

**DEPARTMENT OF HEALTH AND HUMAN SERVICES
NATIONAL INSTITUTES OF HEALTH
NATIONAL LIBRARY OF MEDICINE**

**MINUTES OF THE BOARD OF REGENTS
February 10-11, 2009**

The 150th meeting of the Board of Regents was convened on February 10-11, 2009, at 9:00 a.m. in the Board Room, Building 38, National Library of Medicine (NLM), National Institutes of Health (NIH), in Bethesda, Maryland. The meeting was open to the public from 9:00 a.m. to 4:15 p.m., followed by a closed session for consideration of grant applications until 4:30 p.m. On February 11, the meeting was reopened to the public from 9:00 a.m. until adjournment at 12:00 p.m.

MEMBERS PRESENT [Appendix A]:

Dr. Cynthia Morton [Chair], Brigham and Women's Hospital
Dr. John Connolly, University of California, Irvine
Dr. Carol Friedman, Columbia University
Dr. C. Martin Harris, The Cleveland Clinic Foundation
Dr. O. Wayne Isom, New York Presbyterian-Weill Cornell Medical Center
Mr. Bruce James, Nevada New-Tech, Inc.
Dr. Louis Rossiter, The College of William and Mary
Ms. Eileen Stanley
Ms. Virginia Tanji, University of Hawaii at Manoa

EX OFFICIO AND ALTERNATE MEMBERS PRESENT:

Dr. Michael Corriere, U.S. Department of the Navy
Ms. Gail Graham, Veterans Health Administration
Dr. Steven Galson, Office of the Surgeon General, Public Health Service
MGEN Bruce Green, U.S. Department of the Air Force
Dr. Haym Hirsh, National Science Foundation
Dr. Deanna Marcum, Library of Congress
Ms. Maria Pisa, U.S. Department of Agriculture
Col. John Powers, U.S. Department of the Army
Dr. Charles Rice, Uniformed Services University of the Health Sciences

CONSULTANTS TO THE BOR PRESENT:

Dr. Tenley Albright, Massachusetts Institute of Technology
Dr. Holly Buchanan, University of New Mexico
Dr. Thomas Detre, University of Pittsburgh
Dr. H. Kenneth Walker, Emory University School of Medicine

SPEAKERS AND INVITED GUESTS PRESENT:

Mr. Jonathan Chen, University of California, Irvine
Dr. John Childs, Optical Society of America
Dr. Roderic Pettigrew, Director, NIBIB
Dr. Matthew Scotch, Yale University
Dr. William Stead, Vanderbilt University

MEMBERS OF THE PUBLIC PRESENT:

Mr. Jon Eisenberg, National Research Council
Ms. Grace Klonoski, Optical Society of America
Mr. Herb Lin, National Research Council
Mary Lindberg, Public
Dr. Susan Phillips, Iowa Medical Center
Ms. Elizabeth Rogan, Optical Society of America
Dr. Craig Shadur, Iowa Medical Center
Mr. Thomas West, The Krasnow Institute
Mr. Robert Zeff, Iowa Medical Center

FEDERAL EMPLOYEES PRESENT:

Dr. Donald A.B. Lindberg, Director, NLM
Ms. Betsy Humphreys, Deputy Director, NLM
Dr. Michael Ackerman, High Performance Computing & Communications, NLM
Ms. Dianna Adams, Office of the Director, NLM
Ms. Stacey Arnesen, Division of Specialized Information Services, NLM
Ms. Joyce Backus, Division of Library Operations, NLM
Dr. Stephen Bryant, National Center for Biotechnology Information, NLM
Ms. Martha Byrnes, Division of Library Operations, NLM
Dr. Elizabeth Campbell, Lister Hill Center, NLM
Capt. Mary Chaffee, Division of Specialized Information Services, NLM
Mr. Bruce Cheng, Lister Hill Center, NLM
Ms. Deidre Clarkin, Division of Library Operations, NLM
Ms. Kathy Cravedi, Office of Communications & Public Liaison, NLM
Dr. Milton Corn, Division of Extramural Programs, NLM
Mr. Ivor D'Souza, Office of the Director, NLM
Ms. Celeste Dade-Vinson, Office of the Director, NLM
Mr. Todd Danielson, Executive Office, NLM
Mr. Andrew Diggs, Division of Extramural Programs, NLM
Ms. Mary Kate Dugan, Division of Library Operations, NLM
Ms. Kathel Dunn, Division of Library Operations, NLM
Ms. Gale Dutcher, Division of Specialized Information Services, NLM
Ms. Martha Fishel, Division of Library Operations, NLM
Dr. Jim Fleshman, National Center for Biotechnology Information, NLM
Dr. Valerie Florance, Division of Extramural Programs, NLM
Mr. Mike Gill, Lister Hill Center, NLM
Ms. Mary Hollerich, Division of Library Operations, NLM
Dr. Zoe Huang, Division of Extramural Programs, NLM
Ms. Christine Ireland, Division of Extramural Programs, NLM
Dr. Alla Keselman, Division of Specialized Information Services, NLM

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Dr. John Kilbourne, Division of Library Operations, NLM
Mr. Sheldon Kotzin, Division of Library Operations, NLM
Ms. Lisa Lang, Division of Library Operations, NLM
Mr. Blaine Lee, Office of the Director, NLM
Dr. Simon Liu, Office of Computer and Communications Systems, NLM
Mr. Howard Lu, Lister Hill Center, NLM
Dr. Robert Logan, Office of Communications & Public Liaison, NLM
Ms. Becky Lyon, Division of Library Operations, NLM
Dr. Clement McDonald, Lister Hill Center, NLM
Dr. Christopher Miller, Lister Hill Center, NLM
Ms. Melanie Modlin, Office of Communications & Public Liaison, NLM
Mr. Dwight Mowery, Division of Extramural Programs, NLM
Mr. David Nash, Office of the Director, NLM
Dr. Aaron Navarro, Lister Hill Center, NLM
Dr. Stuart Nelson, Division of Library Operations, NLM
Dr. Glenn Pearson, Lister Hill Center, NLM
Dr. Arthur Petrosian, Division of Extramural Programs, NLM
Dr. Steven Phillips, Division of Specialized Information Services, NLM
Ms. Shana Potash, Office of Communications & Public Liaison, NLM
Dr. Mahmudur Rahman, Lister Hill Center, NLM
Dr. Barbara Rapp, Office of Health Information Program Development, NLM
Ms. Julia Royall, Office of Health Information Program Development, NLM
Mr. Jerry Sheehan, Office of the Director, NLM
Dr. Elliot Siegel, Office of Health Information Program Development, NLM
Dr. Hua-Chuan Sim, Division of Extramural Programs, NLM
Dr. George Thoma, Lister Hill Center, NLM
Dr. Jane Ye, Division of Extramural Programs, NLM

I. OPENING REMARKS

Dr. Cynthia Morton, Chair, welcomed the Regents, alternates and guests to the 150th meeting of the Board. She introduced Mrs. Maria Pisa, Associate Director for Public Services, National Agricultural Library, Mr. Jonathan Chen from the University of California, Irvine and Dr. Matthew Scotch from Yale University. She noted that the first report would be from Dr. Steven Galson, United States Acting Surgeon General.

II. REPORT FROM THE OFFICE OF THE SURGEON GENERAL

Dr. Steven Galson noted that the transition to the Obama Administration is going smoothly. He continues his tenure as the Acting Surgeon General. After the Inauguration, he assumed the position of Acting Assistant Secretary of Health. He has been spending most of his time on the

prevention of childhood overweight and obesity, and traveling to about 35 states to work with State health departments, academic institutions, and community health centers. Progress has been made in the development of new programs and a coordinating council within the Department to encourage new work in this area.

Other initiatives underway within the Office of the Surgeon General (OSG) include a focus on prevention of underage drinking, a result of a 2007 call to action by the former Surgeon General. Dr. Galson continues to work with the first ladies of the States to get out the word about the use of alcohol among young people. The OSG also released a *Call to Action to Prevent Deep Vein Thrombosis and Pulmonary Embolism*, a health condition that many people don't understand which kills many Americans every year.

The OSG also had a national conference on pre-term birth. They worked very closely with the National Institute of Child Health and Development, the March of Dimes, and other organizations. The percentage of children born pre-term in this country goes up each year, in spite of the country's health and wealth. This is a significant public health problem.

Lastly, OSG is working with the National Human Genome Research Institute (NHGRI), to develop a Family Health History online tool for families to share and talk about disease and health conditions that run in the family. The new tool, a collaborative effort with the National Cancer Institute, NHGRI, and the Office of the National Coordinator for Health Information Technology, HHS, will be available on the Surgeon General's Web site.

Betsy Humphreys asked when the new Family Health History tool would be released. Dr. Galson said it is already publicly available online. He noted that they haven't seen numbers yet on the actual usage; the site needs more promotion. Dr. Morton remarked that it is a powerful tool that should be promoted because good medical histories aren't going to take place in the doctor's office. Dr. Galson agreed and said that the Family Health History is meant for families to share with their family members. Gail Graham noted that the Veterans Administration has incorporated the tool into their Web site.

III. REPORT FROM THE NATIONAL INSTITUTE OF BIOMEDICAL IMAGING AND BIOENGINEERING

Dr. Roderic Pettigrew, Director of the National Institute of Biomedical Imaging and Bioengineering (NIBIB), presented a report on the purpose and the priorities of the Institute. He opened his remarks by recognizing Dr. Kenneth Walker as an Emory product who is known affectionately as "Ken" by every Emory student.

NIBIB, which is approaching its seventh anniversary, is the youngest Institute. It was signed into law by President Clinton in 2000 and began its work in 2002. Its mission is to integrate physical

and engineering sciences with the life sciences and to advance basic research and medical care. Its mandate is broad, and the areas of research range from biomaterials to conventional and imaging energy technologies. NIBIB has some joint initiatives with NLM, including interdisciplinary science and research and health information technology. NIBIB has areas of emphasis on advanced imaging techniques, minimally to noninvasive interventions, point of care technologies, regenerative medicine and nanomedicine.

Dr. Pettigrew described work NIBIB is doing that uses a sophisticated imaging tool to understand human thinking processes. Research is also underway to investigate and understand higher levels of information processing. One example he presented allows researchers to observe neurological signals and to interpret what those signals mean to translate thoughts. This particular research was featured on CBS's *60 Minutes*. Correspondent Scott Pelley is shown on a film clip presented by Dr. Pettigrew; he is thinking of a word he wants to communicate. He looks at the letters on the screen one at a time and spells out the word mentally. The grantees are able to tell Scott Pelley the word that he is thinking about via the technology's ability to interpret his thoughts.

Dr. Pettigrew discussed NIBIB's "Quantum Grants Program" (QSP), referred to as "medical moon shots." These grants are meant to make substantial advances in solving major medical problems, regarding high-incidence diseases. An example is NIBIB's support of research to develop a treatment for post-stroke patients, to prevent progressive loss and restore function. Underway at Baylor College of Medicine, this research aims to engineer a complete neurovascular unit and implant it in the patient's brain. Northwestern University is focusing on nerve repair using nanotechnology. Another grantee doing work in nerve repair, but using a different approach, is at the Georgia Institute of Technology.

Another QSP goal is to detect one circulating cancer cell in a billion normal cells long before visible metastasis occurs. A desired impact of this study at the Massachusetts General Hospital would be to reduce significantly the number of cancer deaths. NIBIB is also involved in point-of-care testing, to move modern health care to the patient in rural settings. An example of this is an optofluidic microscope that costs \$10 and is deployable.

In e-health, the State University of New York is looking at ways of measuring patients' vital signs in the home and transmitting them securely to physicians' offices via wireless devices. Already tested with congestive heart failure patients, this technology has resulted in a reduction of hospitalizations. NIBIB research is increasingly focused away from the hospital and toward the home, with an emphasis on noninvasive therapies. Molecular theragnostics (the pairing of diagnosis with treatment) are also of interest.

Dr. Detre asked if there is a connection between the Department of Defense (DOD) and the work in which NIBIB is involved. Dr. Pettigrew said that they are actively involved in working with

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the Armed Forces Institute of Regenerative Medicine (AFIRM), and he would be leaving the Board meeting to attend a meeting with the Institute. AFIRM is sponsored by the DOD and the NIH. Dr. Albright asked ex officio member Dr. Rice of the Uniformed Services University of the Health Sciences if he would discuss the neuroscience and regenerative medicine work that he is doing. He responded that he is going to the same meeting that Dr. Pettigrew is going to, so they are working together. However, Dr. Rice added that they are focusing on an exciting Congressionally-funded, post-traumatic stress disorder project as well.

IV. CONSIDERATION OF MINUTES FROM PREVIOUS MEETING

The Regents approved without change the minutes from the September 16-17, 2008 meeting.

V. DATES FOR FUTURE BOARD OF REGENTS MEETINGS AND BOARD RESOLUTIONS OF APPRECIATION

The Board of Regents will meet next on May 5-6, 2009. The Fall Board meeting is September 15-16, 2009. The dates of February 2-3, 2010 were approved for the following meeting.

The Board approved resolutions of appreciation for the work of Dr. Donald W. King and the Honorable Paul Rogers. Rather than read the entire resolution, Dr. Morton read the summary of each resolution. The summary of the resolution for Dr. Donald King follows:

The Board of Regents of the National Library of Medicine by this resolution applauds the many significant contributions Donald West King, M.D. has made to the NLM and recognizes him for the motivating force he has been in promoting and improving the dissemination of information that has enhanced medical research, education, and health care in the United States and around the world.

The summary of the Resolution for the Honorable Paul Rogers follows:

The Board of Regents of the National Library of Medicine by this resolution recognizes the towering contributions that the Honorable Paul G. Rogers has made to the NLM across five decades. One of the Library's greatest champions ever, Mr. Rogers was a singular force in improving the dissemination of biomedical information, which has greatly enhanced medical research, medical education and health care in the United States and around the world.

The complete texts of the resolutions are included in Appendix B.

VI. REPORT FROM THE NLM DIRECTOR

Dr. Donald Lindberg noted that NLM has been operating under a continuing resolution that

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extends through the first week of March. He discussed new NLM appointments. Melanie Modlin has been chosen to be Deputy Director of the Office of Communications and Public Liaison (OCPL) effective January 5, 2009. She will be working with Kathy Cravedi, Director of OCPL. Both Kathy and Melanie worked for Congressman Claude Pepper when Kathy was his Chief of Staff. We are pleased to have Melanie with us.

Stacy Arnesen has been promoted to head the Office of the Disaster Information Management Research Center. She is another long-term employee of the Library and does a wonderful job. Dianna Adams has been appointed as Head of the Desktop Services Section. Dr. Steven Phillips, Sheldon Kotzin, and Dr. Clem McDonald then introduced new appointees to Specialized Information Services Division (SIS), Library Operations (LO), and the Lister Hill Center (LHC).

Dr. Phillips introduced Dr. Alla Keselman, who joined the SIS in December. She holds a PhD in human cognition and learning and an MA in biomedical informatics from Columbia University. Sheldon Kotzin introduced Dr. John Kilbourne, who has an MD from the University of Illinois and who, after practicing in Chicago, joined the SNOMED division of the College of American Pathologists as a clinical editor. He is working on health data standards, RxNorm, and the UMLS. Dr. McDonald introduced three fellows: Dr. Mahmudur Rahman, who holds a PhD in computer science from Concordia University; Dr. Christopher Miller, who has an MD from the University of Iowa and was a postdoctoral fellow in Sleep Medicine, Neurobiology and Epidemiology at Case Western Reserve; and Dr. Melissa Campbell, a postdoctoral fellow who earned a BS in mathematics and an MD from Creighton.

Dr. Lindberg said that Health IT legislation is likely to be a priority in the 111st Congress. Public access legislation introduced at the end of the 110th Congress would effectively nullify the mandatory NIH Public Access Policy, which was authorized by the House Appropriations Committee in December 2007. Under the mandatory policy, published research that was funded by the NIH must be deposited within a year in PubMed Central (PMC). The program is working well, and the intent of the new bill introduced in Congress would be to undo it. Dr. Lindberg noted encouraging news regarding improved submission rates under the now mandatory NIH Public Access Policy. A Board working group chaired by Dr. Detre reported to the HHS Secretary that the voluntary policy of submission of NIH-funded papers to PMC had poor compliance. It was functioning at around 2-3%. Congress responded by making submissions mandatory. Now, about 56% of all NIH-funded research is appearing in PMC.

The Board Working Group on ClinicalTrials.gov met to determine how NLM is doing to meet legislative requirements to include results reporting. The clinical trials registration has been a huge success and has been voluntarily used by the 105 countries outside the U.S. Legislation requiring deposit of results of clinical trials presents more difficult problems. The Board Working Group has been extremely helpful. The law also requires a public hearing on these matters which is scheduled for April 20. Members of the Board are welcome to attend. To

summarize, the NLM team has developed software for results reporting that is amazingly good. About 400 trials have reported results so far. The problem is not for NLM to absorb the information, but for the world to submit the information accurately and on schedule.

Dr. Lindberg attended The International Conference on Behavioral Health and Traumatic Brain Injury (TBI) in New Jersey and reported on NLM's information resources on this topic for families and the public. NLM does a pretty good job; however, the severity and magnitude of the problem has been underestimated. It is unknown what percentage of persons with TBI also suffers from post-traumatic stress disorder (PTSD). Estimates range from 15-20% to nearly 70%. Many new questions are being raised about when diagnosis should take place. Most experts feel that early diagnosis should take priority, hence the relevance of NLM's informational resources. NLM followed up on this conference by inviting Dr. Maria Mouratidis of the Bethesda Naval Medical Center to NLM to discuss her work with returning troops from Iraq suffering from TBI and PTSD. (MedlinePlus covers both of these topics well.) How to get information into the hands of patients, families and friends is another challenge. Ms. Graham mentioned that the Veterans Administration (VA) has trauma centers that are screening all returning veterans for TBI and PTSD. Dr. Lindberg mentioned that there are an estimated 2.5 million veterans that have had no contact with the VA. Ms. Graham noted that their new Secretary, an injured Vietnam veteran, is very interested in this topic.

NIH's first *Biennial Report of the Director*, covering fiscal years 2006 and 2007, was released in January 2009. It can be found at <http://biennialreport.nih.gov>.

NIH MedlinePlus magazine is doing very well and is now available in a Spanish/English version, *Salud*, which was paid for in part by funds from private organizations.

The Exhibition Program at the NLM develops engaging programs about the social and cultural history of science and medicine for visitors. Over the past decade, it has also developed several traveling exhibitions. The first was *Frankenstein: Penetrating the Secrets of Nature*, developed in collaboration with the American Library Association. It has traveled to 82 libraries in 38 states, reaching 1.1 million visitors. The second, *Changing the Face of Medicine: Celebrating America's Women Physicians*, will visit 61 libraries in 36 states over five years. With support from the Office of the NLM Director, a third copy of *Changing the Face of Medicine* is now touring 24 medical school libraries. Other exhibits currently traveling include: *Opening Doors: Contemporary African American Academic Surgeons*; *Harry Potter's World: Renaissance Science Magic, and Medicine*; and *Against the Odds: Making a Difference in Global Health*. Not all libraries have the physical space to accommodate a large panel exhibition with computer kiosks. To reach this segment, NLM has launched a new exhibition product: a banner show with a smaller "footprint." Dr. Buchanan thanked Dr. Lindberg for the exhibits, noting that these give NLM a new entrée into communities. Dr. Albright said that *Changing the Face of Medicine* was very well received in Mississippi and there was the ability to add names of other noted women

physicians to the exhibit.

VII. BETHESDA HOSPITAL EMERGENCY PREPAREDNESS PROJECT (BHEPP) UPDATE

Dr. Steven Phillips introduced Capt. Mary Chaffee, who is coordinating research efforts related to the emergency preparedness partnership between the Bethesda National Naval Medical Center, the NIH Clinical Center, Suburban Hospital and NLM. Capt. Chaffee presented an overview of each of the projects.

A functional hospital depends on intact facilities. In disasters, of course, there are disruptions to critical systems, and communication problems as well. Yet people have a high expectation that hospitals will continue to function. She presented examples of situations hospitals have encountered during disasters in which all systems failed and evacuation was required. The problems were compounded by difficulties in communication systems. After the sarin attack on the Tokyo subway, hospitals received more than 5,500 requests for care, even though there were only about 500 injuries sustained. In 2001, there was a massive request for screening in DC following the anthrax scare. The three hospitals that received patients following the 9/11 attack in New York saw a huge influx in emergency room patients. Normally seeing around 10 patients an hour, they were faced with 175 an hour. Bellevue, St. Vincent's and NYU hospitals were overwhelmed. BHEPP looks to address the disruption of critical systems.

NLM joined BHEPP last year and it was a perfect fit. The funding NLM has received supports projects that strengthen communications interoperability during disasters, maintain access to information, and support responder/receiver education. The research projects can be grouped into four different areas: patient management, maintaining communications, accessing information, and education. Three NLM divisions are participating in the 11 BHEPP projects. At OCCS, Simon Liu heads the Digital Pen Recording of the Triage Data project. If a hospital has to triage patient data quickly, the digital pen offers that potential. BHEPP will be evaluating use of digital pens that record disaster patient triage data and uplink the data to a computer database for use by hospital administrators. This project will be executed at Suburban. Of course, the digital data has to go somewhere. Dr. Liu and his team are creating a Patient Data Exchange so that hospital facilities can share patient data in a disaster. Redundancy is important in time of disaster. BHEPP is looking at redundancy of communications among the three hospital partners. They will use lasers and dark fiber communications, mounting lasers on the roofs of the three hospital partners to transmit data. Another one of Dr. Liu's innovative projects is evaluating patient tracking with radio-frequency identification (RFID). In this pilot, he will use RFID to track patients and major equipment during disasters. SIS's Dr. Victor Cid is working on a pilot called the Military Affiliate Radio Systems (MARS) Radio Backup. His team will build a system that will take advantage of the MARS infrastructure for moving information via radio in a disaster. Dr. Liu's team is also building a Wireless Communications Bridge which will evaluate

whether BHEPP partners are able to link different types of equipment permitting cross-device communications. The need to provide families with information about their loved ones during a disaster is incredibly important, and difficult. BHEPP will use Lost Person Finder, an electronic database built so that data can be used to facilitate family reunification. Users will be able to go to a Web site and learn whether their family member is at the hospital. Accurate information about patient prescriptions is critical. LHC's Dr. Clem McDonald has designed a project, SureScripts-Rx Hub Prescription Data Access, to provide clinicians with critical data. SIS's Cindy Love is working with others on developing The Disaster Information Specialist, a project that uses librarians as key resources to support emergency personnel in disaster activities. Victor Cid is creating a 3-D online hospital environment called Virtual World Interactive Disaster Training. This online "virtual" hospital will help hospital staff train for disasters in a realistic, cost-effective way.

Capt. Chaffee was asked to comment on whether the patient information piece involves a database independent from the hospitals' systems or whether it would interface with the hospitals' existing systems, to get patient information out. She said it was a separate system. Dr. Connolly mentioned that California has sophisticated disaster response systems in place and wondered if DC did as well. If successful, it was observed that this partnership could be replicated in other US cities. Another Regent noted that keeping track of providers and privacy issues can also be problems during a disaster. Is there a plan to develop a common credentialing and privileging system in case providers move from site to site? Capt. Chaffee mentioned that they have considered various tagging systems, but are not doing it right now. A Regent asked if water storage has been considered. Capt. Chaffee said a study of water storage is needed and noted that these are the first round of projects underway, but research to address other issues will follow.

VIII. APPOINTMENT OF NOMINATION COMMITTEE FOR BOARD CHAIR

Dr. Deanna Marcum will chair the Nomination Committee for Board Chair. Also serving on the Committee will be Gail Graham and Dr. Charles Rice. Dr. Marcum will present the Committee's nomination to the Board in May.

IX. PRESENTATION OF FRANK B. ROGERS AWARD

Dr. Lindberg presented the Frank B. Rogers award to Ms. Terry Wittig. The Award is given to the NLM employee who has made exceptional contributions to NLM's operations and services. Ms. Wittig received the award for her excellent leadership in developing an active program for licensing e-journals and other NLM electronic resources.

X. COMMUNICATIONS NETWORK THROUGH 2030

Dr. Simon Liu, Director of the Office of Computer and Communications Systems (OCCS), discussed the critical role that networking technology plays in helping NLM fulfill its mission. Constant addition of information and expanded use of services keeps OCCS on its toes, but multiple providers and diverse routes help ensure reliability. The NLM network supports the Library's internal computing resources and high-speed connections to external networks — the NIH Campus network, the NIH Consolidated Collocation Site (NCCS) in Sterling, VA, the public Internet and the research-oriented Internet2 (I2).

Dr. Liu then presented a series of charts illustrating the dramatic growth of the network (especially since the introduction of free MEDLINE in 1997) and the increasing speed with which data can be downloaded. In 1970, the vast Visible Humans dataset would have taken 1.6 years to download, a task completed in 48 seconds today. That acceleration continues. In 2008, NLM became the first organization in the Washington area to connect to I2 at a speed of 10 Gigabits per second (Gbps) via the Mid-Atlantic Exchange (MAX). MAX is a consortium of private and public laboratories, agencies, universities, corporations and non-profits.

Dr. Liu described how the NLM networking and security teams collaborate to provide firewall, virus, security and performance monitoring of the networks. (One such mechanism is the Network Weather Map, which identifies and eliminates traffic load bottlenecks.)

What future opportunities and challenges lie ahead? Greater bandwidth is around the bend, with speeds up to 40 Gbps. With Internet Protocol version 6 (IPv6), many more IP addresses will be available and service quality will improve. (NLM is currently IPv6 capable.) Greener networks are coming. Companies are miniaturizing equipment and developing Integrated Services Routers, which combine many functions and use considerably less power.

Dr. Friedman asked what the biggest IT challenge at the Library would be through 2030. Security, Dr. Liu replied; hacking tools are increasingly sophisticated and an expanding cyberspace creates many more targets. Dr. Isom expressed concern about the number of students being trained in IT security. Ex officio alternate Dr. Hirsh from the National Science Foundation had the gloomy report: since the dot com bust, there's been a 70% drop in enrollment in undergraduate IT degree programs even though demand for IT jobs now exceeds that of the dot com boom. Asked how much money OCCS will need for the network over the next five years, Dr. Liu said that I2 offered great capacity, so most funds should go toward security. (Current cost of operating the network is several million dollars a year, he noted.) Dr. Buchanan suggested NLM consider collaborating with the National Security Agency's Centers for Information Assurance. Dr. Albright asked whether NLM could handle the volume, were it to become the repository of the nation's electronic health care records. Dr. Liu observed that storage is no problem, but that, again, security would be the prime concern.

Dr. Hirsh quoted a 2007 study showing that computer data storage doubles every nine months. He asked what ramifications cloud computing might have for NLM. Dr. Liu replied that OCCS was carefully studying that approach. NLM's Dr. Michael Ackerman noted that Lister Hill Center supports research on how people can access NLM resources via different platforms. Asked how NLM stacked up against the rest of NIH in terms of network activity, Dr. Liu replied that NLM accounts for 75% of outgoing traffic. He told the Board that Chief Information Officers from all NIH components meet often to share information on security, capacity and other topics.

XI. NLM COLLECTION SPACE THROUGH 2030

Ms. Mary Kate Dugan, Preservation and Collection Management Section, and Ms. Dee Clarkin Collection Access Section, laid out the 2008-2012 expansion plan for the Library's collection space. Without it, NLM would reach storage capacity in 2010 with no room for growth.

The Library's holdings are housed on three underground floors, each the size of a football field, holding materials on more than 50 miles of shelving. When NLM opened in 1962, it had space for 1.5 million volumes. Today, the Library houses 2.5 million volumes. This does not include more than six million non-book items, such as audiovisuals and microforms. This 66% increase in capacity came about with the installation of compact shelving on the lowest level, which is built on bedrock, in the early 1970s.

With plans for a new building on hold, there was a renewed urgency to solve the storage problem. Given recent advances in floor-strengthening technology, NLM had another underground floor tested for weight load capacity and the amount of floor strengthening required before compact shelves could be installed. In fall of 2008, a thin but surprisingly strong layer of fiber-reinforced polymer composites was bonded to a 4,000-square foot area of the floor using an epoxy adhesive. The first set of compact shelves will be installed on the B2 level in March 2009.

Once the floor strengthening is complete and B2 is filled with compact shelves, the Library's collections can expand in this building until 2030. There will be other improvements, too: enhanced lighting and sprinkler systems, plus technologies to regulate temperature and humidity in the stacks. Plans also include the creation of work space for 35 staff members.

A temporary offsite storage facility has been leased in Rockville, Maryland to house low-use collections during construction. Materials there are retrievable on demand, so the arrangement has had minimal impact on customer service. Once the five-year project is completed, all of the collections will be housed together under the domed roof of the NLM. (In addition to items temporarily stored in Rockville, part of the manuscripts collection is currently housed at the University of Maryland, Baltimore.)

All items on the second and third levels will be moved at some point in the process, which is disruptive, but the gains will be great. Upon completion, the Library will have 14 miles of additional shelving, and space for three million volumes — double its original capacity.

In a lively discussion, the Board discussed whether paper copies of books and journals will be necessary in the foreseeable future. Several challenges make hard copies desirable and necessary for the foreseeable future. NLM owns many items for which no high quality machine-readable copies exist. Copyright law prevents NLM from digitizing many items. In cases where publishers have digitized back volumes, restrictive licensing agreements may make it more difficult and expensive to provide “fair use” copies to remote users from electronic versions than it is to scan and deliver copies from the print volumes. Digital data require migration over time to ensure preservation, and this is more expensive and difficult when material is published in many different and ever changing electronic formats. The problem with much electronic data is that NLM, like other libraries, does not own it and must license its use. Whenever NLM has control over digital data and the right to preserve it, it has a great track record, Ms. Humphreys remarked. MEDLINE data originally created in 1966 is still searchable, for example. If current copyright law prohibits the digitization of some materials, could that law be changed, Mr. James asked. Ms. Humphreys responded that, unfortunately, although it was changed primarily to protect entertainment property for 70 years, the copyright law also prevents NLM and other libraries from digitizing many scholarly and scientific works. It has been tightened up considerably over the past 20 years. Dr. Walker asked whether NLM could digitize and launch its holdings only on on-site computers, but Ms. Humphreys replied that permission from copyright holders would still be needed. Dr. Hirsh pointed out that when an institution cancels an electronic subscription to a journal, the institution no longer has access to the journals from the years of his or her subscription, as opposed to still owning the physical copies if you subscribe to the non-electronic journal. Ms. Tanji commended the NLM team for planning and executing the expansion of the collection space and for its emphasis on preservation, pointing out that NLM *is* the medical library of last resort, at a time when many libraries are cutting back on space and subscriptions.

XII. TRAINING GRANT PRESENTATION: ARTIFICIAL INTELLIGENCE IN CHEMISTRY: “AN EXPERT COMPUTER SYSTEM FOR PREDICTING ORGANIC CHEMISTRY REACTIONS”

Jonathan Chen is an MD, PhD candidate in the School of Information and Computer Science at the University of California, Irvine (UCI), and an NLM Training Grant program fellow.

He discussed his project: to design an expert computer system to reproduce the core problem-solving capabilities for reaction prediction and discovery usually reserved for human chemists. The system is based on over 1,200 manually-composed reaction pattern rules. Why is it important to predict chemical reactions quickly and accurately? Almost all of biology and

chemistry is grounded in organic chemistry reactions, Mr. Chen commented. In more practical terms, an expert computer system would likely speed the path of drug discovery and development, since the vast majority of those substances are small organic molecules.

Mr. Chen and his UCI colleagues have collaborated on several chemistry databases, with the aim of catching up to the fields of biology and physics as far as large-scale, informatics-driven products that are available to the public. UCI ChemDB (developed alongside NCBI's PubChem) allows its creators to catalog and make publicly searchable every commercially available chemical compound known to exist.

But ChemDB is also a "technical sandbox," with plenty of room to play and explore. Reaction predictions are calculated on the spot, permitting free-form creativity. Virtually every aspect of undergraduate organic chemistry is represented — 80 reagent models, 1,500 reaction rules and 4,500 validation examples. UCI students who used the system had higher test scores than those who did not. As for the next step, Mr. Chen said that, rather than add 1,000 more rules, they will incorporate principle-driven simulations. Based on principles of physical organic chemistry, thermodynamics and kinetics, this new system should provide much more potential for the predictive system and possibly even discover new kinds of reactivity. This model is currently in development.

The Board commended Mr. Chen on his achievement and asked whether there was a reaction data Web site that could be used by the general public. He said that UCI had to pay about \$10,000 for a license to obtain data from a Russian company; Chemical Abstracts (from the American Chemical Society) would not share its information. Dr. Connolly said he hoped that Mr. Chen and ChemDB would help develop new anti-rejection drugs to be used in transplantation. Mr. Chen said he definitely is headed for a career in drug discovery and development. Dr. Stephen Bryant of NCBI, who works on PubChem, expressed hope that reaction data culled from the medical literature and other sources could be combined into a publicly accessible reaction data site at NLM. Mr. Chen said he thought that such a Web resource was inevitable, and was the right way to go.

XIII. TRAINING GRANT PRESENTATION: A MASH-UP TO HELP PUBLIC HEALTH PROFESSIONALS: "ZOONOTIC DISEASE SURVEILLANCE: COMBINING ANIMAL AND HUMAN DATA"

Matthew Scotch, PhD, MPH, is an NLM Training Grant fellow, conducting research under a career development award at Yale University. Like any mash-up, his project created a Web application which would combine data from multiple sources into a single, integrated tool. Dr. Scotch focused on zoonotic diseases, which are transmittable between humans and animals. This is an important area because the majority of emerging infectious diseases that affect humans are zoonotic.

His goal was to develop a public health informatics system to support the monitoring and assessment of disease risk in humans and animals. He presented a scenario involving a patient with tularemia, a zoonotic infectious disease also known as rabbit fever. Tularemia is rare in humans, but it's something to take seriously, because it can be used as a biological weapon. (Tularemia, anthrax, botulism, plague and viral hemorrhagic fevers are zoonotic diseases that the Centers for Disease Control and Prevention considers grave risks to national security.) The health of animals can be a sentinel for zoonotic disease in humans, allowing epidemiologists to predict disease trends in humans earlier, and reduce morbidity and mortality.

The doctor detecting a case would notify his state health department right away, and that office in turn would examine the case: why did the human become infected and what risks may be posed to others? There are other important questions on the animal side of the equation for consideration. Because rabbits are hosts of this disease, were any infected rabbits found in the area? How about other animals — were any cats with enlarged lymph nodes found nearby? (This is a possible sign of spread of the disease.) How about infected ticks, which may be transmitting the illness to humans from animals?

Unfortunately, the state health department has no direct link to local veterinarians, nor to state entomology databases (which would keep track of diseased ticks), nor to the agriculture department, which in effect serves as the state health department for animals. These data, which are so critical, are siloed in different sectors.

Dr. Scotch decided to harness Web 2.0 technologies to link animal and human health data, environmental data and other resources. This mash-up, he theorized, could analyze and detect clusters, trends and outbreaks, and show the geographical spread of disease and numerical charts and graphs through an interactive graphical user interface. Examining West Nile Virus (WNV) cases in Delaware and New Jersey, he took an existing Global Information System (GIS) tool developed by Zou et al. and reimplemented it using Web 2.0 data, to estimate WNV risk based on temperature data. Using Google Earth, which is available free online, he obtained readings from weather stations in the two states. Yahoo! Pipes was the composition tool he employed for aggregation and mash-up of Web content. So equipped, he could import weather data, human and animal disease data and other information, making calculations about WNV risk.

Dr. Scotch admitted that many of the Web 2.0 sites he used were unstable — they're not built to handle large public health datasets. However, those sites are improving and are still integral to public health informationist efforts to create automated surveillance systems. (This activity is particularly important because state health agencies today are cash-strapped and can't conduct the kind of in-depth surveillance they would like.) Looking ahead, Dr. Scotch hailed the Semantic Web (Web 3.0) for its potential to support querying of publicly available animal, human and environmental data.

Dr. Walker commended Dr. Scotch on his work and mentioned that Google can sometime pinpoint outbreaks of flu before public health officials, by counting the number of searches for “flu” coming in to the site. Dr. Hirsh asked whether Web 2.0 tools can be used by public health people who aren’t technologically skilled. Dr. Scotch said Yahoo! is making Pipes easier to use and there are other resources like Microsoft’s Popfly that are fairly intuitive.

Dr. Lindberg asked whether the mash-ups are generally reliable. Dr. Scotch said that they are, or if they falter in their aggregations and calculations, generally no data will appear at all, rather than erroneous data being generated.

XIV. EXTRAMURAL PROGRAMS REPORT

Dr. Corn first reported on recent honors for NLM grants management staff. Outgoing HHS Secretary Mike Leavitt, who was commendably sensitive to the value of health information technology, formed a group called the American Health Information Community (AHIC), which he himself chaired, to facilitate use of health IT. When Secretary Leavitt subsequently decided that a grant-funded private-public entity could work more efficiently, NLM was asked to provide assistance in handling the competition and grants management process. AHIC has been reborn as the National e-Health Collaborative, and may prove to have considerable importance in contributing to the policies governing use of funds related to health IT in the American Recovery and Reinvestment Act. In gratitude for the help provided by NLM, the Secretary invited grants officer Dwight Mowery and grants specialist Andrew Diggs to HHS, to present an award and to thank them personally.

Dr. Corn next asked the Board to act on an item at Tab VIIB, Guidelines in Adjustment by Staff in Time or Amount of Grant Award. Currently, EP staff has blanket authority from the Board to adjust sums up or down, and to alter time period of grants with the proviso that all administrative increases in excess of \$40,000 in direct costs must be reported to the Board for review at its next meeting. No change from past operating procedures was requested. Motion for approval was made and passed unanimously.

Dr. Corn directed the Board to Tab VIIC, Compliance with NIH Policy on Inclusion Guidelines. This policy reflects NIH guidelines to include women and minorities in all relevant clinical research. Every two years, governing bodies at NIH must receive a report on how well their Institute or Center is honoring that policy. Dr. Corn reported that NLM grant processes follow strictly all elements of the compliance policy. Motion to accept report was made and unanimously approved.

Dr. Corn next turned to conflict of interest (COI). He noted that NLM’s grantees focus on biomedical computing and are less likely than grantees at most other Institutes to be involved in clinical trials, although informatics-related trials are supported. NLM’s grantees are associated

with the same Institutions as grantees from other Institutes; therefore the COI policies with which NLM interacts vary from poor to excellent as judged by the American Medical Students Association. In the past three years, NLM has seen only one instance a year of a grantee's institution reporting a possible COI, usually related to software development in the area of genomics, or a training grant, and none to patient care. In all instances, the involved Institution reported later that the problem had been resolved, but provided no explanation as no details are required by current NIH policy. Recently, NIH has required that such COI notices be submitted to a central database in the Office of the NIH Director.

Dr. Rossiter asked whether NLM was open to risk of COI because software development has the potential to be so lucrative. Dr. Corn said he thought so, and that COI rules with more teeth in them were still needed at NIH. He revisited the case of Dr. Alan Schatzberg of Stanford University, who, as reported in the New York Times, 1/15/09, was conducting research on an anti-depressant drug used to treat children, and who owns the company that makes the drug. Stanford suspended him, "to avoid the appearance of impropriety", but defended his actions, as did the American Psychiatric Association, of which he is incoming president.

The current NIH policy on COI, Dr. Corn said, largely absolves NIH of direct responsibility. Acting NIH Director Dr. Raynard Kington said there will be a change in the COI policy in the next 6-12 months. NIH plans to publish a Notice of Proposed Rule Making in the *Federal Register* and solicit public comment. Dr. Morton asked the Board's consent to send a letter to Dr. Kington (a draft was furnished to members), urging a revision of NIH COI policies. Motion was made and unanimously approved.

Sens. Grassley and Kohl hope to add an amendment to the Stimulus Bill, asking NIH to focus on COI and requiring that any grant over \$250,000 must provide details on grantees' financial interests and how the institution would manage any COIs.

Dr. Valerie Florance, Deputy Director, Extramural Programs, described the NIH Loan Repayment Program (LRP) for health professionals. The purpose is to attract health professionals into clinical research careers. NIH will repay up to \$35,000 of qualified education debt per year in exchange for a comparable (in years) commitment to clinical research. Applicants must have a doctoral degree from an accredited institution doing research at a government or non-profit organization. Of the extramural NIH loan repayment categories (NLM does not fund intramural research grants), the Library participates in the Clinical Research and Pediatric Research LRPs, making on average four to six awards per year.

Interested in how this program is working, NIH decided to conduct an evaluation in 2009, using data from 2003-2007. Some highlights of the findings: for NIH, the ratio of female to male applicants was 45% to 55%, just the reverse of recent graduating MD and PhD classes. For both NIH and NLM, 2.5 more PhDs who apply are women than men, and twice as many applicants

who hold MD/PhD degrees are men. The average debt of an MD LRP applicant is \$114K (compared to \$97K for all MDs, in a statistic from the American Association of Medical Colleges). The average debt of a PhD LRP applicant is \$62K (compared to \$20K for all PhDs, in a statistic from the National Science Foundation). The vast majority (72%) of new LRP applicants apply within six years of receiving their degree, which is seen as a favorable sign of interest in research careers.

Other findings showed that the LRP program is increasing the retention of physician doctorates in the NIH extramural workforce, both through increased grant applications and participation in research activities. Women LRP awardees are less likely than men to be retained in the NIH extramural program, an issue which NIH will examine in greater detail. There was no significant difference between funded and unfunded LRP applicants in research productivity (as evidenced by publications, citations and grant applications and awards), but this may be because one to four years since an award is too short a period in which to measure applicants' productivity. (Also, Dr. Florance noted, these are not research grants but are loan repayment contracts.) NIH also expects to explore the long-term implications of having nearly equal proportions of physician doctorates and academic doctorates applying for LRP awards, since the program was originally designed to reach MDs. Finding that nearly 50% of LRP applicants are PhDs was an unexpected outcome.

XV. REPORT ON THE STUDY “ENGAGING THE COMPUTER SCIENCE RESEARCH COMMUNITY IN HEALTHCARE INFORMATICS”

Former NLM Board Chair Dr. William Stead of Vanderbilt University reported on [*Computational Technology for Effective Health Care: Immediate Steps and Strategic Directions*](#), a study recently published by the National Research Council of the National Academies that was chartered by the National Library of Medicine. The study examined what computer science researchers could do to help achieve the Institute of Medicine's vision of 21st healthcare IT that is patient-centered, evidence-based, and efficient. The project, which focused on electronic health records, was conducted under the auspices of the Computer Sciences and Telecommunications Board.

Dr. Stead, who chaired the study, explained how the study was done and the central conclusions that were reached. A committee consisting of experts in computer science and in biomedical informatics visited eight health systems considered leaders in applying IT to observe current health information systems in order to identify any problems that could be solved relatively easily by today's computer technologies, as well as larger challenges appropriate for computer science research. The eight sites visited represented a spectrum that included government owned, for profit, non-profit, academic, community, places using home-grown systems and those using commercial systems.

The study concluded that if efforts to deploy the current generation healthcare IT systems were accelerated, they would not achieve the Institute of Medicine's vision of safe, effective, patient-centered care and may even set back the cause. More emphasis should be placed on IT that helps users deal with cognitive tasks — helps them understand the clinical problem for which they are dealing and how to make choices about that problem. Whatever action is taken in the near future should be done in the context of measurable improvement in clinical quality.

Stead outlined numerous suggestions and recommendations. They include: putting the focus on clinical improvement that would encompass change in people's roles, the process, and technology rather than focusing solely on technology; recording all data available in any form so that it can be mined, rather than trying to get the data to mean the same thing in all the systems; increasing interdisciplinary research; and insisting that vendors decouple patient data from the systems that automate facilities.

Post-presentation discussion included how to get buy-in from the medical community, vendors, and the many parties that would be involved in any change. Dr. Lindberg noted that Dr. Stead undertook this project to find out whether there's a role for computer science in the hospital world, and he made sense of that assignment.

XVI. REPORT FROM THE CHAIR OF THE WORKING GROUP ON HEALTH DATA STANDARDS

Dr. William Stead next presented a preliminary report from the Board's Working Group on Health Data Standards, with assistance from Deputy Director Humphreys. The Working Group was charged to look at NLM's standards activities to determine whether they are useful and worth the resources devoted to them, to identify any new priorities and opportunities that play to NLM's strengths, and what resources would be needed to pursue them. The group will provide a written report in April 2009.

Ms. Humphreys gave a brief history of NLM's work related to health data standards, which began when NLM initiated its informatics training grants in the early 1970s. In mid-1980s, NLM increased intramural and extramural research related to terminology standards in the context of the UMLS project. In the early 1990s, due to expertise gained in the UMLS effort, NLM became involved in federal-wide policy discussions about standards for administrative and clinical data. NLM became even more involved after the passage of the Health Insurance Portability and Accountability Act (HIPAA). During the period between 1998 and 2003, when the NIH budget doubled, NLM began to provide support for the ongoing maintenance and dissemination of clinical terminology standards so they would be available for free US-wide use. It was during this time that NLM initiated contract support for LOINC, negotiated the US-wide SNOMED CT license, and developed RxNORM.

Dr. Stead summarized the group's findings, which noted that NLM is a major player in the health data standards policy and coordination. Most current NLM activities are useful and there's not much to trim, with the possible exception of pair-wise mapping of clinical vocabularies with billing codes. Areas that could use more funding include: a coordination/roadmap effort to drive use of standards where they provide significant benefit, outreach to people unaware of NLM products, research and development, and developing the next generation of the standards workforce.

The Working Group recommends establishing a formal office at NLM tentatively called Health Information Interoperability (as opposed to standards) to coordinate and manage the effort. Another recommendation is to work with the makers of drugs, devices and test kits to achieve standardized identifiers in labels, packaging, etc. Much like a bar code on a grocery item, information content would be identified at the point of manufacture and passed through the system. A third recommendation is to work with standards developers to define and test how information models, clinical data elements, and terminology value sets can work together to achieve health improvements in the near term, starting with newborn screening. A fourth recommendation is to provide more tools and services to help people incorporate standards in operational health IT systems. The final recommendation is to initiate a research and development effort with characteristics similar to the original UMLS project. The effort would revisit the goal of retrieval, integration and analysis of information from a variety of sources to help decision making in a variety of areas, including presenting a patient-centered view of data and knowledge in the clinical context.

Dr. Lindberg thanked the group for the report and recommendations.

XVII. REPORT FROM THE CHAIR OF THE WORKING GROUP ON CLINICAL TRIALS

Board Chair Dr. Cynthia Morton, Board member Dr. Louis Rossiter, and Dr. Deborah Zarin, who leads the ClinicalTrials.gov project, gave an update on the clinical trials and results database.

There currently are 67,000 trials registered. Results from more than 400 studies have been submitted in four months and that number is expected to increase substantially. The working group noted there are some issues that still need to be resolved. One is the quality of data submission. The clinical trials team is developing online materials to help the people providing data. The working group suggested stepping up outreach and education to the data providers, and also suggested that data providers may be able to share best practices among themselves. Another issue that needs to be resolved is NLM's role in verifying the quality of data before it's posted.

Dr. Zarin showed slides of a results page and explained what's seen on the site. She also showed

examples of quality problems. She noted the ClinicalTrials.gov team will never know if the data are valid. What the team looks for is whether the entries are meaningful, logical, and consistent. For example, the team flagged an entry reporting hours of sleep per day as more than 800. Dr. Zarin said determining where to draw the quality assurance line will determine the number and type of people needed to continue to support this effort.

XVIII. REPORT FROM THE SUBCOMMITTEE ON OUTREACH AND PUBLIC INFORMATION

Ms. Stanley reported on the subcommittee's meeting, which started with a discussion on how to inform and engage the public in understanding the clinical trials results database and providing display and linking features that will allow users to access individual trial results within a broader context. The subcommittee is examining NLM's educational outreach efforts and possible new activities to reach out to underserved populations and teach them about careers in health care. The Board got an update on *NIH MedlinePlus* magazine, which Ms. Stanley said "just keeps getting better and better." She also noted that *Salud*, the English/Spanish magazine, is now in print. Circulation for *NIH MedlinePlus* magazine continues to grow while funding remains an issue. The History of Medicine Division's exhibition program now has a new page on the NLM Web site listing all the traveling exhibits and how to sign up for them. The subcommittee also heard about recent activities related to the upcoming exhibit on Native American health and was updated on Go Local, which now covers more than 40 percent of the US population.

XIX. INTERACTIVE SCIENCE PUBLISHING

Dr. Michael Ackerman of the Lister Hill Center and Dr. John Childs for the Optical Society of America (OSA) told the board about a joint project, Interactive Science Publishing (ISP). NLM and OSA both have an interest in imaging and share the same vision of an interactive medium for scholarly publishing. Dr. Ackerman said that the goal is to develop an interactive software infrastructure allowing authors to submit not only their articles but also their databases to peer-reviewed publications. Readers and editors will be able to see and interact with the source data. In addition, the project will explore how to archive the material.

The ISP team plans to produce four volumes in this interactive genre, with each volume containing about 10 journal articles. For example, readers will be able to bring up an article, click on a picture and get the full CT scan behind the image, or click on a diagram and get the full table of data behind it. The databases also will go on the Web as open, freestanding resources that can be accessed and searched separate from the article. This may present an added benefit, because other people could use and cite the databases in their research. The reader software will be free. The project includes an editorial board, a software development and database group, and an evaluation and assessment group that will determine if ISP is worth the effort.

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Does ISP make a difference educationally to the reader by helping them learn and remember more? Dr. Ackerman said one ISP issue was completed in October 2008, with positive feedback. He and Dr. Childs then demonstrated ISP. Dr. Childs called up an article in an OSA journal, clicked on a link that took them to an image, and demonstrated how the image could be modified. He showed how it could be moved in three-dimensions, adjusted in terms of brightness or contrast, cropped, and measured to get an idea of tumor size, for example. Dr. Childs said that, in the future, authors may even be able to do voiceovers to explain their images. Dr. Ackerman said the second issue is about to be published and two other special issues are in process. Assessment is about to start and will continue through the fall of 2009. Dr. Morton asked if ISP can be downloaded to an iPod. Dr. Ackerman said not at present.

Dr. Marcum asked what NLM's role would be in archiving datasets. Dr. Childs said a reputable third-party server bank would be best to store the databases. Dr. Ackerman said they've already started talking with PubMed Central so both the article and datasets can be archived and accessible. Ms. Stanley asked about ownership. Dr. Childs said the articles and datasets are open source, so not really owned by anyone. Dr. Childs says they are interested in talking with other societies that might be interested in this technology. Dr. Ackerman noted ISP increases the reviewer's job because both the article and databases have to be reviewed.

XX. ADJOURNMENT

The Board of Regents meeting was adjourned at 12:00 p.m. on February 11, 2009.

ACTIONS TAKEN BY THE BOARD OF REGENTS:

- Approval of the September 16-17, 2008 Regents' Minutes
- Approval of February 9-10, 2010 Meeting Dates
- Board Resolutions of Appreciation for Dr. Donald W. King and the Honorable Paul Rogers
- Approval of the Grant Operating Procedures
- Acknowledgement of the Board Notification on the 2009 Biennial Report on Compliance with Inclusion Guidelines
- Board Vote on Letter to NIH Regarding Grantee Institution Conflict of Interest
- En Bloc Concurrence of NLM Grants

Appendix A - Roster - Board of Regents

Appendix B – Board Resolutions of Appreciation

Appendix C - Letter to NIH regarding Grantee Institution COI

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I certify that, to the best of my knowledge, the foregoing minutes and attachment are accurate and complete.

Donald A.B. Lindberg, M.D.
Director, National Library of Medicine

Cynthia C. Morton, Ph.D.
Chair, NLM Board of Regents