining enough patient information in relation to their samples so that the research is clinically meaningful. A more fundamental challenge has been access to clinical data for feasibility analysis.

Last summer, IS selected the i2b2 (Informatics for Integrating Biology and the Bedside) platform for use in developing the data repository—a prototype named Massachusetts Integrated Clinical Academic Research Database (MICARD). The project was led by Ralph Zeitels, PhD. A breakthrough came when it was demonstrated by the project team that MICARD has the capacity to support critical quality reporting needs of the hospital. A central data repository that supports both clinical and research needs, the Analytic Health Repository (AHR), is now under development by UMMS and UMass Memorial IT staff with Reconbmitt Data Corporation as an implementation partner.

Data from clinical activities is the foundation for medical research and, therefore, central to the vision of translational medicine. Typically, clinical data resides in the information systems at UMass Memorial, but the traditional approach to getting this data for research required requests to clinical IT staff, which raised several efficiency issues. To resolve these issues, IS explored a number of commercial options and ultimately selected the Clinical Research Chart (CRC) and related tools from i2b2 (for more information on i2b2, visit www.i2b2.org).

So far, 775 slides have been added to digital images to enhance teaching and learning. A virtual slide is a digitally captured, diagnostic-quality image of a glass slide, and use of a computer provides on-demand viewing, navigation, magnification and focus via the Internet. Notes and overlays can be added to digital images to enhance teaching and learning.

Virtual Microscopy preserves slide collections

Virtual Microscopy (VM), a computer-based technology offering the full range of traditional microscope functionality, went live at UMass Medical School in August 2007. One of the reasons this technology was pursued is the age of the School of Medicine’s traditional glass slide collection used in the curriculum and the fact that many of the slides are irreplaceable. Digitizing the slides is a way to preserve the collection. VM also provides students with open and easy access to the collections. The Bacus Laboratories system was selected by the Virtual Microscopy working group comprising Information Services (IS) employees and faculty.

To integrate VM technology into the online curriculum, IS has incorporated VM into its Learning Management System through a Media Library Collection, links of PDFs and PowerPoint presentations of lectures and notes, and in the Assessment and Assignment Tools, which includes self-tests and homework.
IS builds a high-performance computing environment for researchers

High performance computing (HPC) is a system made up of multiple processors linked together allowing the ability to quickly process large amounts of data. HPC has been a component of scientific investigation and research for nearly four decades. However, for most of this time, HPC has been expensive and restricted to large, centralized computation centers. Recently, UMass Medical School Information Services developed an HPC environment for UUMS researchers. The environment, called Binar, was built to provide a system with a variety of applications, including genomics, structural biology, molecular mechanics, imaging and simulations.

A high-performance computing environment requires several components: many computational units (processors, memory), large file space capacity and high-speed networking to bind the components together. This modular environment is called a cluster. Clusters are versatile, expandable and cost effective. Binar is composed of three types of computational units or nodes, for a total of 82 nodes with 352 CPUs:

- 54 HP DL145 nodes with two dual core AMD Opterons (275) and 4 GB memory each;
- Two Dell PE6850 nodes with four dual core Intel (7100) and 64 Gb memory each; and
- 25 Dell SC1435 nodes with two dual core AMD Opterons (2216), 4 GB memory each, interconnected with high-speed networking.

IS has created a queuing system on Binar that allows for a mix of jobs, minimal congestion and fair allocation of resources to research groups. There are also architecture queues (e.g., the Dell SC1435 with high-speed interconnects, which can be used for computations).

The home directories for Binar are:

- A 2 Terabyte share on a Clarion file system, which provides fast file access for all of the nodes. It is possible for researchers to obtain file space that can be associated with Binar. IS is currently implementing a plan for the research community for near-line storage that can be accessed through the network. The Deep Sequencing Core, for example, generates 700+ Gb of data for each run, which is processed on Binar. The processing of image data from the sequence to base-called sequences (20-35 million), and mapping to a genome requires eight nodes and takes four or five hours. On a single processor that would take more than four days to finish.

IS has recruited a dedicated HPC Systems Engineer to manage the environment and work directly with researchers using the systems. Accounts on Binar can be obtained by contacting the Help Desk at 6-8453 or umcmhelpdesk@umassmed.edu.

Electronic Classroom Upgrade

Mastering the tips and tricks of polling technology or image editing on a Macintosh or PC is now possible as a result of the upgrade in training lab S2-307D. The upgrade included the installation of 17 20-inch display Intel Macintosh desktops and the testing of applications in both the Mac and PC environments with a user-friendly interface to toggle between platforms. This allows the learner to use their preferred platform in class. The Mac desktops create a streamlined, updated and friendly learning environment.

Shared clinical research vision

continued from page 4

the Trusted Independent Data Environment (TIDE).

TIDE is located in the Medical School data center but has its own security infrastructure and processes. The TIDE environment includes dedicated firewalls and intrusion detection systems, restricted access (only authorized data repository developers), two-factor secure ID authentication and rigorous auditing. Additionally, all developers receive training in the Protection of Human Subjects. The environment is designed to securely host and process data from multiple sources. It is similar to the environments that are already in place to support the University’s PeopleSoft and the campus’ Commonwealth Medicine programs. The AHR Staging Server is located within the TIDE.

MICARD is the UMass Medical School implementation of i2b2 CRC for research. UMSMS was among the first academic health centers to adopt the i2b2 framework. There are now 20 academic health centers implementing this framework. MICARD currently operates as an i2b2 cell that can receive, process and respond to data requests from anywhere. The MICARD workbench allows investigators to quickly determine if a patient cohort with a specific clinical characteristic exists in the system, which facilitates proposal development and Internal Review Board workflow. Additionally, the system will report the availability of consented biospecimens.

UMMS and UMass Memorial have created MICARD to provide an information platform for translational medicine. Its success is the result of effective data warehouse development, organizational cooperation and the support of executive management at both institutions.