

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

**MINUTES OF THE BOARD OF REGENTS
September 19-20, 2006**

The 143rd meeting of the Board of Regents was convened on September 19, 2006, 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 4:40 p.m., followed by a closed session for consideration of grant applications until 5:00 p.m. On September 20, the meeting was reopened to the public from 8:30 a.m. until adjournment at 9:30 a.m.

MEMBERS PRESENT [Appendix A]:

Dr. Holly Buchanan [Chair], University of New Mexico
Dr. James Gray, Microsoft Research
Dr. Vasiliki Karlis, New York University, College of Dentistry
Dr. Cynthia Morton, Brigham and Women's Hospital

MEMBERS NOT PRESENT:

Mr. Richard Chabran, California Community Technology Policy Group

EX OFFICIO AND ALTERNATE MEMBERS PRESENT:

Ms. Eleanor Frierson, U.S. Department of Agriculture
Major General Thomas Loftus, United States Air Force
Dr. Kenneth Moritsugu, Office of the Surgeon General, PHS
Col. John Powers, U.S. Department of the Army
Dr. Dale Smith, Uniformed Services University of the Health Sciences
Dr. Sylvia Spengler, National Science Foundation
Ms. Mary Ann Tatman, U.S. Department of Veterans Affairs
Capt. Dan Wonderlich, U.S. Department of the Navy

CONSULTANTS TO THE BOR PRESENT:

Dr. Marion Ball, Johns Hopkins School of Nursing
Dr. Thomas Detre, University of Pittsburgh
Dr. H. Kenneth Walker, Emory University School of Medicine

SPEAKERS AND INVITED GUESTS PRESENT:

Dr. Benjamin J. Fregly, University of Florida

MEMBERS OF THE PUBLIC PRESENT:

Mr. Brian Carlsen, Apelon, Inc.
Mr. Peter Farnham, American Society for Biochemistry and Molecular Biology
Dr. John Greene, SRI International, Inc.
Ms. Erin Heath, American Association for the Advancement of Science
Mr. Naveen Hota, SCI

September 19-20, 2006 - Board of Regents

Ms. Stephanie Kart, American Society of Hematology
Mr. Somanath Lanka, SCI
Mary Lindberg, Public
Dr. Clement McDonald, Regenstrief Institute
Ms. Beth Nosma, American Association for the Advancement of Science
Ms. Alice Raanan, American Physiological Society
Ms. Michelle Rodrigues, SRI International, Inc.
Mr. David Sherertz, Apelon, Inc.
Mr. Mark Tuttle, Apelon, Inc.
Mr. Thomas West, Krasnow Institute

FEDERAL EMPLOYEES PRESENT:

Dr. Donald A.B. Lindberg, Director, NLM
Ms. Betsy Humphreys, Deputy Director, NLM
Dr. Donald King, Deputy Director for Research and Education, NLM
Dr. Michael Ackerman, High Performance Computing & Communication, NLM
Mr. Adbrahamane Anne, Associate Program, NLM
Ms. Caroline Ahlers, Lister Hill Center, NLM
Ms. Suzanne Aubuchon, Office of the Director, NLM
Ms. Mary Beth Bigley, Office of the Surgeon General, PHS
Ms. Chantelle V. Britton, Office of the Director, NLM
Dr. Dennis Benson, National Center for Biotechnology Information, NLM
Ms. Susan Buyer, Office of Health Information Program Development, NLM
Ms. Janet Coleman, National Center for Biotechnology Information, NLM
Ms. Marisa Conte, Associate Program, NLM
Dr. Milton Corn, Division of Extramural Programs, NLM
Ms. Courtney Crummett, Associate Program, NLM
Mr. Todd Danielson, Executive Office, NLM
Ms. Gale Dutcher, Division of Specialized Information Services, NLM
Ms. Robin Featherstone, Associate Program, NLM
Dr. Valerie Florance, Division of Extramural Programs, NLM
Mr. Mike Gill, Lister Hill Center, NLM
Ms. Wendy Hadfield, Executive Office, NLM
Ms. Mary Higgins, Office of the Director, NIH
Dr. William Hole, Lister Hill Center, NLM
Dr. Zoe Huang, Division of Extramural Programs, NLM
Ms. Christine Ireland, Division of Extramural Programs, NLM
Dr. Lawrence Kingsland, Lister Hill Center, NLM
Ms. Michelle Krever, Division of Extramural Programs, NLM
Mr. Sheldon Kotzin, Division of Library Operations, NLM
Dr. David Landsman, National Center for Biotechnology Information, NLM
Dr. David Lipman, National Center for Biotechnology Information, NLM

September 19-20, 2006 - Board of Regents

Dr. Simon Liu, Office of Computer and Communications Systems, NLM
Dr. Robert Logan, Lister Hill Center, NLM
Ms. Becky Lyon, Division of Library Operations, NLM
Dr. Wei Ma, Lister Hill Center, NLM
Ms. Amy McNeeley, Associate Program, NLM
Mr. Robert Mehnert, Office of Communication and Public Liaison, NLM
Mr. Dwight Mowery, Division of Extramural Programs, NLM
Dr. Aaron Navarro, Lister Hill Center, NLM
Dr. James Ostell, National Center for Biotechnology Information, NLM
Dr. Arthur Petrosian, Division of Extramural Programs, NLM
Dr. Barbara Rapp, Division of Library Operations, NLM
Ms. Alison Rollins, Associate Program, NLM
Ms. Julia Royall, Office of Health Information Program Development, NLM
Mr. Jerry Sheehan, Office of the Director, NLM
Mr. Mark Siegal, Division of Extramural Programs, NLM
Dr. Elliot Siegel, Office of Health Information Program Development, NLM
Dr. Hua-Chuan Sim, Division of Extramural Programs, NLM
Mr. Kent Smith, National Center for Biotechnology Information, NLM
Dr. Jack Snyder, Division of Specialized Information Services, NLM
Ms. Meredith Solomon, Associate Program, NLM
Ms. Marti Szczur, Division of Specialized Information Services, NLM
Dr. Frederick Wood, Office of Health Information Program Development, NLM

I. OPENING REMARKS

Dr. Holly Buchanan, Chair of the NLM Board of Regents, welcomed the Regents, alternates, consultants, and guests to the 143rd meeting of the Board. She noted especially the presence of Dr. Thomas Detre as a new consultant and two alternate ex officio members, Air Force Major General Thomas Loftus and Navy Captain Dan Wonderlich.

II. REPORT FROM THE OFFICE OF THE SURGEON GENERAL

Dr. Kenneth Moritsugu, Acting Surgeon General, commented on the timeliness of the newest NIH MedlinePlus Magazine about diabetes featuring Mary Tyler Moore. He said that he too is an insulin-dependent diabetic and he is glad that we are focusing on this issue. Dr. Moritsugu said that there have been a number of notable recent events emanating from the Office of the Surgeon General. Dr. Richard Carmona completed his 4-year term as Surgeon General at the end of July. A landmark Surgeon General's Report was released in June on the consequences of involuntary exposure to tobacco smoke. It is an update of a 1986 report and it is having a salutary effect on local and state governments that are attempting to combat second hand smoke exposure. Dr. Moritsugu described some of the many harmful health consequences of breathing second-hand smoke. He gave the Regents a copy of the Report, a CD-ROM version, executive

summary, and a low-literacy public summary. Also released (in late July) was the public version of “Improving the Health and Wellness of People with Disabilities.” The Office of the Surgeon General is now working on several other important matters: workshop proceedings on Women and Mental Health, workshop proceedings and a call to action on the effects of deep vein thrombosis, workshop on health literacy, and the Surgeon General’s Call to Action on the Prevention of Underage Drinking (soon to be released). Although some 15 Surgeon General actions are in the pipeline, those just mentioned are the most imminent. Dr. Moritsugu noted that all released documents are on the Web at www.surgeongeneral.gov; there are also links from NLM to the documents.

III. CONSIDERATION OF MINUTES FROM PREVIOUS MEETING

The Regents approved without change the minutes from the May 2006 meeting.

IV. DATES FOR FUTURE BOARD OF REGENTS MEETINGS

The Board of Regents will meet next on February 6–7, 2007. The Board meeting next spring is May 8–9, 2007. The dates of September 18–19, 2007, were adopted for the following meeting.

V. REVIEW OF NLM LONG-RANGE PLAN 2006-2016

Dr. Elliot Siegel, NLM Associate Director for Health Information Programs Development, said that NLM has many friends and colleagues and the extensive planning that NLM periodically undertakes gives them a chance to give us the benefit their views on where the Library is and where it should be going. The Library’s leadership has strongly supported this periodic seeking of outside advice to create a comprehensive plan for the NLM. Dr. Siegel briefly described how this planning round was organized and carried out last fall, winter, and spring. He emphasized that the plan is really a product of the NLM Board of Regents and that three successive Board chairs have been leaders in the planning process: Dr. William Stead, Dr. Thomas Detre, and Dr. Holly Buchanan. Other Regents closely involved have been Dr. Newt Gingrich, Dr. Kenneth Walker, and Dr. Richard Dean. Today the Board is to give a final review of the draft plan.

Dr. Thomas Detre said that he was amazed how well the system worked to produce a cohesive document. He said that an earlier National Academy of Sciences report concluded that one of the fundamental impediments to progress in biomedicine is that mathematics, physics, chemistry, biology, and engineering do not have sufficient impact on the knowledge base of biomedical science. What we have in this plan, however, is the potential to look at *all* the linkages possible with the biomedical and other sciences mentioned in the NAS report. He also said it has not been emphasized enough how important it is for the public (not just scientists) to have access to the NLM databases. He noted that the National Library of Medicine is the only place with widely available up-to-date information related to homeland security and dealing with disasters. Dr. Detre commented that the NLM plan makes repeated references to the importance of the

Electronic Medical Record; the NLM is the logical locus for informatics work related to the creation of an Electronic Medical Record system for the 21st century. This might be stated explicitly in the plan. He summed up by congratulating the staff and all involved in the creation of the plan for the “wonderful job” they did.

Dr. Holly Buchanan chaired a wide-ranging discussion of the Board of Regents about the Long Range Plan. Among the topics raised: the funding needed to implement the plan’s recommendations; how best to provide information (and knowledge) to “patients, families, and the public” and the need for research on consumer health information; biodefense; the Electronic Medical Record and the need for an interactive and graphic interface to it; the widespread problem and serious challenge presented by “health literacy”; and the problem of space for the Library’s programs.

A motion to approve the Long Range Plan as written was passed unanimously by the Board of Regents. A second motion, that NLM staff, with Dr. Detre’s assistance, analyze the resources necessary to implement the Long Range Plan and report back to the Board at its February 2007 meeting, was also passed unanimously.

VI. REPORT FROM THE NLM DIRECTOR

Dr. Donald A.B. Lindberg reported that there is as yet no action on the FY 2007 budget by the Congress. The House appropriation provides for a level of \$313.3 million; the Senate for a level of \$315.3. Not included in these figures is \$8.2 million for health services research activities which is funded by the HHS Secretary. In the area of personnel, Dr. Lindberg said that Dr. Clem McDonald from the University of Indiana has been appointed Director of NLM’s Lister Hill National Center for Biomedical Communications. In another high-level appointment, Mr. Sheldon Kotzin has been named NLM Associate Director for Library Operations. The NLM Director also noted the retirements of Dr. James Knoben from the Division of Specialized Information Services and Carolyn Tilley, who was the long-time head of the Medlars Management Section. Dr. Barbara Rapp then introduced the new NLM Associate Fellows: Abdrahamane Anne (from Mali), Marisa Conte, Courtney Crummett, Robin Featherstone, Amy McNeely, Alison Rollins, and Meredith Solomon. Dr. Donald King reported that at the recent Lister Hill Center Board of Scientific Counselors two projects were presented: interactive publication/digital preservation and the creation of a knowledge base based on NLM resources such as ClinicalTrials.gov. Associated with these projects are three new Lister Hill Center senior members: Dr. Caroline Ahlers, Dr. Thomas Lehmann, and Dr. Zhiyun Xue, who were introduced to the Board by Dr. King. Dr. Milton Corn introduced Mark Siegal, a new Program Analyst in the Division of Extramural Programs.

In the area of legislation, Dr. Lindberg reported briefly on several bills that would have an impact on the NLM: two having to do with health IT, a bill on drug safety that would involve NLM’s ClinicalTrials.gov, and bills that would require NLM to collaborate with others to create

two clearinghouses of information—one on newborn screening and one on vaccine safety. Dr. Lindberg also noted that the July 27, 2007 *Congressional Record* contains a laudatory resolution introduced by Rep. Chris Van Hollen (Md.) on the 50th anniversary of the National Library of Medicine Act. There are also hearings in the Congress to “reauthorize” the entire NIH. A limit on the number of institutes, the suggestion that there be just one appropriation for the entire NIH, and the establishment of a common fund to be used at the NIH Director’s discretion are among the subjects being considered for the reauthorization.

On the subject of the NIH public access policy, Dr. Lindberg said that PubMed Central has articles from NIH-sponsored principal investigators that are contributed “with urging.” The NCBI has done a great job in creating software to make submission of articles to PubMed Central a relatively easy process. He noted that the American Society of Hematology has signed an agreement with NIH to automatically submit in a batch fashion the grant-supported articles it publishes to the PubMed Central. Dr. David Lipman said that there are some 700,000 articles in PubMed Central and that some 5 million different users have searched and retrieved articles from the database. There is a bill in the Congress that would require investigators funded by NIH to submit an electronic version of their final, peer-reviewed and accepted manuscripts to PubMed Central. Dr. Lipman noted that the Wellcome Trust in the U.K. has implemented a requirement that manuscripts be deposited in an archiving system within six months of publication, as has the British Medical Research Council.

Dr. Lindberg updated the Board on the MedlinePlus “Go Local” service, whereby MedlinePlus users can be connected to a variety of health and social services within their state or other local area. Since the last meeting, Arizona, Nevada, and South Carolina have been added; almost one third of the U.S. population is now served by Go Local. Also related to MedlinePlus, he said that he has begun a new PodCast, “Director’s Comments,” based on important or otherwise notable topics selected from the weekly “What’s New on MedlinePlus” email distribution list. Dr. Lindberg reported on the Informatics Training Conference that was held at the end of June at Vanderbilt University in Nashville. This is the annual meeting of directors, faculty, staff, and trainees of the 18 NLM-supported biomedical informatics training sites. One of the major topics discussed was how to increase recruitment into the program of underrepresented minorities. The NLM Director concluded his remarks by saying that NLM’s Profiles in Science Web site has been enriched by the addition of the papers of Dr. Virginia Apgar, inventor of the “Apgar score” for newborns. Dr. Lindberg said he was a student of Dr. Apgar at Columbia University’s College of Physicians and Surgeons. The papers of Dr. Michael Heidelberger, one of the founders of modern immunology and the person who first quantitated the measure of antibodies, have also been added to Profiles in Science.

VII. REPORT FROM THE SUBCOMMITTEE ON OUTREACH AND PUBLIC INFORMATON

Dr. Vasiliki Karlis, who chaired the subcommittee meeting, reported that there was a recap of the

media coverage of the NLM in the months since the last meeting. There was also a report about tomorrow's media launch of the new NIH MedlinePlus Magazine, which will feature Mary Tyler Moore at a press conference in the Capitol Building. The Regents are invited to attend. There was a discussion about the expansion of the NIHSeniorHealth.gov database; Stephanie Dailey, a representative of the National Institute on Aging (NLM's partner in NIHSeniorHealth.gov), demonstrated some of the features of the system. Dr. Siegel discussed with the Subcommittee NLM's outreach program for Native Americans. Dr. Karlis also said they heard about plans to publicize MedlinePlus en español with Don Francisco, a well-known personality on Spanish language television.

VIII. REGENTS' AWARD PRESENTATION

Dr. Holly Buchanan presented the 2006 Regents Award for Scholarship or Technical Achievement to Jeffrey Beck of the National Center for Biotechnology Information. Mr. Beck was cited for his leadership in developing the NLM Journal Archiving and Interchange Document Type Definition (DTD). Commenting on the significance of the achievement, Betsy Humphreys said that the DTD is the standard archiving format for electronic representation of journal articles in PubMed Central. It has been endorsed by the Library of Congress and the British Library and it is being adopted by journal publishers in the United States and around the world.

IX. PUBMED DISCOVERY INITIATIVE

Dr. David Lipman, Director of the National Center for Biotechnology Information, first introduced to the Board of Regents several new staff scientists: Aleksandr Morgulis, Dr. John Anderson, Dr. James Song, Dr. John Jackson, Dr. Cynthia Liebert, Dr. Roxanne Yamashita, Dr. Gabriele Marchler, and Dr. Myra Derbyshire.

Dr. Lipman said that the Discovery Initiative is of immense importance to the NCBI and to the NLM as a whole. It is intended to help users of NCBI databases make "more discoveries." Although usage keeps increasing, an analysis of search patterns shows that most people are not making optimum use of links from their retrieved results to important related information on the Web site. The challenge is to make this information visible in such a way that users will avail themselves of it. The planned approach is similar to that of advertisements on Amazon.com and the Web search engines, as well as marketing approaches at the retail stores, where the user is enticed by products they did not come in wanting. In this case, rather than selling a product, NCBI is trying to give users related information that they might not have otherwise seen, thereby aiding them in the discovery process. This is possible because of the wealth of interlinking data—literature, genomic, etc.—in NLM's many information resources. The more integrated the data is, and the more visible related information is to users, the greater the possibilities for discovery, Dr. Lipman said.

The architecture of the current retrieval system, Entrez, is being upgraded to facilitate enhancements that will be made under the Discovery Initiatives. The new architecture, to be rolled out over the next few months, will allow a more flexible and robust approach to development by enabling the addition of new features and revision to display options without risking problems that sometimes arise when new coding is introduced. NCBI plans to have multiple experimental sessions in subsets of users to evaluate which display options and query pages work best. The first step in implementing the Discovery Initiative was changing the display page for PubMed so that viewers could see titles for the top five related articles when they view any single result of a search. The related articles were always available, but users needed to click on a link to see them. Introduction of the new page view has resulted in 25% to 30% of users clicking on a related link, compared to only 3% before. Following Dr. Lipman's presentation, Dr. James Ostell, chief of NCBI's Information Engineering Branch, discussed some of the hardware and software architecture considerations in designing the new Entrez system. He demonstrated how, by separating the Entrez system from a single program into separate "portals," changes in searching and display can be made quickly and tried out with users. Dr. Lipman added that in addition to NCBI being able to do parallel testing to find out what is working and gaining feedback, users will be able to customize the kinds of information they want to see on a page.

In response to a question from Dr. Clem McDonald, Dr. Lipman said that the drug-related database now being integrated into the system is the database in MedlinePlus and that users would be sent to that site. Dr. Thomas Detre commented that results of the Discovery Initiative will not only be tremendous for researchers, but will also be an important educational tool—for high schools students, for example, it will change their traditional cognitive style to something entirely different and exciting.

X. TOXMYSTERY

Marti Szczur, Deputy Associate Director for Specialized Information Services, said that the SIS has developed information products both for scientists and for consumers. Tox Town, demonstrated previously to the Board of Regents, is an example of the latter. The newest product, "Tox Mystery," has just been moved into production mode, she said. Tox Mystery is a learning, game-like Web site for children, in the 7–11 year old age range. She briefly described how the site was constructed and tested, with plentiful sound and animation, to make it fun to learn about chemical hazards in the home. She brought up the Tox Mystery home page and pointed out a number of the system's features, including resources for teachers.

Ms. Szczur introduced five young people—Miranda (10), Cami (8), Julia (9), Vivian (6), and Andrew (7). Each went to a different area of the Tox Mystery house and encountered various possible chemical hazards. "Toxie" the cat was the student's guide, asking multiple-choice questions and reinforcing correct answers. After the demonstrations, each child gave a brief evaluation of what he or she liked best and suggested possible improvements. More houses and

more rooms and a “friend” for Toxie were suggested. Ms. Szczur said that auxiliary activity sheets for the students have also been developed. As for promotion, she said that they plan to partner with some elementary school teachers and develop lesson plans. A public announcement will be sent out widely. Following the demonstrations, Dr. Karlis suggested that outdoor scenes might be appropriate as well as indoor scenes. Dr. Ball suggested the possibility of interactive games on hand-held devices.

XI. STATUS OF MEDLINEPLUS TUTORIALS FOR AFRICA

Julia Royall, Chief of NLM’s International Programs in the Office of Health Information Programs Development, told the Board of Regents about the development of two MedlinePlus tutorial programs about tropical diseases (malaria and diarrhea) intended for users in Africa. Ms. Royall briefly reviewed NLM’s work in improving health communications among scientists in Africa—the Multilateral Initiative on Malaria. This has been presented previously to the Board. She described how the idea of a MedlinePlus for Africa was born and developed. She listed the topics judged most important by a board of advisors: malaria and diarrheal diseases were rated high. Other diseases listed as important were HIV/AIDS, tuberculosis, acute respiratory infections, anemia, sickle cell anemia, sexually transmitted diseases, tetanus, meningitis, and cerebrospinal meningitis. She described how prototype tutorials were put together by a team consisting of staff from NLM’s Public Services Division and contract assistance. In Africa, two young technology-savvy doctors from Makerere University Faculty of Medicine in Uganda, together with several medical students and Ugandan artists, partnered with the NLM team. The challenge was to work together to design a tool that would be useful to health workers, medical students working in the field, and those living in rural areas and contribute to improving health. Ms. Royall described how the prototype was field tested in remote villages and how the knowledge gained was used to improve the tutorials. The staff of the Public Services Division then took the tutorials and, with much “backing and forthing,” achieved the beta versions that are now being reviewed in two languages, Luganda and Rukiga. Ms. Royall showed the MedlinePlus tutorial on malaria (in English). Ms. Royall said the cost of developing the tutorials was \$5,000. Among the next steps for the project is to distribute the tutorials on Palm Pilots and other hand-held devices in Uganda.

Following Ms. Royall’s presentation, Mr. Anne, the Library Associate Fellow from Mali, said that community health centers are an important locus of teaching people about subjects like malaria, and that the new tutorials will be helpful to the health workers at the centers. Dr. Ball congratulated Ms. Royall on what she has accomplished for a very modest investment. Dr. Lindberg said that Ms. Royall began the Africa project with one center, in Mali, and that she has been remarkably successful in expanding the project to the present 19 centers.

XII. COMPUTATIONAL SIMULATION OF JOINT MECHANICS

Dr. Benjamin J. Fregly of the University of Florida, and an NLM grantee (“Computational

Simulation of Joint Mechanics”) described his research on developing computational techniques to make it possible to custom-tailor to individual patients orthopedic surgeries and rehabilitation procedures. The ultimate goal of his research is to improve the reliability of surgical and rehabilitation procedures and thus improve the quality of life for patients. Traditionally, the design requirement (for, say, a knee joint) is given to the engineers, who come up with a design that is then made into a computer model. After the computer model is tested (under static conditions) the first physical prototype is made. The prototype is put into a simulator machine and they do physical wear testing on it. If it is “no worse than previous models,” it is ready for clinical trials. What is missing, Dr. Fregly said, is functional simulation. He cited statistics from the American Arthritis Foundation that one in six Americans have arthritis, at a cost to the U.S. economy of about \$65 billion a year. Osteoarthritis is the most common form of arthritis, and the knee is the joint most often affected. His laboratory takes high-end computational approaches that are being used to design cars and consumer products and makes them available to the medical world to design patient-specific interventions for knee osteoarthritis. Dr. Fregly showed the Board a number of video simulations of knee joint mechanics and full-body walking models that he uses in his work. This is an exciting time to be applying computational techniques computer simulations to address clinical problems, he said. He thanked the NLM for its support.

Dr. Morton commented said that many of her colleagues are interested in the genetic basis of osteoarthritis—looking for small variations in genes that predispose to the disease. She said there is the potential for a marriage of genetics and the kind of engineering Dr. Fregly is engaged in—we may discover that people with a certain genetic predisposition would do better with a certain type of engineering approach.

XIII. EXTRAMURAL PROGRAMS REPORT

Dr. Milton Corn, NLM Associate Director for Extramural Programs (EP), presented the final EP budget for FY 2006, with a breakdown of expenditures into allocations to the major programs under the Medical Library Assistance Act and under PHS 301. He also discussed EP participation in a number of grant programs not created by NLM. These involve cooperation with other NIH Institutes and Federal agencies, or are defined by NIH for all of the Institutes. While a minority of the EP budget is expended on such multi-organizational granting initiatives, the amount has been increasing and requires monitoring. These programs often involve interdisciplinary science not easily handled by a single Institute. They can also involve other federal agencies. Examples are BISTI (biomedical computing), BECON (biomedical engineering), and the NIH Roadmap for interdisciplinary science. Other multi-organizational grant programs in which NLM participates include the Dynamic Data-Driven Application Systems (with the National Science Foundation), Pharmacogenetics (with NIGMS), and Understanding and Promoting Health Literacy (with many Institutes and the Agency for Healthcare Research and Quality).

There are both benefits and costs associated with this cooperation. Among the benefits: it helps

NIH address new areas of biomedical research that transcend single Institutes, it is consonant with NLM's long championing of biomedical computing and computational biology, it complements NLM's Informatics Training Programs, and it encourages networking across NIH and other agencies. Among the costs: it reduces funds available for NLM's own programs, it limits the ability of NLM to develop and run its own unique programs, and it drains administrative energy with a plethora of new committees and management schemes.

Dr. Valerie Florance, Deputy Associate Director of EP, discussed another set of NIH grant programs in which NLM participates but which are not created by NLM. The first is the Grants for Small Businesses. This is a Congressional set-aside of 2.5% for grants for small business R&D that has commercialization potential (SBIR). There is also a set-aside of 0.15% to facilitate collaboration between small business and U.S. research organizations (STTR). There are three phases to the grants: planning, R&D, and commercialization. Only the first two receive federal funds (NIH spends about \$475 million per year for small business grants). The success rate for such applications assigned to NLM is low. Dr. Florance gave several examples in the area of emergency disaster response, advanced medical speech recognition, and medical translation software.

Dr. Florance also discussed NLM Conference Grants. These average \$10,000 and are for conferences that advance scientific development in biomedical informatics, bioinformatics, computational biology, and information sciences. They do not support the annual meeting of an organization. Examples are the Workshop on Biomedical Computations on the Grid (University of Connecticut), Pacific Symposium on Biocomputing (IUPUI), Chief Complaint Symposium (UNC-Chapel Hill), and Informatics and Vulnerable Populations (AMIA).

**MEETING CLOSED FOR THE REVIEW OF GRANT APPLICATIONS
September 19, 2006, 4:40 P.M. to 5:00 P.M.**

XIV. TRANSFERRING UMLS METATHESAURUS PRODUCTION

Betsy Humphreys, NLM Deputy Director, provided a brief background for the Board of Regents on the origins and use of the Unified Medical Language System (UMLS) and Metathesaurus. NLM is the HHS coordinating body for clinical terminology standards and the UMLS and Metathesaurus are integral to this effort. She described how the UMLS was launched 20 years ago to help computer programs "behave as if they understand the meaning of biomedical language," including all its many variations, and she gave a thumbnail sketch of how it has evolved. The Metathesaurus is the largest of the UMLS components—today it has 1.3 million "concepts" and millions of discrete terms in 17 languages. She gave examples of how it is being used today in a number of NLM products (such as ClinicalTrials.gov) and in the National Guidelines Clearinghouse; essentially it underpins all significant medical natural language processing activities in clinical and research information retrieval and data mining activities that deal with English language sources.

Dr. William T. Hole of the Lister Hill Center described how the UMLS R&D was conducted and why we are now at a point when it is being transitioned from the Lister Hill Center to the Office of Computer and Communications Systems. The UMLS was developed in an iterative manner, with repeated cycles of increased discovery, evaluation, and modification. Dr. Hole described a series of seven iterations from 1988 to 2006. He said that today the UMLS, with its increasing size, frequency of release, and complexity of production (including a rapidly growing body of foreign language names), has outgrown its R&D resources and approach. It requires a move from its research iteration model to a stable, reliable, production operation, which the Office of Computer and Communications Systems, with its experience with production systems, can provide.

Dr. Simon Liu, Director of the Office of Computer and Communications Systems, described how a transition team in OCCS was created and the Metathesaurus Production Life Cycle was established and installed. Among the challenges they had to face was the sophisticated domain knowledge of the UMLS, the complex system with multiple technologies that had been used in its development, and the administrative challenge of making the transition with limited resources and in the face of competing priorities. For example, massive software coding was accomplished, involving hundreds of thousands of lines of code and multiple programming languages and software technologies. Dr. Liu described how such challenges are being faced and successfully met with the help of staff from a number of NLM organizations and contractor assistance. He listed a number of accomplishments. For example, 24-hour information service has been introduced and the production time of a UMLS version has been reduced from 6 weeks to 4 weeks. He said that the entire transition effort is several months ahead of schedule and he briefly outlined the next steps in the process.

Following these presentations, Dr. Gray commented that “there is no one on the planet” that has a vocabulary as large as the UMLS Metathesaurus. It thus has a much “wider medical knowledge” than any one person; it is a step toward the goal of having computers understand medical knowledge. He was impressed by the transition plan and he was glad to see that the problems are “technical problems” and not “people problems.” Medicine is far ahead of other sciences in this arena, he said. Ms. Mary Ann Tatman said that the UMLS is an “amazing accomplishment” and having such vocabulary tools is essential to achieving interoperability of health systems.

XV. ADJOURNMENT

The formal portion of the Board of Regents meeting was adjourned at 9:18 a.m. on September 20, 2006. The Regents then boarded a bus to go to the U.S. Capitol to attend a press briefing on the launching of the new quarterly publication, *NIH MedlinePlus*.

September 19-20, 2006 - Board of Regents

ACTIONS TAKEN BY THE BOARD OF REGENTS:

- Approval of the NLM Long Range Plan for 2006-2016
- Approval of the May 8-9, 2006 Regents Minutes
- Approval of September 18-19, 2007 Meeting Dates
- Approval of EP Subcommittee Recommendations and Conducted En Bloc Grant Concurrence

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

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

Holly Buchanan, Ed.D.
Chair, NLM Board of Regents