

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

**MINUTES OF THE BOARD OF REGENTS  
September 9-10, 2003**

The 134th meeting of the Board of Regents was convened on September 9, 2003, at 9:00 a.m. in the NLM Board Room, Building 38, National Library of Medicine (NLM), National Institutes of Health (NIH), Bethesda, Maryland. The meeting was open to the public from 9:00 a.m. to 4:30 p.m., followed by a closed session for consideration of grant applications until 5:00 p.m. On September 10, the meeting was reopened to the public from 9:00 a.m. until adjournment at 12:15 p.m.

**MEMBERS PRESENT:**

Dr. Holly Buchanan  
Dr. Ernest Carter  
Dr. A. Wallace Conerly  
Dr. Richard Dean  
Dr. Thomas Detre  
Dr. Vasiliki Karlis  
Dr. Ralph Linsker  
Ms. Eugenie Prime [Chair]  
Dr. William Stead

**EX OFFICIO AND ALTERNATE MEMBERS PRESENT:**

Dr. Richard Carmona, U.S. Public Health Service  
BGEN Joseph Kelley, U.S. Department of the Air Force  
RADM Nancy Lescavage, U.S. Department of the Navy  
Dr. Deanna Marcum, Library of Congress  
Dr. Michael Pazzani, National Science Foundation  
Col. Kristen Raines, U.S. Department of the Army  
Dr. Robert Roswell, U.S. Department of Veterans Affairs  
Ms. Mary Ann Tatman, U.S. Department of Veterans Affairs  
Mr. Peter Young, U.S. Department of Agriculture  
Dr. James Zimble, Uniformed Services University of the Health Sciences

**CONSULTANTS TO THE BOR PRESENT:**

Dr. Tenley Albright, Whitehead Institute for Biomedical Research  
Dr. Marion Ball, Healthlink, Inc.  
Dr. H. Kenneth Walker, Emory University School of Medicine

**SPEAKERS AND INVITED GUESTS PRESENT:**

Dr. Stephen Aylward, University of North Carolina  
Dr. David Bates, Brigham and Women's Hospital  
Dr. Morris Collen, Kaiser Permanente  
Mr. Ned Collier, Perry Dean Rogers & Partners

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Mr. Steven Foote, Perry Dean Rogers & Partners  
Ms. Liz Lowe, United Negro College Fund Special Programs  
Ms. Karma Gaines-Ra, Norfolk State University  
Dr. Daniel Masys, University of California, San Diego  
Dr. Kenneth Olden, National Institute of Environmental Health Sciences  
Dr. Steven Phillips, Public  
Dr. Melvin Spann, Public

### **MEMBERS OF THE PUBLIC PRESENT:**

Mr. Alec Stone, Friends of the NLM  
Mr. Tom West, The Krasnow Institute

### **FEDERAL EMPLOYEES PRESENT:**

Dr. Donald A.B. Lindberg, Director, NLM  
Mr. Kent A. Smith, Deputy Director, NLM  
Dr. Michael Ackerman, High Performance Computing & Communications, NLM  
Ms. Stacey Arnesen, Division of Specialized Information Services, NLM  
Ms. Suzanne Aubuchon, Office of the Director, NLM  
Ms. Theodora Bakker, Associate Fellow, NLM  
Dr. Carol Bean, Division of Extramural Programs, NLM  
Ms. Lonelyss Charles, Associate Fellow, NLM  
Dr. Milton Corn, Division of Extramural Programs, NLM  
Ms. Kathleen Cravedi, Office of Communication and Public Liaison, NLM  
Ms. Gale Dutcher, Division of Specialized Information Services, NLM  
Ms. Erinn Faiks, Associate Fellow, NLM  
Dr. Valerie Florance, Division of Extramural Programs, NLM  
Dr. Charles Friedman, NLM Sabbatical/University of Pittsburgh  
Ms. Cynthia Gaines, Office of Outreach and Special Populations, NLM  
Ms. Julie Gaines, Associate Fellow, NLM  
Ms. Jane Bortnick Griffith, Office of the Director, NLM  
Ms. Wendy Hadfield, Executive Office, NLM  
Ms. Vera Hudson, Biomedical Information Services Branch, NLM  
Ms. Betsy Humphreys, Division of Library Operations, NLM  
Ms. Christine Ireland, Division of Extramural Programs, NLM  
Dr. Donald W. King, Office of the Director, NLM  
Ms. Michelle Krever, Division of Extramural Programs, NLM  
Ms. Eve-Marie Lacroix, Public Services Division, NLM  
Ms. Janet Laylor, Office of the Director, NLM  
Dr. David Lipman, National Center for Biotechnology Information, NLM  
Dr. Simon Liu, Office of Computer and Communications Systems, NLM  
Dr. Robert Logan, Lister Hill National Center for Biomedical Communications, NLM  
Mr. Jeffrey Loo, Associate Fellow, NLM  
Ms. Becky Lyon, Division of Library Operations, NLM

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Dr. Alexa McCray, Lister Hill National Center for Biomedical Communications, NLM  
Mr. Robert Mehnert, Office of Communication and Public Liaison, NLM  
Mr. Dwight Mowery, Division of Extramural Programs, NLM  
Mr. David Nash, Office of Equal Employment Opportunity, NLM  
Ms. Nancy Pulsipher, Associate Fellow, NLM  
Dr. Barbara Rapp, Division of Library Operations, NLM  
Mr. Jon Retzlaff, Executive Office, NLM  
Dr. Merlyn Rodrigues, Division of Extramural Programs, NLM  
Dr. Angela Ruffin, Division of Library Operations, NLM  
Ms. Andrea Ryce, Associate Fellow, NLM  
Dr. Elliot Siegel, Health Information Program Development, NLM  
Dr. Hua-Chuan Sim, Division of Extramural Programs, NLM  
Dr. Jack Snyder, Division of Specialized Information Services, NLM  
Mr. Ronald Stewart, Executive Office, NLM  
Ms. Marti Szczur, Division of Specialized Information Services, NLM

### **I. OPENING REMARKS**

Ms. Eugenie Prime welcomed the Regents, alternates, and guests to the 134<sup>th</sup> meeting of the Board of Regents of the National Library of Medicine. She noted the presence of two new Regents, Dr. Holly S. Buchanan of the University of New Mexico and Dr. Vasiliki Karlis of New York University, and alternate ex-officio member Ms. Deanna Marcum from the Library of Congress. She welcomed also consultants Dr. Marion Ball and Dr. H. Kenneth Walker and Dr. Steven Phillips, former Chair of the Board of Regents and NLM Deputy Director.

### **II. REPORT FROM THE OFFICE OF THE SURGEON GENERAL, PHS**

Richard Carmona, M.D., Surgeon General of the U.S. Public Health Service, reported to the Regents about the priorities and activities of his office. His agenda, prepared in discussions with the HHS Secretary and President Bush, includes three priorities: prevention, preparedness, and overcoming disparities in health care. Connected to all three is the issue of health literacy. Even educated people sometimes have difficulty reading food labels or following a physician's directions, for example, and the problem is even more pronounced in minority communities. Dr. Carmona said he has had conversations with Dr. Lindberg and other Institute directors about this. The issue is not having enough science to drive policy or programs, it is the need for "transformational messaging" that allows people to be receptive and take appropriate action. There is also a health literacy gap with peers, e.g., practitioners. The information resulting from today's cutting-edge science has to be communicated to the bedside, and that is a problem. Dr. Carmona discussed the state of the Public Health Service Commissioned Corps; he believes that it must be transformed as a uniformed service. The Corps needs to strive for 100 percent deployability—all staff physically fit with competencies that can be deployed to meet any threat to the public's health. We also need a more robust reserve component for the Commissioned Corps (this may require legislative action). A training academy and other educational

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components are also being planned for the Corps. Finally, the Surgeon General reported on a number of reports in the pipeline: health consequences of tobacco use (2004), osteoporosis and bone health (2004), and one dealing with mental health preparedness, among others.

Following Dr. Carmona's report, Dr. Detre commented that another cultural aspect of health literacy that needs study is the problem of lack of adherence to physicians' recommendations. Dr. Lindberg asked about how NIH laboratory scientists, for example, who are Corps members, could be made "deployable." Dr. Carmona said he is sensitive to the needs of NIH researchers. With today's biological threats, they are an integral part of the team. Perhaps there should be two parallel tracks of professionalism at NIH, allowing flexibility between Corps members and regular civil service.

### **III. CONSIDERATION OF MINUTES FROM PREVIOUS MEETING**

The Regents approved without change the minutes from the May 13-14, 2003 meeting.

### **IV. DATES OF FUTURE BOARD MEETINGS**

The Board of Regents will meet next on February 10-11, 2004. The Board is meeting next spring on May 18-19. The dates of September 21-22, 2004, were adopted for the meeting next fall.

### **V. REPORT OF THE NLM DIRECTOR**

Dr. Donald Lindberg reported that there is as yet no final budget for FY 2004. At the level put forward by the President, NLM would receive about a 3 percent increase. There are comments in the bills that are helpful to NLM, for example, about a backup computer facility, bioethics research, clinical vocabulary standards, the Visible Human Project, an expanded physical facility, outreach to minority communities, PubMedCentral, and outreach to senior citizens. Dr. Lindberg introduced new staff member Brent Bolin, Specialized Information Services, and reported the promotion of Wei Ma as a branch chief in the Office of Computer and Communications Systems. Betsy Humphreys introduced new staff members in Library Operations: David Gillikin, Bibliographic Services Division, Michael North of the History of Medicine Division, and Terry Wittig, Technical Services Division. Dr. Barbara Rapp next introduced the new NLM Associate Fellows: Theodora A. Bakker, Lonelyss B. Charles, Erinn E. Faiks, Barbara J. Few, Julie K. Gaines, Jeffery L. Loo, Nancy Pulsipher, and Andrea N. Ryce. Dr. Alexa McCray introduced Dr. Aaron Navarro and Mr. Shiuan-Haur Lu, who joined the Lister Hill Center as computer scientists. Dr. David Lipman introduced several new members of the staff of the National Center for Biotechnology Information: Dr. Michael N. DiCuccio, Dr. Melissa J. Landrum, Dr. Pierre Ledoux, Dr. Michael R. Murphy, Dr. Bhanu Rajput, Mr. Yan Raytselis, Dr. Barbara J. Ruef, Ms. Lorraine K. Tanabe, and Dr. Janet A. Weber.

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Dr. Lindberg next reported briefly on legislation of interest to the NLM, including HIPAA and bills dealing with medical privacy and with the national health information infrastructure. Jane Griffith, NLM's Assistant Director for Policy Development, reported that the House Judiciary and Commerce Committee staffs have informally circulated a draft database protection bill for discussion. The bill will be much discussed in the coming weeks, especially issues about ensuring that government-produced information remains openly available to the public.

Dr. Lindberg lauded "shopping the bill around" and getting comments about it in advance of formal introduction. The NLM Director mentioned that there were several recently introduced bills on homeland security, an area where NLM would like to be useful. He noted that both NLM's National Center for Biotechnology Information and Division of Specialized Information Services have information services of direct application to homeland security. "Intellectual property and the public domain" is another subject being addressed in legislation recently introduced in the Congress, notably the "Public Access to Science Act," introduced by Rep. Sabo. That bill would not allow copyright for the results of federally supported research and development. Dr. Lindberg said he would report further on this legislation if Congress acts on it. Dr. Lindberg's July 10, 2003, testimony, "Bench to Bedside," was included in the materials distributed to the Board.

On July 1, 2003, HHS Secretary Thompson announced an agreement, brokered by the NLM with the College of American Pathologists, that will make SNOMED Clinical Terms (SNOMED CT®) available at no cost through NLM's Unified Medical Language System®. The Board has heard progress reports in the past, and the agreement is now a reality. Dr. Lindberg briefly described the UMLS and how its enrichment with SNOMED-CT will benefit the health professions and, ultimately, the public. NLM's Betsy Humphreys, who led the successful multi-agency effort, briefly told the Board how it evolved. The two-day symposium, "The Library is a Place: Symposium on Building and Renovating Health Sciences Libraries in the Digital Age," mentioned at previous meetings, has now been set for November 5-6, 2003. The Regents are invited to attend. On another subject, Dr. Lindberg described the recent visit by him and several senior NLM staff to a "Listening Circle," held at the tribal center of the Standing Rock Lakota Indian Reservation in North Dakota. The goal of the Listening Circle is to promote open dialog between NLM and tribal leaders with a view to identifying collaborative projects that can benefit both, especially in the areas of improving the information resources of tribal colleges and lessening the unemployment rate on the reservations. In July, the directors of the 18 academic training programs supported by NLM met at the Library. Thirty-four informatics trainees presented their research projects. Another meeting in July was the Planning Meeting for the National Center for Biotechnology Information at which program priorities, staffing levels, and funding for the next 3 to 5 years were discussed. A summary of the meeting is in the agenda book. A training program aimed at mid-career medical librarians is being funded by NLM in cooperation with the Association of Academic Health Sciences Libraries: the Leadership Fellows Program. Five fellows are being funded each year for a 3-year trial period. Dr. Lindberg next described a series of "roadmap" meetings convened by NIH Director Zerhouni. The purpose is to lay out a direction (roadmap) for the NIH in the aftermath of the doubling of the budget over 5 years. Two areas are worthy of note: to improve the way clinical research is

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conducted and to encourage collaborative or team research. Another theme is the need to invest in more “high-risk” research. Finally, Dr. Lindberg briefly described the new major exhibit now being installed in the Library’s rotunda. “Changing the Face of Medicine” will celebrate the achievements of women physicians in America. The Regents will see the exhibit at their next meeting.

### **VI. ALLERGY ALERTS IN COMPUTERIZED PHYSICIAN ENTRY**

Dr. David Bates, Chief of the Division of General Medicine at Brigham and Women’s Hospital, Boston, Massachusetts, reported to the Regents on an NLM-supported project called “Allergy Alerts in Computerized Physician Order Entry” (CPOE). There has been much publicity recently about “medical mistakes” killing thousands of patients every year. Dr. Bates presented some data about the rates of adverse events in several states and in other countries. In all of those studies medications were the leading cause of injuries. Known allergies to drugs represented 6% of the serious medication errors, he said. We should do a better job of tracking patient allergies to medications and warning physicians about these allergies. One source of error is poor handwriting on the part of the physician that is misinterpreted by other staff. Computerizing the ordering of drugs can improve safety by streamlining and structuring the order process, by giving information at the time needed, and by performing a variety of checks in the background, for example drug-drug interactions and dose ceilings. In an early version of CPOE, an intervention trial done over 15 months, there was a 55% decrease in serious errors. The “Leapfrog” group—a coalition of very large employers—is an organization that has had a big impact in this area. One of the problems encountered in CPOE is that the computer systems of some hospitals just aren’t up to handling a CPOE system. Dr. Bates then described specifically the allergy alerting system he and his colleagues created at the Brigham and Women’s Hospital and several other hospitals in that area. The key features of their system: entering allergy and reaction, drug-allergy interaction checking, reverse allergy checking, and the ability to override a drug-allergy warning. He showed the allergy and reaction entry screen. The goal of the current study was to find out why so many drug-allergy alerts were being overridden (and the consequences) and to make recommendations to refine and improve the system. There were almost 8000 drug-allergy alerts during the study period; the alerts were overridden 80% of the time. Dr. Bates discussed the problem of overriding—in what circumstances the physician overrode the warnings, and why. There were 23 adverse drug events on occasions in which the warning had been overridden. Completeness of the drug-allergy documentation on patient charts ranged from fair to poor. There are several future directions for the study: the need to determine better when and how to alert; encourage better documentation; learn more about what kinds of information would be most useful to clinicians at the point of care; and how to deliver more complex decision support. Specific recommendations include the need for consistent decision support across applications, reduce unnecessary alerting, adjust notification based on severity, improve allergy documentation, and include drug-food allergies. Concluding, Dr. Bates said that the use of information technology in this area has the potential to dramatically improve safety and quality of health care, but we still have a lot to learn about how best to deliver decision support.

Following Dr. Bates' presentation, Dr. Daniel Masys asked whether they had considered using a "slider bar" to let practitioners select their own level of alerting. Dr. Bates said they had seen some experiments where that was done; a substantial proportion of physicians then elect not to see the alerts at all. However, if the slider bar were sensitive enough, that might be an option to look into. Dr. Richard Dean said that physician order entry is a very high priority subject. He asked about the definition of an "allergy" and how valid are the data that are entered into the computer. Dr. Bates agreed that there is a question about data validity—having incorrect allergies in the application is a problem. An initial decision not to let physicians delete allergies turned out to be a mistake and was reversed, he added. Dr. Ralph Linsker asked about providing a sort of "mini-grand rounds" to assess the relation between adverse outcomes and physicians' decisions to use or ignore alerts. Dr. William Stead asked whether anyone was creating a database that had clinically relevant actual occurrence data that could be used to drive a sliding bar. Dr. Bates said he did not know of such a system. Dr. Robert Roswell said that at the Department of Veterans Affairs, which treats 5 million patients a year, they have been using CPOE for years with results similar to what Dr. Bates has reported. A bar-coded medication application "really completes the package" and virtually eliminates errors resulting from the lack of cognizance of allergies and drug-drug interactions, and transcription and administration errors. Dr. Donald King commented that there are also errors and lack of compliance on the part of the patient. He asked whether anyone was attacking the problem of multiple drug interaction—the synergistic or antagonistic effects of many drugs in a patient. Dr. Bates said that to his knowledge this was not being done; in their ICU the average patient is receiving 25 different drugs and predicting the consequences is uncertain. Vendors fear lawsuits and thus are "nervous" about supplying too much decision support. We need a "national repository" of decision support applications.

## **VII. PRESENTATION OF AWARDS**

Dr. Lindberg presented the 2003 Frank B. Rogers Award to Christa F. B. Hoffmann, Head of the Cataloging Section, Technical Services Division for leadership and vision in reinventing the *NLM Classification* as a system that can be kept constantly up to date. Ms. Prime presented the 2003 National Library of Medicine Regents Award for Scholarship or Technical Achievement to Dr. Stephen Sherry of the National Center for Biotechnology Information. Dr. Sherry was cited for his important advisory role in applying DNA forensic methods to help identify victims of the September 11, 2001 tragedy of the World Trade Center in New York City.

## **VIII. BUILDING REPORT**

Kent Smith, NLM Deputy Director, said that the design of the new building is now essentially at 100%. He praised the teamwork of the NLM staff, especially Mr. Ron Stewart, the architects, engineers, and the NIH construction managers. He briefly reviewed the timeline for the design from its earliest stages to the present. If funds are made available, the building could be constructed in three years. Following this introduction, Mr. Steven Foote of the architect firm

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Perry Dean Rogers & Partners, showed the Regents a variety of views of the planned new facility and described the materials being proposed. Dr. William Stead said that the Board of Regents has been behind this initiative from its beginning. He said that ultimately, there are three aspects of the NLM's mission pertinent to the new building: the Library as an archive of last resort and a conductor of research on how to make information available, the work of the NCBI in molecular genetics, and the idea of a "collaboratory" that will assist in putting together teams of experts with different backgrounds to engage in large-scale multidisciplinary science. We need to make the case that NLM is the "leveraging resource" for everything that NIH does and therefore this facility should be an important priority for NIH. Dr. Detre suggested that a persuasive one-page summary be created that would explain the critical role of NLM's facilities in the advancement of science. He and Dr. Stead will undertake to draft such a document.

## IX. SUBCOMMITTEE AND WORKING GROUP REPORTS

### *Subcommittee on Outreach and Public Information*

Eugenie Prime, Chair of the Subcommittee, reported on this morning's meeting. There was a report on the pilot "Information Rx" program being carried out by NLM in collaboration with the American College of Physicians. The object is to encourage practicing physicians to "prescribe" the information in MedlinePlus to their patients. The two test states are Iowa and Georgia.

Ms. Prime said that special outreach materials were produced for the project—prescription pads, posters, etc. She briefly described some of the preliminary data reported by Dr. Siegel. A full report will be made at a future Board meeting.

### *Bioethics Working Group*

Dr. Thomas Detre, who chairs the Working Group, said that it met for the first time on May 14. Three NLM staff made presentations: Dr. Stuart Nelson (Medical Subject Headings), Judith Eannarino (coverage of bioethics in the NLM collection), and Sheldon Kotzin (selecting and indexing bioethics journals). Scott Plutchak, Director of the Lister Hill Library at the University of Alabama, said that he was less concerned about sophisticated searchers and their access to the bioethics literature, and more concerned about the needs of undergraduates, especially those not from biomedical disciplines. The Working Group discussed several ideas to help inexperienced users, among them: a Web site for bioethics information, alerting users to new terms added to MeSH vocabulary, introducing software that will cross the retrieval of legal, chemical, and other topics. The Working Group also suggested inviting to the next meeting a representative of the Kennedy Institute of Ethics at Georgetown University (NLM's contractor). The Working Group members have consulted with librarians and faculty at their respective campuses to learn about the types of questions inexperienced users have and the most-consulted information resources. The members have also recommended that NLM review for indexing several journals not currently indexed. Dr. Detre said that the most frequently asked ethical issues cover a broad range of topics, such as fetal rights, rural access to healthcare, women in clinical trials, and animal research. The next meeting is on September 11, 2003. The Working Group expects to make its final report, with recommendations, at the next Board meeting.

*Biomedical Imaging and Bioengineering Working Group*

Dr. Morris Collen, chair of the Working Group, said that this Working Group met for its second meeting yesterday (minutes from the first meeting were provided to the Board). The members focused on (1) what is the important literature in this area and does NLM collect and index it and (2) whether the Medical Subject Headings vocabulary is adequate to describe it. The Working Group members solicited from leading colleagues in the field the 10 current publications most pertinent to their work. Of the consolidated list, 148 journals are currently held and indexed by NLM, 16 are held by NLM but not indexed, and 28 journals are not held or indexed by NLM. The Working Group recommended that these last two groups be examined by the Literature Selection Technical Review Committee to see if they should be held and indexed by NLM. It was the Group's consensus that a significant hole does *not* exist in the biomedical imaging and bioengineering literature held and indexed by NLM. Further, the existing NLM mechanisms are adequate for the consideration of journals not already collected or indexed. As to the adequacy of the MeSH vocabulary, there are currently more than 50,000 MeSH concepts and new terms are continually being added. Although human indexers are specially trained to review journals for important clinical terms, the Working Group recommended that indexers should place more emphasis on the "methods" section of articles and consider indexing technologies, tools, procedures, and processes that are of interest to bioengineers. The Group also concluded that MeSH adequately covers concepts to describe biomedical imaging and bioengineering. The Group also discussed indexing digital images and digital signals. The consensus was that the development of test image banks and adequate repositories is needed.

**X. LHC BOARD OF SCIENTIFIC COUNSELORS REPORT**

Dr. Alexa McCray, Director of the Lister Hill National Center for Biomedical Communications, said that the Lister Hill Center Board of Scientific Counselors (BOSC) meets for one and a half days twice a year. The Board consists of eight members drawn from the informatics community. She noted that Dr. Morris Collen, who just reported on the Working Group on Biomedical Imaging and Bioengineering, is a past chair of the BOSC. The current chair is Dr. Sherrilynne Fuller of the University of Washington (a past member of the Board of Regents). Dr. McCray introduced the immediate past chair, Dr. Daniel Masys, Professor of Biomedical Informatics and Professor of Medicine at the University of California, San Diego, who reported to the Regents on the last two BOSC meetings. In September 2002 the Board considered Content-Based Image Retrieval (CBIR) research. In May 2003 the BOSC considered two topics—3D Informatics Research and Anatomic Images for the Public. The overall goal of the CBIR is to advance the state of the art of automatic image processing by defining the steps needed for content-based indexing, developing techniques for image-based retrieval, developing algorithms for automated and semi-automated indexing and retrieving biomedical images, and developing prototype systems. Dr. Masys briefly described LHC progress in automated image indexing and retrieval using as a test collection the radiographic spine images from the NHANES survey. Plans in this area are to develop methods organizing features, query tools, and to extend the methods to other collections. The BOSC believes that this is a strategically important project that is substantially

hampered by the quality of the NHANES images. The Board recommends that LHC find collections of high-quality archival collections of images.

The goals of the 3D Informatics Research, the second topic considered by the BOSC, are to gather, manipulate, classify, store, retrieve, navigate, and display complex 3D (and higher) medical data. The “higher” refers to the changes over time, motion, and additional dimensionalities of what is fundamentally volumetric data. Dr. Masys described some specific objectives for the project, using as an example a biologic 2D image of a human tooth and how it could be converted to a 3D image. He talked about progress in several areas—prototypes have been developed, for example, for edge detection and features extraction, and statistical pattern recognition for automated registration. The third project reviewed by the BOSC is one that has as its goal to encourage the use of high-quality anatomical imaging by health professionals and the public. The objectives of this project are to develop systems to query the Visible Human image databases, to extend lay services such as MedlinePlus with image capability, and to segment and label image regions Visible Human data to all anatomic regions (beyond the currently available thorax). Progress to date includes the prototype “Anatquest.” Knowing what the general public needs or wants in this area is deceptively simple. The BOSC recommended that the functional requirements for public image retrieval be developed in collaboration with likely potential users, such as high school science teachers. Dr. Masys said that the overall assessment by the Board of Scientific Counselors is that the Lister Hill Center research and development program is “alive and well” and that the current research programs are well conceived and well managed. He concluded his remarks by saying that this is the 20<sup>th</sup> anniversary of his association with the NLM. It is too easy to lose sight of the fact that having a public library of health science is, in fact, a remarkably powerful idea. With the Internet, the NLM is now truly a global resource and, with the planned new building, the Library is poised to play a crucial role in molecular medicine.

Following Dr. Masys’ presentation, he was asked, “what’s next” after imaging? He speculated that at one end of the spectrum we currently store data from molecular sequencing; at the other end we have the Visible Human Project at the level of the intact in vivo organism. There are practically no detectors between—for example at the level of cells, precursors of organs, or the schemas by which a vascular tree is created and maintained. This is a big “blind spot” in our understanding of biology, that is, between the macroscopic and the microscopic.

## **XI. VISIBLE HUMAN TOOLKIT**

Dr. Michael Ackerman, NLM Assistant Director for High Performance Computing and Communications, said that four years ago NLM launched a 3-pronged effort to (1) build a Web-based functional atlas of the head and neck; (2) create new histological methods to allow the capture of greater anatomical detail for use when acquiring possible future Visible Humans; and (3) create an open-source software toolkit for segmentation and registration of Visible Human data which would be applicable to patient-specific data. These efforts are being undertaken by a consortium of six NIH Institutes and the National Science Foundation. The last effort is being

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done under contract by 13 universities and 4 companies, collectively called the Insight Toolkit Consortium. A year ago the Regents heard about the development and design of the Insight Toolkit. Version 1.0 of the Toolkit was released last October. Dr. Ackerman then introduced Dr. Stephen Aylward of the University of North Carolina, Department of Radiology, one of the original consortium members.

Dr. Aylward described to the Board how Version 1.0 is now being applied and the impact it has had on his laboratory. Basically, the Insight Toolkit is public domain state-of-the-art medical image segmentation and registration software. The Toolkit allows scientists to research new methodologies and to rapidly prototype applications for clinicians and researchers. It works not only on the Visible Human Male and Female data sets, but is generic enough to work with a variety of clinical data such as MR scans. To date there have been more than 4,000 free downloads of the Toolkit from users in more than 30 countries. Dr. Aylward mentioned several of the scientific organizations now making use of the Toolkit. The impacts on his own lab, he said, are in such areas as detection and diagnosis (for example, uterine fibroid tracking) and intervention planning and guidance. He described a number of such projects. The developers are sponsoring and conducting tutorial sessions on the Toolkit at professional conferences, both engineering and medical. Also, a 580-page software guide is now being printed.

Following Dr. Aylward's presentation, Dr. Linsker commented that the applications were well chosen and varied. He asked about the level of sophistication needed by the user to use the algorithms to create new applications. Dr. Aylward replied that the Toolkit is now primarily geared toward programmers and there is a learning curve. However the graduate students in computer science and biomedical engineering using the software guide at the beginning of the courses had very few questions. In response to another question, he said that advances in the field will be dependent to a certain extent on sharing databases; since some (especially in radiology) are reluctant to do that, advances in the near future are uncertain. Dr. Ackerman added that the next challenge is to find enough known images for the algorithms to be validated.

## **XII. EXTRAMURAL PROGRAMS REPORT**

To obtain Concept Review for a proposed new program to provide "Informationist" fellowship training, Dr. Corn described the informationist function. The term "Informationist" is used to describe a specialist who has significant understanding of both information science and some biomedical domain, and who works 'in context' as a peer in teams with health care providers, scientists, educators or others. Drs. Frank Davidoff and Valerie Florance presented the original idea of the Informationist in an editorial in the *Annals of Internal Medicine*. There is a wide spectrum of potential candidates for such a role, including physicians, scientists, and librarians among others.

In July 2001, the Medical Library Association appointed the MLA Informationist Task Force, chaired by Jean Shipman. The Task Force was charged with planning a 2-day invitational conference on the Informationist. The Informationist Conference, funded with support from the

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NLM, was held April 4-5, 2002 at the Lister Hill Center. The MLANET Website provides a detailed synopsis of the conference at <http://www.mlanet.org/research/informationist/index.html>. The concept was also discussed in depth by NLM senior staff, who recommended that Extramural Programs proceed with a new fellowship program intended to produce informationists. Draft program announcements have been prepared for both a standard fellowship, and a senior fellowship for experienced professionals interested in a career change.

Discussion centered on the potential for future employment for such fellows, and on problems that might be encountered for fellows who had no peers during the training period. Dr. Corn responded that tentative assurance about employment prospects would be required in the application, and that “isolation” issues would be monitored during the first year of the program. The Board unanimously approved the new program in concept.

Dr. Corn also described NLM participation in a new trans-NIH initiative for tools to facilitate network-based virtual laboratories. Over the past nine years the NSF, the NIH, and other Federal agencies, have supported the development of network-based virtual laboratories, following the recommendations of the 1993 National Research Council (NRC) report, National Collaboratories: Applying Information Technology for Scientific Research. As described in the NRC report, collaboratories are expected to improve the speed and output of scientific research through Internet access to instruments, data, and colleagues—independent of time and place. Many of the early collaboratory projects focused on remote control of distant equipment with less emphasis on data. Changes since 1993 in both the character of biomedical and chemical research and in underlying computer and network technologies suggest a re-examination of the collaboratory concept with increased attention to data flow, from acquisition to deposition in a data repository, data reuse after deposition, and integration of data across various repositories and databases. Accordingly, a new program announcement, Tools for Collaborations that Involve Data Sharing, has been published under the leadership of the NIH National Center for Research Resources and with participation of a number of other Institutes, including NLM. The purpose of this program announcement is to invite proposals to develop tools and techniques to harness the unprecedented volume of data generated by collaborations among researchers. Proposals dealing with data from either research laboratories or clinical laboratories are welcome. Using these new tools and techniques, it is expected that two or more laboratories will be able to productively collaborate in ways that are currently not possible.

As part of a series of periodic review for the Board of different NLM grant programs, Dr. Corn described the Information System Grant Program. Information System Grants, which can provide up to \$150,000 a year for three years, emphasize the use of information technology to bring usable, useful, health-related information to end-users. Dr. Corn presented a number of examples of funded projects. The term ‘information system’ is defined broadly to include equipment, software, knowledge resources and services, and human expertise. An Information System grant can be used to support a variety of activities, including but not limited to:

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- Creating new and/or unique digital information resources
- Integrating digital information that comes from different sources to create tailored views
- Testing the usability of interfaces and digital resources
- Customizing information resources or services to meet needs of special audiences
- Delivering information resources and services to underserved rural and urban populations
- Applying a new information technology to improve access to information
- Designing and testing a new information service.

### **XIII. REPORT FROM THE DIRECTOR, NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES**

Dr. Kenneth Olden, Director of the National Institute of Environmental Health Sciences, said that over the last dozen years the NIEHS and the NLM have collaborated on a number of projects. NIEHS is not a basic science institute: its mission is to investigate the role of the environment in the development of human illness. Setting priorities in an Institute with such a broad mission is a difficult task, he said. The two “drivers” of the Institute’s mission are (1) is the illness caused, at least in part, by the environment? and (2) would dealing with the illness or dysfunction have a significant impact on public health? In addition to medicine and public health, the NIEHS’ work affects environmental health policy. Thus, there is much interaction between the Institute and the EPA, FDA, OSHA, and members of Congress. In many cases, available information is inadequate to make intelligent public policy decisions. Three things go into determining environmental illness: genetic susceptibility, environmental exposure, and the stage of development (for example, age, behavior). Few diseases are solely genetic in origin or caused solely by the environment. It is the interaction of the two that in most cases causes the disease or dysfunction. The research supported by NIEHS emphasizes prevention, Dr. Olden said. Among the elements in today’s definition of the environment are: industrial and agricultural chemicals, physical agents (heat, radiation), byproducts of combustion and industrial processes, food and nutrients, prescription drugs, lifestyle choices, social and economic factors, and biologicals. NIEHS supports research in all of these areas. There is much evidence today that dispels the myth that diseases are caused primarily by genetics: cancer is about two-thirds non-genetic, as are auto-immune diseases, 90% of people with heart disease have one or more of four classic risk factors, and so forth. The NIEHS approach is three-pronged: identify risk factors or causes, develop measures to eliminate or reduce the risk, and translate knowledge gained into practice. This last approach is one in which NLM also is involved. Dr. Olden mentioned several of the specific programs created by the Institute to put this approach into action (the Environmental Genome Project, the National Center for Toxicogenomics, Mouse Genomic Centers, and others). Dr. Olden ended his presentation by describing briefly three NIEHS-NLM joint projects: the Environmental Health Portal, the Tox-Seek meta-search engine, and the Environmental Health Thesaurus.

### **XIV. DEMONSTRATION OF HOUSEHOLD PRODUCTS DATABASE**

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Marti Szczur, NLM Deputy Associate Director for Specialized Information Services, assisted by Vera Hudson and Florence Chang, demonstrated the new Household Products Database. This database, launched on August 1, 2003, was designed with the general public as the target user. The announcement resulted in many newspaper articles (including the *Washington Post* and the *Wall Street Journal*) and there were more than 3 million hits in the first month alone. The lure of the database is that it makes it easy to learn about the ingredients of products used in everyday life—including their potential harmful effects. Ms. Hudson then performed an online demonstration of the Household Products Database for the Regents, showing the variety of information the database puts at the user's fingertips. Ms. Szczur said that planned next steps include adding new types of products and more brands to the existing categories.

Following the presentations and demonstration, Dr. Kenneth Walker, who over the years has had some familiarity with NLM's toxicology and environmental health information services, said that the SIS databases are excellent and on the right track. He also said he was impressed that the Library's PR and outreach programs have matured over the last few years. Dr. Walker praised the work of Dr. Olden as NIEHS Director and asked him what he plans to do now that he announced he is stepping down. Dr. Olden said that he started as a scientist and he is looking forward to returning to the active research program he has maintained over the last decade. He briefly described the cancer-related laboratory work he is doing. He added that he has enjoyed tremendously working with NLM Director Lindberg.

## XV. NIHSeniorHealth

Joyce Backus of the Public Services Division (Library Operations) said that the new information resource, [NIHSeniorHealth.gov](http://NIHSeniorHealth.gov), is the product of a partnership between the NLM and the National Institute on Aging (NIA) working with other NIH Institutes. She said that [NIHSeniorHealth.gov](http://NIHSeniorHealth.gov) has many features to make it especially useful to older users, largely the result of applying research done by NIA on how seniors use the Web. Other NIH Institutes are adapting their consumer health information to the format required by [NIHSeniorHealth.gov](http://NIHSeniorHealth.gov). For example, the site has large fonts and a high contrast option. Perhaps the most unusual aspect is that the Web site will "talk to you" as you select text on a page. When the site is officially launched later this year there will be ten topics of particular interest to older citizens. Ms. Backus said that NLM tested the site at two senior centers, in Maryland and in Washington, D.C., and several focus groups, getting much useful information that was fed back into development work. She showed several sample pages of [NIHSeniorHealth.gov](http://NIHSeniorHealth.gov), discussing the features that make it useful to older users. One section has brief videos about the benefits of exercise and features several directors of NIH Institutes; the Regents were shown the clip of NIH Director Zerhouni swimming at the YMCA.

Next, Dr. Simon Liu, Director of NLM's Office of Computer and Communications Systems, discussed the prevalence of vision problems in older populations and described the special efforts NLM technical staff have made to create a site that mitigates those problems for Web users. The solutions to the various problems are server-based, at NLM, and do not require

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special software or other adaptation by the user. All commonly used browsers and platforms are supported (there are more than 40 possible combinations of these, all supported). He said that special compression techniques were used so that users operating at 56K would not be at a disadvantage in viewing the video clips. Special coding was needed to ensure that older browsers worked well with NIHSeniorHealth.gov. Dr. Liu said that NLM introduced content creation and management standards that all NIH Institutes use when preparing topics for the database. He described how the speech engine of the “talking Web” feature was adapted from commercial software. He and Ms. Backus then demonstrated the special features of NIHSeniorHealth.gov that make it especially useful to older people, for example, the speech feature, enlargeable fonts, and adjustable contrast. They showed a brief video clip of comments by focus group users in Florida, including comments by former NLM Director Martin M. Cummings on the value of the new Web site. As to the future, Dr. Liu said that they will continue to improve the quality of the speech engine, expand its vocabulary, let the user choose the voice (male or female), and adjust the speed of the speech. Perhaps in the future it will even be possible to completely navigate the NLM Web site by speech alone, making it accessible to those who are blind.

Following these presentations, Dr. A. Wallace Conerly said that the system is “fantastic.” It is a new way to reach our senior population with information that has not heretofore been provided. He asked how it would be advertised to the public so that our senior citizens will know that it is available. Ms. Backus said that NLM has many partners to work with on this, not only at NIH, but also with senior organizations. Dr. Lindberg added that the launch event should receive considerable media attention, and we will be working with members of the National Network of Libraries of Medicine in all areas of the country. Dr. Tenley Albright said that NLM’s experience in working closely with the other NIH Institutes is very encouraging and bodes well for the future expansion of the database. She said that NLM’s recent efforts to make its products available through public libraries are extremely important and should be continued.

## **XVI. UNITED NEGRO COLLEGE FUND SPECIAL PROGRAMS**

Gale Dutcher, Head of the Office of Outreach and Special Populations, Specialized Information Services, said that NLM was working on an exciting outreach project with the United Negro College Fund Special Programs Corporation. NLM has been working with health professionals in a group of Historically Black Colleges and Universities for over 10 years as part of its Toxicology Information Outreach Project. The present project aims to work with the HBCUs in the area of consumer health to encourage the use of reliable electronic health information (such as that provided by the NLM) by the public. The project has several components: workshops (the first featured former Surgeon General Joycelyn Elders, the second featured Board Chair Eugenie Prime); small grants to develop campus programs that enhance the use of online information resources (four HBCUs received grants in the first year); skills development and technical assistance for faculty and staff of grantees; and an advisory committee that serves as a link between this project and the earlier Toxicology Information Outreach Project.

Following Ms. Dutcher's background briefing, there were presentations by several of the officials directly involved in the project. Liz Lowe, President of UNCFSP, said the mission of the United Negro College Fund Special Programs Corporation is to support minority higher education. There is a network of colleges, universities, and non-governmental organizations that form mutually beneficial partnerships with federal agencies and foundations. There are currently 19 such partnerships through 12 federal agencies under which \$18.4 million has been awarded in the form of institutional grants and \$7.3 million in fellowships and scholarships. There is an international component with 52 partnerships on 4 continents and in 32 countries. The UNCF was formed about 60 years ago to provide scholarships for 39 member institutions. The UNCF Special Programs is a spin-off from the UNCF. Whereas the UNCF is focused on scholarships, the UNCFSP is broader in its interests—on anything it takes to assist HBCUs and other minority enterprises. Ms. Lowe listed the various federal departments (including the NLM) that are their partners and briefly described the subject areas of cooperation (environment, historic preservation, health, etc.).

Eugenie Prime, Board Chair, presented to her colleagues a few highlights from her June 2003 presentation to the UNCFSP/NLM-HBCU ACCESS project. One aspect of her presentation was the problem of the "digital divide"—an area in which the NLM has had a pivotal role. This divide is still a reality: 45% of the minority population has access to the Internet (vs. 60% for non-minority users). Health illiteracy, discussed at this meeting by the Surgeon General yesterday, results in considerably increased health care costs, she said. Ms. Prime cited a number of dismaying mortality statistics (from *Healthy People 2010*) of minority vs. majority health: infant mortality rate is more than double; heart disease is 40% higher; all cancers are 30% higher; prostate and breast cancer are both more than double; and mortality from HIV/AIDS is seven times higher. Statistics just released by CDC show that for those born after 2000, 49% of African American females, 43% of African American males, and 53% of Hispanic males will develop diabetes. She said that the HBCUs have the mission, indeed the ministry, to do something about this state of affairs. Online access to good health information empowers people to improve their status.

Ms. Karma Gaines-Ra, a library specialist at the Norfolk State University, discussed the project, "Promoting Health and Wellness through Online Information," for which she is the principal investigator. The purposes of the project are to increase campus and community awareness of health information, to promote the NLM's Web site as a source of health information to campuses and the community, to train the University's library staff to search NLM databases and online information resources, and to assist the community generally to become active in their health care. She described the various advertising they did (for example on the campus radio and newspaper) to get students to participate. Their program was integrated into the mandatory bibliographic instruction that all new students undergo. For the community at large, the program was incorporated into a health fair. To date, 28 faculty and 94 students have been trained. In February 2003, when the project became active, there were 213 weekly hits; in the week ending June 10 there were more than 107,000 hits. There is now a permanent link on the University

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library's home page to NLM databases; a stand-alone computer accessing MedlinePlus was installed; and bibliographic training in the NLM information resources is ongoing.

Following the presentations, Dr. Ernest Carter thanked the UNCFSP and the NLM for this important initiative. It represents an important step in NLM's expanding its work with HBCUs in disseminating health information to those who need it. He described the "translational burden" of HBCUs in taking information, such as that created by NLM, and translating it for the minority community. Dr. Melvin Spann, former NLM Associate Director, who began NLM's work with the HBCUs some years ago, related the present UNCFSP to the long list of activities that NLM has been associated with in its work with HBCUs. He said the UNCFSP/NLM program has the potential for the greatest impact on the health of minority communities.

### **XVII. PRESERVATION AT IRON MOUNTAIN**

Mr. Walter Cybulski, Head, Quality Assurance Unit, Preservation and Collection Management Section, Public Services Division, reported to the Board about NLM's extensive preservation program. Preservation is based on retaining an "archival" or "master" copy. In the case of filming, the archival copy is the film in the camera. In the case of movie film, chances are the NLM does not own the camera film. In that case, the copy in our collection closest to that film is the archival copy. Mr. Cybulski discussed preserving high-quality print artifacts—manuscripts and books—that under optimum condition can last hundreds of years. He showed pictures of a variety of deteriorating library materials. He discussed the fire hazards associated with nitrate film and the development of nonflammable safety film. Polyester-based microfilm (which NLM has used since the 1980s) is safe and, when properly created and stored, has a life span of 500 years. Mr. Cybulski discussed the rate at which various materials deteriorate and fade, primarily the result of exposure to moisture and heat. One problem is that various non-book library pieces may be made of proprietary materials, and, not knowing what is in them, we don't know how best to preserve them. Another problem is the obsolescence of equipment on which some materials can be viewed. For these reasons, NLM has a program to duplicate films and other materials so patrons may use them before the materials are sent to offsite storage. Mr. Cybulski discussed the advantages of storing NLM archival materials in the cool, clean, dry environment of an underground limestone cave in Pennsylvania, owned by Iron Mountain, Inc. He took the Regents on a photo tour of that facility. NLM's main facility there is 1,500 square feet and kept at a constant 55 degrees F and 30 percent relative humidity. NLM also has a cold vault of 850 square feet kept at 35 degrees F and 25 percent relative humidity. Although many of today's users want materials copied to DVDs and other digital media, we must continue to provide optimal storage conditions for the archival copies of NLM's historic films.

Following Mr. Cybulski's presentation, Dr. Holly Buchanan commented on the importance of NLM's assuming a national role for the preservation of material. She described several environmental problems she had encountered at different institutions over the years that led to damaged or destroyed library materials. She thanked NLM for its stewardship in serving as a safety net for preserving the scholarly record of medicine. She asked about how NLM was

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facing the challenge of preserving digital information. Mr. Cybulski said that this is a “predominant concern” and if we are to preserve materials that are “born digital” we must provide support for the format of the technology in which the material was issued. NLM is committed to providing that support. Ms. Deanna Marcum of the Library of Congress congratulated NLM for its work in preservation. The Library of Congress also takes seriously its responsibilities for audiovideo materials, and it is retrofitting a bunker in northern Virginia for the preservation of these materials. She commented that CDs and DVDs do not last as long as film and that we will have enormous problems in the future with these formats.

## **XVIII. ADJOURNMENT**

The meeting was adjourned at 12:15 p.m., September 10, 2003.

### **ACTIONS TAKEN BY THE BOARD OF REGENTS:**

- Approval of the May 14-15, 2003 Board of Regents Minutes
- Approval of September 21-22, 2004 Meeting Dates
- Approval of Fellowship Training Concept
- Concurred with recommendations of the Extramural Programs Subcommittee

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

Eugenie Prime, M.A., M.S., M.B.A.  
Chair, NLM Board of Regents