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

MINUTES OF THE BOARD OF REGENTS
September 10-11, 2013

The 164th meeting of the Board of Regents was convened on September 10, 2013, 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 3:15 p.m., followed by a closed session for consideration of grant applications until 3:45 p.m. On September 11, the meeting was reopened to the public from 9:00 a.m. until adjournment at 12:00 p.m.

MEMBERS PRESENT [Appendix A]:
Dr. Ronald Evens [Chair], Washington University School of Medicine
Dr. David Fleming, University of Missouri School of Medicine
Dr. Henry Lewis
Ms. Mary Ryan, University of Arkansas for Medical Sciences Library
Dr. F. Douglas Scutchfield, University of Kentucky College of Public Health
Ms. Gail Yokote, University of California, Davis

MEMBERS NOT PRESENT:
Dr. Katherine Gottlieb, Southcentral Foundation
Dr. Robert Greenes, Arizona State University
Dr. Trudy MacKay, North Carolina State University
Dr. Ralph Roskies, University of Pittsburgh

EX OFFICIO AND ALTERNATE MEMBERS PRESENT:
RADM Scott Giberson, Office of the Surgeon General, PHS
Mr. Christopher Cole, National Agricultural Library
Dr. Joseph Francis, Veterans Health Administration
Col. Helen Hootsmans, United States Air Force
Ms. Kathryn Mendenhall, Library of Congress
Col. Cathy Nace, United States Army
Dr. Charles Rice, Uniformed Services University of the Health Sciences
Ms. Linda Spitzer, Uniformed Services University of the Health Sciences

CONSULTANTS TO THE BOR PRESENT:
Dr. Marion Ball, Johns Hopkins School of Nursing
Dr. Holly Buchanan, University of New Mexico
Dr. H. Kenneth Walker, Emory University School of Medicine

SPEAKERS AND INVITED GUESTS PRESENT:
Dr. Gary Gibbons, National Heart, Lung, and Blood Institute, NIH
Mr. Kevin Read, New York University
Mr. Matthew Stokes, University of Pittsburgh

MEMBERS OF THE PUBLIC PRESENT:
Mr. Glen Campbell, Friends of the National Library of Medicine
Dr. Dennis Cryer, Friends of the National Library of Medicine

Ms. Carla Funk, Medical Library Association
Mr. Andrei Komarov, Technical Resources International, Inc.
Mary Lindberg
Dr. Barbara Redman, Friends of the National Library of Medicine
Dr. Elliot Siegel, Consultant
Dr. Christina Yoon, Friends of the National Library of Medicine

FEDERAL EMPLOYEES PRESENT:
Dr. Donald A.B. Lindberg, Director, NLM
Ms. Betsy Humphreys, Deputy Director, NLM
Dr. Milton Corn, Deputy Director for Research and Education, NLM
Dr. Michael Ackerman, Lister Hill Center, NLM
Dr. Sameer Antani, Lister Hill Center, NLM
Ms. Stacey Arnesen, Division of Specialized Information Services, NLM
Ms. Dianne Babski, Division of Library Operations, NLM
Ms. Joyce Backus, Division of Library Operations, NLM
LCDR Eunice Chung-Davis, USPHS
Ms. Deirdre Clarkin, Division of Library Operations, NLM
Ms. Kathleen Cravedi, Office of Communications and Public Liaison, NLM
Ms. Francesca Crawford, Division of Extramural Programs, NLM
Mr. Todd Danielson, Office of the Director, NLM
Dr. Dina Demner-Fushman, Lister Hill Center, NLM
Mr. Ivor D'Souza, Office of Computer and Communications Systems, NLM
Ms. Mary Kate Dugan, Division of Library Operations, NLM
Dr. Kathel Dunn, Office of the Director, NLM
Ms. Gale Dutcher, Division of Specialized Information Services, NLM
Mr. Mehryar Ebrahimi, Office of the Director, NLM
Ms. Martha Fishel, Division of Library Operations, NLM
Dr. Marcelo Fiszman, Lister Hill Center, NLM
Dr. Valerie Florance, Division of Extramural Programs, NLM
Dr. Dan Gerendasy, Office of Health Information Programs Development, NLM
Dr. Bert Hakkinen, Division of Specialized Information Services, NLM
Dr. Michael Huerta, Office of Health Information Programs Development, NLM
Ms. Christine Ireland, Division of Extramural Programs, NLM
Mr. Don Jason, Office of the Director, NLM
Dr. Santosh KC, Lister Hill Center, NLM
Ms. Janice Kelly, Division of Specialized Information Services, NLM
Mr. Paul Kiehl, Office of the Director, NLM
Mr. Halil Kilicoglu, Lister Hill Center, NLM
Dr. John Kimbrough, Lister Hill Center, NLM
Ms. Nicole Lehotsky, Office of the Director, NLM
Dr. David Lipman, National Center for Biotechnology Information, NLM
Dr. Robert Logan, Office of Communications and Public Liaison, NLM
Ms. Katherine Masterton, Office of the Director, NLM
Dr. Clement McDonald, Lister Hill Center, NLM
Ms. Christian Minter, Office of the Director, NLM
Ms. Melanie Modlin, Office of Communications and Public Liaison, NLM
Mr. Dwight Mowery, Division of Extramural Programs, NLM
Mr. David Nash, Office of the Director, NLM
Ms. Jamie Peacock, Division of Specialized Information Services, NLM
Dr. Steven Phillips, Division of Specialized Information Services, NLM

Dr. Jeffrey Reznick, Division of Library Operations, NLM
Ms. Alicia Ross, Division of Extramural Programs, NLM
Dr. Angela Ruffin, Division of Library Operations, NLM
Dr. Eric Sayers, National Center for Biotechnology Information, NLM
Mr. Jerry Sheehan, Office of the Director, NLM
Dr. Hua-Chuan Sim, Division of Extramural Programs, NLM
Dr. Johann Stan, Lister Hill Center, NLM
Dr. George Thoma, Lister Hill Center, NLM
Ms. Holly Thompson, Office of the Director, NLM
Dr. Alan VanBiervliet, Division of Extramural Programs, NLM
Dr. Fred Wood, Office of Health Information Programs Development, NLM
Dr. Jane Ye, Division of Extramural Programs, NLM
Ms. Janet Zipser, Division of Library Operations, NLM

I. OPENING REMARKS

Dr. Ronald Evens, NLM Board of Regents Chair, welcomed the Regents, alternates, and guests to the 164th meeting of the Board. He then welcomed Col. Helen Hootsmans attending for Maj. Gen. Dorothy Hogg. He then introduced Rear Admiral Scott Giberson, Acting Deputy Surgeon General, PHS, to give the report from the Office of the Surgeon General (OSG).

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

Rear Admiral Scott Giberson noted that he is representing Dr. Boris Lushniak, the Acting Surgeon General, and that the Office will be in transition until a new Surgeon General is confirmed. He announced that a report commemorating the 50th anniversary of the first release of the Surgeon General's report on tobacco will be issued in January 2014. It will highlight the fifty years of activities by the Office relating to smoking cessation and tobacco use. He stated that 3,800 people start to smoke every day. Most new users are young and we focus on them. Walking initiatives have been given a lot of attention by the OSG, and this activity resonates with everyone. It is free and does not require additional resources.

He discussed the role of the OSG in the implementation of the Affordable Care Act. The Surgeon General chairs the National Prevention Council which was created by the Affordable Care Act. Comprised of 20 Federal departments, agencies and offices, the Council is committed to prevention and wellness in the U.S. health care system. He noted that the marketplace will open on October 1 and that the OSG, which is a partner, will work to ensure that the word about eligibility for health care is widely distributed.

Dr. Evens asked RADM Giberson his thoughts about e-cigarettes. Giberson replied that the OSG did not yet have an official position on it but acknowledged that it is a hot topic.

III. MAY 2013 MINUTES AND FUTURE MEETINGS

The Regents approved without change the minutes from the May 21-22, 2013 meeting. It was agreed that next year's fall meeting will take place September 9-10, 2014.

IV. REPORT FROM THE NLM DIRECTOR

Dr. Lindberg began his report with a note about the budget. NLM operated in 2013 without furloughing any employees, and it is hoped that we will do the same in 2014. It is expected that FY 2014 will begin under a Continuing Resolution, and the potential effect of an FY 2014 sequester of funds is uncertain at this time.

The NLM has done a great deal on health data standards and other federal agencies have transferred funds to the Library to assist in standards work relevant to meaningful use of electronic health records. A recently concluded interagency agreement with the US Department of Veterans Affairs (VA) will provide up to $1 million a year for the next five years for terminology enhancements. An existing agreement with the Centers for Medicare and Medicaid provided more than $2.3 million in FY 2013 for authoring and distributing vocabulary value sets for clinical quality measures.

With respect to personnel, Dr. Lindberg announced that Deirdre Clarkin has been named the Deputy Chief of the Public Services Division. Dr. Clem McDonald introduced three new Lister Hill National Center fellows. They are: Santosh KC, PhD, whose research will focus on retrieving complex medical images, such as chest X-rays, and computing symmetry; John Kimbrough, MD, PhD, will be working on projects analyzing the MIMIC-II database to answer questions related to his interests in cardiology, internal medicine and other areas; and Johann Stan, PhD, whose research will involve extracting drug interactions from text.

Dr. Kathel Dunn introduced the new Associate Fellows. Don Jason received his MLIS and MS in Information Architecture Knowledge Management from Kent State University in 2013. Nicole Lehotsky received her MSLS degree in 2013 from the University of North Carolina, Chapel Hill. Katherine (Kate) Masterton received her MLIS from Drexel University in 2013. Christian Minter received her MS in Library and Information Science from the Catholic University in DC in 2013, and Holly Thompson received her MS in Library and Information Science from the Palmer School of Library Science at Long Island University in 2011.

Of interest to the Board is the Fair Access to Science and Technology Research Act of 2013. Neither the House nor the Senate have taken action yet, but both favor requiring federal science agencies with annual extramural research expenditures of more than $100 million to develop public access policies similar to the NIH Public Access Policy, but with a maximum embargo period of six months, compared to the 12 months for NIH.

Dr. Lindberg discussed the status of legislation offered by Reps. Markey (D-MA), Waxman (D-CA) and DeLauro (D-CT), called the Trial and Experimental Studies Transparency (TEST) Act of 2012. It would, if passed, strengthen existing statutory requirements for clinical trial registration and results submission at ClinicalTrials.gov.

Action has not yet been scheduled on the Freedom of Information (FOIA) Oversight and Implementation Act of 2013. The bill would make public information disclosed under FOIA available in an electronic, publicly accessible format.

With respect to clinical trials, Dr. Lindberg provided an update noting that the FDA Amendments Act of 2007 requires rule-making and that NLM has continued to work with NIH and the FDA to draft regulations to implement clinical trial registration and results reporting requirement, including the Department's proposals for expanding the database. This has taken years to move forward. ClinicalTrials.gov includes about 150,000 studies as of August 1, 2013 and more than 9,500 studies with results from over 1,260 data providers.

Dr. Lindberg congratulated NCBI Director Dr. David Lipman, and Dr. Atul Butte of Stanford University, an NLM grantee, for their recent receipt of the prestigious *Champions of Change* award at a White House ceremony. They were recognized for their outstanding work in "promoting and using open scientific data and publications to accelerate progress and improve our world."

Tab F, said Dr. Lindberg, presents an update on public access to publications and data resulting from federally funded research. Tab G discusses NLM's contribution to the launch of the Dietary Supplement Label Database (DSLD), a joint project of NLM and the NIH Office of Dietary Supplements. The DSLD contains the full label contents from dietary supplement products marketed in the US. The database currently contains 17,000 labels and images of labels. It is expected to grow rapidly over the next three years, eventually covering most of the 55,000 dietary supplement products sold to American consumers.

Dr. Lindberg also discussed the recent launch by NLM of about 1,800 new high quality images of solid oral dosage medications. These images cover about 15% of the more than 10,000 solid dosage forms of the 4,075 human prescription medications on the US market and a higher percentage of frequently prescribed medications. Images were taken at high resolution. Researchers and product developers may obtain the images and accompanying metadata via an applications programming interface (API) at http://RxImage.nlm.nih.gov. NLM also makes the images available for interactive Web searching via its *Pillbox* and *RxNav* sites. This project was done in partnership with the FDA's Center for Drug Evaluation and Research.

Two NLM projects, Dr. Lindberg reported, were among the 13 selected by HHS Secretary Sebelius to participate in a new innovation initiative, *HHSignite.* Organized by the HHS Office of the Chief Technology Officer, the election into the program comes with $10,000. The two projects are called *Pillbox Takes the Red Pill: Promoting innovation and developer engagement around HHS medication data through open source* and *The NIH 3D Printing Exchange*.

Dr. Lindberg reported on NLM's 13th Annual Informatics Training Conference that was held at the University of Utah on June 18-19, 2013. Approximately 230 attendees participated, including directors, faulty, staff and trainees from all current NLM training programs.

The History of Medicine Division, Lindberg noted, will be loaning seven works from its collections to the Sackler Gallery Smithsonian Institution, for the new public exhibition entitled "Yoga: The Art of Transformation" which will open October 19, 2013. The exhibition will be the first ever created about the visual history of yoga. The works loaned by NLM include five issues of "Yoga–Mimansa," a now rare but very influential journal devoted to the art and science of Yoga, published between 1924 and 1930.

Dr. Lindberg mentioned that the NLM has developed a traveling version of the *Native Voices* exhibition. It will be pilot-tested in four sites across the country starting in October 2013 in North Dakota. Other sites will include: Honolulu, Hawaii; Southcentral Foundation, Anchorage, Alaska; and Chickasaw Nation, Oklahoma.

Lastly, Dr. Lindberg reported on a descendent of the Hippocrates Tree that was planted on the north side of the NLM in 1962. The tree was presented by the Greek Ambassador as a gift from the town of Cos to the NLM at the dedication of its new building on December 14, 1961. Some years ago, as the tree started to fail, the NIH Grounds Maintenance and Landscaping Branch undertook significant efforts to produce two viable clones. The tree died this year, and one of the clones will be installed in the spring of 2014.

V. AUTOMATIC CLASSIFICATION AND ANSWERING OF NLM CUSTOMERS' REQUESTS

Dr. Dina Demner-Fushman discussed a Consumer Health Question Answering (CHQA) system that a group chaired by Dr. Lindberg is developing to facilitate processing of about 100,000 requests received yearly by NLM's customer services. Users submit these requests through multiple NLM contact Web forms and e-mails. Requests are for interlibrary loans, for corrections to MEDLINE/PubMed citations, and for clarifications and information on various health-related problems, among other issues. Currently the Web forms and e-mails are submitted to the NLM Customer Request Management System, and are answered by the reference desk staff manually within four business days. Many steps in preparing the response can be computer-assisted, including pre-fetching the citations that instigated the request and preparing draft answers to health-related questions.

Dr. Demner-Fushman said that the first step in automating NLM's response is to understand the nature of the request. We have developed a Request Classification and Routing module that recognizes the interlibrary loan requests, requests to correct PubMed citations, and reference questions. This module currently achieves an average accuracy of about 80%. The requests to correct PubMed citations are then processed by our Corrections Processing module that extracts the PubMed Identifier(s), or PMID(s), that brought about the requests. The module then retrieves the citations using E-Utilities, and prepares responses based on the information extracted from the citations.

Similarly, Dr. Demner-Fushman pointed out, the reference questions are sent to the Question Answering module that currently is focused on answering questions about genetic disorders. The module first converts the submitted question into a structured form and then uses the form to search MedlinePlus, Genetics Home Reference and GeneReviews for paragraphs of text that answer the question. For the questions that it was able to understand, the module currently reliably finds answers for simple questions about general information, causes, diagnosis, treatment and prognosis for the diseases that can be found in the three sources of information mentioned above.

The drafts of the answers generated by the Corrections Processing and Question Answering modules are added to the original requests and submitted to the Customer Request Management System. The CHQA, said Dr. Demner-Fushman, is in the early stages of development and testing.

Board member Mary Ryan asked Dr. Demner-Fushman if she was getting 29% precision in this step in the pilot. Dr. Demner-Fushman said yes, they had tuned the classifiers for high recall to capture all reference questions and would achieve higher precision at the next step. Ideally, Dr. Demner-Fushman said that classification methods could achieve precision in the high 90s.

Board consultant Dr. Holly Buchanan asked Dr. Demner-Fushman how she planned to get follow up information from the customer. Dr. Demner-Fushman said she is hoping that if the quality of the initial answer is reasonable then we can work in real-time with customers.

Dr. Buchanan asked whether this system is taking place in real-time, like an online chat. No, replied Dr. Demner-Fushman. The current practice is to respond to questions within four business days. (NLM is trying to shorten that period.) Dr. Lindberg said that he initially thought NLM could take more than the second and a half that IBM's Watson tries to meet in answering a consumer's question. Whether it will usually take an interaction with the user to provide a useful answer is an important question to answer in determining how to move forward.

VI. APPLICATION OF NETWORK LABEL PROPAGATION FOR BIOMARKER RANKING

Matthew E. Stokes, MS, an NLM-funded predoctoral trainee at the University of Pittsburgh, shared the preliminary results of his research for his dissertation on biomarker discovery in genome-wide SNP (single-nucleotide polymorphism) data. This research involves looking for a biochemical signal associated with a phenotype, generally a disease. These biochemical signals can take a whole variety of forms, and then they can be measured, and associated with disease and eventually achieving a clinical impact. While we are looking for causation, even correlation can have a great impact on diagnosis or understanding prognosis of disease.

Mr. Stokes explained that, at the University of Pittsburgh, he is a member of both the Department of Biomedical Informatics and the Intelligent Systems Program. The Intelligent Systems Program is more of a computer science-based department which seeks to apply statistical machine learning techniques to large scale data sets. One great example is genome data sets. So, what biomarker discovery really boils down to in terms of machine learning is feature selection. These data sets can have tens of thousands of features. There are simply too many to examine in a data set. Ideally, you would like to find just a few variables which you can use to explain your data. These biomarkers which you find in your data sets to explain your data are useful for a number of reasons. In addition to improving biological knowledge and algorithmic performance, there are a number of clinical applications for biomarkers including prognosis and prediction of disease, risk of disease and mortality, diagnosis, and treatment. These biomarkers can affect the way we think about screening, lead to pre-emptive therapy, and suggest lifestyle changes. Disease treatment could be individualized leading to reduced costs and elimination of negative side-effects.

There are other types of biomarkers, but Mr. Stokes' research focuses primarily on genetic biomarkers because DNA is a nice, fixed source of data in the body, which does not change over time, and the knowledge base about DNA is growing constantly and getting extremely cheap to compute. Mr. Stokes said his research involves SNPs, single nucleotide polymorphisms, the smallest unit of genetic variance. Millions of SNPs exist in the human genome. With so much

data, the bottleneck is analysis. An algorithm has to be fast, multivariate, robust and feature-selective.

Mr. Stokes' research focuses on label propagation which has never been applied to a data set of this scale. He said that he represents his GWAS data as a bipartite network structure and uses known sample labels to propagate information about nodes to neighboring nodes through the graph edges. He applied label propagation (LP) to over 100,000 SNPs for predictive performance and reproducibility between data sets.

Compared to chi square (a univariate ranking method) and ReliefF (a multivariate ranking method), the top-ranked SNPs obtained from LP had significantly better predictive performance when used in a k-nearest neighbor classifier. Moreover, with LP significantly more SNPs were found to be common in the top-ranked SNPs between the two datasets. His results suggest that application of LP to GWAS data has strong potential to improve the effectiveness of ranking of SNPs.

Board consultant Dr. Kenneth Walker asked Mr. Stokes what he sees as the clinical relevance of the work that he is doing. Mr. Stokes said that it is a versatile algorithm. With regard to the clinical relevance of his work, Mr. Stokes said that eventually everyone would have their genome and use it in clinical applications. The doctor will use this genomic information daily.

National Science Foundation representative Howard Wactlar observed that Mr. Stokes indicated that in the not too distant future, everyone will know their genome and it will be available for therapeutic decision making. Are we also not that far from individuals being able to access their own genome independently? As they do with pregnancy testing. Mr. Stokes replied that he sees people wanting to have access to own their own genome and said there are many genomic products coming into the market and becoming quite popular.

Dr. Evens said that for $1,000 you can get your own genome. How much is it going to cost to analyze it? Mr. Stokes said that the current bottleneck is the analysis. Tools have been developed to make it more accessible to the general public. His algorithm is useful for getting biological information and determining what biological markers need to be examined.

Dr. Lindberg asked about the degree to which training in his field gave him the requisite mathematical knowledge. Mr. Stokes said it came from his background in computer science. He is not a biologist and he had to learn the genomics. And, a lot of his colleagues have had to get familiar with computer science. To succeed you need both disciplines.

VII. PRESENTATION OF REGENTS' AWARD

The Board of Regents considers the Regents' Award, established in 1970, to be the highest award that can be given to a member of the staff. This year, the award goes to Dr. Sameer Antani and Dr. Dina Demner-Fushman. Both Drs. Antani and Demner-Fushman are staff scientists at the Lister Hill Center and are responsible for developing the Open-I system that enables us to access visual information from biomedical articles that are relevant to their query, as well as the article's text.

VIII. THE NATIONAL HEART, LUNG, AND BLOOD INSTITUTE (NHLBI)

Dr. Gary Gibbons, NHLBI Director spoke on "The NHLBI at 75: Toward a Diverse, Networked Scientific Community." Currently in its 65th year, NHLBI will be undertaking a strategic visioning over the next 10 years. Dr. Gibbons noted that he inherited a legacy of excellence and that that continues in the 21st century, even with its fiscal realities. Among NHGRI's enduring principles are to: value investigator-initiated fundamental discovery science; initiate fundamental discovery science; maintain a balanced, cross-disciplinary portfolio that includes basic, translational, clinical and population science; support implementation science that empowers patients and enables partnerships to improve the health of the nation; train a diverse new generation of leaders in science; and value the health of all communities, i.e., elucidate and eliminate health inequities in the US and around the world.

Expanding upon these principles, Dr. Gibbons noted that the NIH tag line is, "Turning Discovery into Health." It's essential that NHLBI translate its research findings into treatments and therapies that have an impact on public health. Health literacy is another major concern of NHLBI's, as its successful implementation can enlighten and empower patients. The NIH biomedical workforce includes a tiny sliver of African Americans and Hispanic Americans, but the vision is for this workforce to become increasingly diverse, better reflecting the diversity of our nation. To be successful in science, Dr. Gibbons noted, one has to have passion and the curiosity to want to know about something. If budding scientists of all backgrounds are willing to step out on faith to pursue an uncertain career path, NIH leadership should meet them halfway with the opportunities to fulfill their ambitions. Dr. Gibbons was appointed by NIH Director Dr. Francis Collins to serve on the Advisory Committee to the Director Working Group on Diversity. Two key initiatives are building infrastructure and leading diversity. The new program targets undergraduate students, identified as a critical group for developing diversity. A complementary strategy is to create a national mentorship research network to provide guidance to minority students.

With the changing fiscal environment, all NIH Institutes and Centers are asked to be more efficient, effective and economical. When the sequester took effect, slashing research funding, it brought home to Dr. Gibbons the importance of having very clear strategic priorities in mind. As part of that process, NHLBI is systematically going through its program portfolio, evaluating it in a methodical way. He said that NHLBI has been conducting a clinical trial productivity and impact analysis, for example, to measure bang for the buck.

In the final part of his talk, Dr. Gibbons discussed NHLBI's scientific and public health agenda. Arguably, NHLBI has been a poster child for NIH, demonstrating how the investment of taxpayer dollars in the biomedical enterprise has translated into dramatic improvements in the public's health. There has been a 60% reduction in coronary heart deaths over the last couple of decades and, although NIH can't take full credit for that, certainly the engine of investing in the biomedical research and creating those breakthroughs has been NHLBI.

One of the challenges NHLBI sees is the inequities in heart, lung and blood disease—particularly asthma—among populations. African American and Hispanic children are disproportionally

burdened by asthma relative to other populations. Similarly, one of the ravages of hypertension is chronic kidney disease. He showed a chart with incidence of chronic kidney disease—African Americans and Native Americans have the highest rates relative to the rest of the population. Another example of health disparity within the Blood Division relates to rates of stroke in children with sickle cell disease.

These are vexing problems, but still there are ways that we can make tremendous advances in public health by addressing and hopefully reducing health inequities. And there is a great opportunity, Dr. Gibbons observed, to look at things from a systems view from "nucleotide to neighborhoods" view that is really going to provide new insights. This holistic, multidimensional approach to systems science is emerging both in the biomedical sphere and in the social context. There is a lot of resonance between that systems biology perspective at a public health level and, at a macro level, the socioecological model that appreciates that a patient experiences the effects of biological systems in the context of a family , a community, and a broader environmental context that . Dr. Gibbons believes that the systems approach is going to be critical if we are going to bend the curve and make an impact on those health inequities that have been so difficult and refractory to intervention. Perhaps for NLM as well, this represents a data and knowledge management challenge, to be sure that that information and that literacy to successfully interpret it transcends all of these elements.

To conclude, we are on a threshold of an exciting new information age, said Dr. Gibbons. This is clearly within NLM's province. He discussed the expertise of amazon.com at understanding customers' characteristics and needs. It would be great if medical professionals could assess patients so well. New technologies are emerging, allowing researchers to check EKG, measure blood pressure, fitness, energy expenditure, etc. remotely and patients to monitor their vital signs themselves. NHLBI is thinking of ways to transfer big data as networks through a series of partnerships to create knowledge networks, many of which will be health systems, HMOs, etc.

Dr. Gibbons closed by saying he hoped he'd communicated a sense of NHLBI's excitement about the opportunities that lie ahead. With the rethinking of NHLBI's message will come a major effort to prevent and even cure the heart, lung and blood illnesses that are widespread and represent a large segment of health care costs. One challenge that he's given to NHLBI and the extramural community relates to sickle cell disease (SCD). Unfortunately, stroke is a substantial occurrence in children with SCD. One of our challenges is to create a research agenda that will move us forward toward a stroke-free generation of children with the disease.

Dr. Scutchfield asked whether NHLBI would continue to fund the Framingham Heart Study, begun in 1948. Yes, he replied. Population studies are an important part of the NHLBI portfolio and Framingham has had a great legacy—and will continue to do so. It's almost priceless, Dr. Gibbons said, to have the multigenerational phenotyping information inherent in that dataset.

Regarding health literacy, information is power, noted Board member Dr. Henry Lewis. Putting the right information in the patient's hand is what we need to do more of. How do you see NHLBI and NLM expanding the scope of health literacy, particularly regarding diseases that your Institute covers?

Part of NHLBI's challenge to enable and empower patients is through information, and as part of its congressional mandate, public education is a key element of our portfolio. In today's health system, there may be a variety of communicators, in addition to the clinician or care provider. NIH needs to work to get reliable, understandable information into the hand of a community health worker or a school nurse or whoever might be able to help enhance health literacy in ways that are culturally sensitive and appropriate.

Board consultant Dr. Kenneth Walker expressed concern about the pace of translational research in sickle cell disease. There have been a lot of advances, Dr. Gibbons pointed out, but there's not much on the horizon. One of NIH's newest initiatives is a group of Centers of Excellence in Hemoglobinopathies, which should provide an exciting opportunity for cross-disciplinary knowledge exchange. As a vascular biologist himself, Dr. Gibbons noted that vasculopathy is causing stroke, and that may relate to pathways and mechanisms that are different from hemoglobin regulation. So the opportunities for translation may come from different spheres. As you know, innovations and breakthroughs can come from unforeseen sources or out of unanticipated directions, so this, as you can probably glean, is a high priority and we're going to be sure that we have a full portfolio to fulfill that vision.

IX. TRAINING LIBRARIANS IN BIOINFORMATICS AND NCBI RESOURCES

Ms. Janet Zipser, head of the Training and Outreach Unit in the MEDLARS Management Section, Library Operations, began the presentation. She and Dr. Eric Sayers of NCBI discussed the development and delivery of two classes to train librarians in bioinformatics and NCBI resources. Ms. Zipser presented a brief timeline of this recent training program.

In 2008, during the National Network of Libraries of Medicine site visits, one theme emerged in all of the regions—the need for a training program designed specifically for a librarian audience, covering bioinformatics and the NCBI molecular biology databases. In parallel, from about 2008 to 2010, the NCBI Discovery Workshops offered throughout the country were attracting a growing number of librarians. In 2009, the Library began writing the Statement of Work (SOW) for the new Network contracts and a specific task was included in the NLM Training Center SOW—to address this need identified in 2008. The new training center contract was awarded in May 2011 and in 2012 NCBI, MEDLARS Management Section training staff, and the NLM Training Center staff began collaborating on a new bioinformatics training initiative for librarians. Finally, in 2013, the courses debuted.

The target audience for the training was health science librarians at US institutions who had the strong support from upper management that would allow them to develop and conduct bioinformatics training once they had been trained themselves. Interested parties had to submit an application and curriculum vitae. Organizers hoped for a range of students from universities and other institutions, as well as a reasonable geographic distribution.

Forty-two applications were received and 22 students were accepted. All have successfully completed Parts 1 and 2. The group—82% from universities, 9% from hospitals, 4.5% from research institutes and 4.5% from government—represented a fairly broad range of states.

Part 1, "Fundamentals in Bioinformatics and Searching," was a three-week online, self-paced course, March 4-18, 2013. The aim was to provide, from a librarian's professional perspective, the fundamental knowledge and background information necessary for the subsequent, more intensive second portion of the course. Bioinformatics was introduced both as a discipline and as a research practice. Students previewed selected NCBI databases, tools (including search tools) and bioinformatics records, and developed a beginning working knowledge of the molecular biology vocabulary needed to enable successful searches of NCBI resources. The course consisted of video lectures, exercise assignments and readings. Students received 15 hours of Medical Library Association (MLA) continuing education credits.

Part 2, "A Librarian's Guide to NCBI," was a five-day, in-person course held at NLM April 15-19, 2013. Topics included the Entrez text search system, the BLAST sequence similarity search and NCBI resources devoted to genes, genomic variations, gene expression, protein structures and chemical informatics. The overall goal of this class was to assist librarians in handling customer questions by describing the various kinds of molecular and chemical data available and explaining how they are used in modern biomedical research.

What lessons did NLM learn, after this first-year pilot? Overall, ratings were very high, but some thought that the online course was too tightly packed into three weeks. (The next class, in fall of 2014, will be six weeks long, straddling Thanksgiving.)

Dr. Sayers discussed the educational challenge that devising Part 2 presented to his team. They're a group of NCBI scientists who have had a number of years of experience training scientists on how to use the NCBI tools, but they needed to learn about the unique needs of librarians. For example, scientists are narrowly focused on the problem, while librarians are broadly focused. Scientists look at results and librarians look at resources. A goal in developing Part 2 was to take the basic biology background that the librarians were able to gain during Part 1 and leverage that information in the course at NCBI. Another aim was to create a community of trained trainers that would go home and network with people in other institutions with similar challenges. Course planners are also conducting "NCBI Office Hours," every other Friday, via Adobe Connect. These sessions have an open format in which NCBI staff can present new or changing aspects of tools and databases, and answer questions. For example, one of the participants gave a short version of a presentation she was asked to give to a local department and asked for a critique. In addition, a number of the lectures from the training have been posted to either a private YouTube channel or on the public NCBI YouTube channel.

NLM is planning to offer the "Fundamentals" course again in the fall. Almost 120 applications have already been received. The team plans to offer Part 2 in April 2014, decoupling it a little bit from Part 1. NLM staff will try to write up biology review materials prior to coming to Part 2, to ensure that students solidify even further their understanding of the basic biology. Dr. Sayers said that he looked forward to continuing support and collaboration on this well-received course.

Board member Gail Yokote noted that her institution, the University of California, Davis, sent a representative to the training. She asked about the sustainability of the content for the course—will it require constant updating? The greatest amount of effort, NLM staff replied, was in creating the class the first time, because a lot of it is organizing the information. After that, what

is required is largely refreshing Web shots and training exercises. Ms. Yokote asked whether this course linked to other training opportunities such as those offered by the Regional Medical Libraries (RMLs) and the MLA. Yes, staff replied, they'll make sure that students are aware of those opportunities and perhaps link to some of these resources.

Asked how this class related to the bioinformatics training course at Woods Hole, that, said NLM staff, is a broader course, not specially targeted to librarians.

Board ex-officio member Dr. Charles Rice from the Uniformed Services University of the Health Sciences said that their librarian thinks this class is very exciting. She points out that librarians are particularly skilled in the management of online databases, and these resources are an actual extension of that. Also, NLM is training librarians who are good at teaching and sharing information. It's interesting to see how librarians have moved from the custodians of print materials to information experts.

Particularly for Part 2, a Board member asked, is there a pathway that a user could select for a more in-depth exploration of a particular module that they may find especially applicable in their institution? Yes, said NLM staff. Each of the classes' resources has its own documentation set, and students can also consult the many documents on NCBI Bookshelf.

Dr. Lindberg closed the session by saying that a person doesn't get to be a librarian in a library. Today's medical librarians are skilled in research techniques, informatics and the sciences; their information comes from many media and fields. Both of these courses are wonderful, but they're aimed at improving librarians' understanding of something and not the retrieval of information

X. EXTRAMURAL PROGRAMS REPORT

NLM has a long-standing interest in the area of disaster information management, EP Director Dr. Valerie Florance noted. Following the incidents of September 11th, the Library launched several initiatives aimed at engaging the informatics research community in developing approaches for the management of health information during disasters. These include grants and contracts issued and managed by several NLM divisions.

NLM activities related to disaster information management are crosscutting, with ongoing intramural work (for example, the Lost Person Finder and Bethesda Hospitals' Emergency Preparedness Partnership) and extramural funding—through grants and contracts—in basic and applied research, and in training for information specialists, public health informationists and others who want to conduct research in this area.

NLM's many disaster- related projects fall into several categories: [Valerie – should review and revise this section so it makes sense without reference to her slides]

- Infrastructure for casualty management: This includes network infrastructure, RFID (Radio Frequency Identification) tagging to identify where the responders are and where the patients are and ways of using wireless technologies to deliver information when and where needed. WISER (Wireless Information System for Emergency Responders), developed intramurally, is a good example.

- Biosurveillance: Early on in the grant world, there has been activity to try and predict outbreaks. One of the first of those projects was HealthMap, out of Harvard. A dynasty in syndromic surveillance has developed, beginning with 2003 NLM grantee Ken Mandl. John Brownstein started his work with an exploratory developmental grant, developing models of national spread of influenza. It's been a successful project and has received funding from other parts of HHS. The federal flu.gov Web site uses his software as well.
- Decision support in disaster settings: Dr. Dan Reininger developed an approach that the community could use to develop the information resources that it needs. He received Phase 1 and 2 small business funding from NLM, and almost $1 million in supplemental funds from the Defense Department. He went on to get Phase 3 funding, which means commercialization status. This is definitely a win in a different area from NLM's traditional research grants.
- Disaster health information outreach: Several awards in this area have been given by the SIS Disaster Information Management Research Center (DIMRC). Through SIS, there have been 14 projects focused on this topic funded since 2011. This category centers on disaster medicine and public health information access for people who play a role in health-related disasters. A focal point is fostering collaboration among the health science libraries and community organizations. In a typical project, folks are teaming to develop information resources for the Medical Reserve Corps of Arkansas. The effort involves a state-sponsored mobile resource Web site, smartphone applications and other technologies. To convey the breadth of this program, another project pairs the American Academy of Pediatrics with the University of Illinois at Chicago Library of the Health Sciences, creating Disaster Outreach and Collaboration for Kids, focusing on the unique needs of children in disaster settings.

There have been new collaborations that have emerged among researchers and with other agencies. Dr. Florance gave three examples of current NLM-funded research, which she proclaimed as "almost second generation." We have a grant funded at the University of Massachusetts, Amherst which is creating a mapping tool for triage. They have measurable outcomes about their R&D to reduce evacuation time as well. In the area of syndromic surveillance, grantees are working to bring more kinds of information together, resulting in a more accurate visualization of infectious disease. Another project is looking to develop computational methods to modify existing emergency plans, with specific points of dispensing and figuring out how to get diverse populations to bus stations and other points. This is being done in rural Texas, which is a good test site.

In closing, Dr. Florance noted that we can see that the investigator's scientific background influences the dissemination of his/her findings, which can affect uptake—the kinds of people who are reading things. The Library's grantees are doing very well in reaching computer science and medicine audiences, but mental health or social services audiences read different journals. She wondered if NLM can step back from funding some mature areas, such as infrastructure testing, and refocus our investment into gap areas.

Board member Dr. Douglas Scutchfield asked how NLM was coordinating with the Department of Health and Human Services Assistant Secretary for Planning and Response (ASPR) and with the CDC's programmatic elements. Ms. Stacey Arnesen, Head of the Disaster Information Management Research Center (DIMRC) at NLM, replied that NLM has a number of joint activities with ASPR, including REMM and CHEMM, and that DIMRC has worked with their

HAZMAT and Chemical Biological Nuclear Radiological Group. They are helping ASPR with an interactive all-hazard plan or playbook, turning it into a searchable, interactive tool, which is now implemented in their emergency operations center. Dr. Lindberg added that, the bottom line is that we're helping them.

Board member Dr. David Fleming asked about sustainability. Is there an expectation in the proposal that's being submitted that there will also be a plan for sustainability for a project, once funding is no longer available from NLM? Also, what about integration? Is there an expectation that these new technologies and programs will be integrated regionally with other plans that are out there? There are a number of different successful plans in place but are they able to integrate when the need arises?

Dr. Florance noted that, with the exception of mental health studies, NLM has been the lead IC funder in disaster information management, and the amount of money spent by other Institutes has gone down. Typically we don't ask about sustainability in a research grant. Part of that question is what is a successful research project? We don't have hard metrics for that but NLM/EP is looking to develop some. Most NLM grants have had dozens of publications with many citations.

SIS Director Dr. Steven Phillips added that NLM efforts to expand involvement of libraries and information specialists in disaster preparedness and response are sustainable. He didn't know how many librarians have been certified as disaster information specialists, but there is a certification program and an active network has developed. NLM's decision making tools are also updated and upgraded regularly.

Ms. Yokote mentioned the articles and the frequency of their citation. NIH has the mandate that you need to make sure your information is freely available. How do you keep access to this disaster information barrier-free? For such subject areas, searchers are not going to be going to PubMed. Citing and using the metrics of citing means looking at other ways of tracking impact, other than a PubMed-like approach. We need to figure out how to incorporate Google and some of the social media on the "Like" section, etc., into the article metrics level.

Dr. Florance responded that she's been talking to librarians at the clinical library at NIH, to gain a better understanding of new citation analysis tools. It's helped her understand what is available to do the kinds of deeper analysis needed. She noted that nobody is happy with current citation analysis, but new and powerful tools are coming—affinity maps, for example.

Ms. Yokote mentioned various researcher profiling systems and asked if NLM was using that strategy in looking at impact. Dr. Florance said that talking about impact is difficult, especially in informatics. We may want the uptake to be on the medical side in some areas, and more related to communicating and sharing information in others.

NLM Deputy Director for Education and Research Dr. Milton Corn asked whether this richness of disaster information, is being picked up by some state, system or network of hospitals. It shouldn't remain just with the academic community. HealthMap, flu.gov and other programs

have been put to use very successfully, responded Dr. Florance. These are concrete successes, and some projects build upon earlier ones.

Dr. Rice asked whether anyone is studying whether Native Americans, the elderly and other populations may be more vulnerable to disasters than others. Yes, said Stacey Arnesen, ASPR has a group researching at-risk individuals because of various factors they've observed.

EP is working on creating a cluster of search terms we can use to mine NIH grants more broadly, Dr. Florance told Dr. Rice. Examining the other Institutes and Centers' grants may show that they have supported this kind of demographic research in the past.

XI. USING SOCIAL MEDIA FOR OUTREACH TO CAREGIVERS

When the meeting reconvened on September 11th, Chairman Evens called for a moment of silence to honor those lost in the events of September 11th, 2001. As it happened, the NLM Board was also in session on that day.

Janice Kelly and Jamie Peacock of NLM's Division of Specialized Information Services (SIS), Outreach and Special Populations Branch provided a look at NLM's social media efforts. Ms. Kelly opened the presentation with an overview. NLM uses social networking including Facebook, Twitter, blogs, RSS feeds, podcasts, video sharing and Pinterest (coming soon). The goal is to increase and enhance the awareness of NLM's collections, resources and services. Social media provides more avenues and opportunities to connect with our audiences and the ability to monitor and respond to current events faster than static webpages and print resources. Ms. Kelly gave a brief history of NLM social media milestones and looked at the ways in which SIS uses social media.

Ms. Peacock provided a closer look at a pilot project using social media as an outreach tool to engage a specific community of online users—family caregivers. The audience was chosen because it's role-based and reaches across all ethnic and socioeconomic sectors; it's heterogeneous yet specific enough to form a campaign around; and it involves people across the lifespan. The pilot project had several goals: to become more adept at professional uses of social media; to share information relevant to community needs; to increase awareness of NLM resources among family caregivers; to learn more about existing resources for caregivers; and to build online and offline partnerships with other government agencies and community groups. Ms. Peacock detailed the model they use to get trusted health information into the caregiving network. She noted that hands-on caregivers are often so overwhelmed that another member of the family becomes the health information researcher and gatekeeper. The pilot used Facebook and Twitter to reach those gatekeepers. NLM 4Caregivers top ten followers on Twitter have a combined reach of nearly 3.5 million people. The potential reach for Facebook posts is about 360,000. Lessons learned include: be consistently present on social media; have a strong infrastructure for creating content; engage on a daily basis; and make room for the increasing time commitment. As for family caregivers, Ms. Peacock said the team learned that caregivers value self-care information and support. Additionally, they need quality healthcare information, tools for communicating with health professionals, and information on medications. Ms. Peacock also noted the effort resulted in a relationship with a Ronald McDonald House in Dallas, Texas, thanks to a connection made through the South Central Regional Medical Library.

After the presentation, Ms. Mary Ryan asked how caregivers find out about NLM. Ms. Peacock said they hope to leverage their Twitter and Facebook presence to get NLM information into the hands of caregivers in off-line networks. Ms. Ryan also asked if NLM is reaching out to advocacy groups. And Ms. Peacock said yes they are identifying people doing advocacy and establishing relationships with them online and offline.

XII. BIG DATA TO KNOWLEDGE UPDATE

Michael Huerta, PhD, director of NLM's Office of Health Information Programs Development (OHIPD) provided an update on the NIH Big Data to Knowledge initiative, known as BD2K. The effort will be led by an NIH Associate Director for Data Science; there's an NIH Scientific Data Council that consists of senior staff from around NIH (NLM Deputy Director Betsy Humphreys sits on the council); and the council has an Executive committee and four implementation groups (Dr. Huerta sits on the executive committee and other NLM staff participate in the implementation groups).

Dr. Huerta says there are three major thrusts to BD2K. The first is to advance the science and technology of biomedical big data. To accomplish that, Centers of Excellence will be created; research project grants to develop software tools and methods will be made available; and efforts will be made to expedite the wide use of large-scale computing and biomedical research. The second component is to enhance and develop the workforce in biomedical big data. This will include training of undergraduate students up to senior investigators. A workshop exploring training needs was held over the summer, and Dr. Huerta reported on highlights from those discussions. The third aspect of BD2K is to facilitate the broad use of biomedical research data. Dr. Huerta said he thinks this will have the smallest budget and the biggest impact. Goals include changing the policy, practice and culture at NIH to increase availability of data; establishing a framework to support community-based standards; and cataloging information about data to bring it into the ecosystem of research and scholarship. Cataloging information about data, such as authors of the data set and when, where and how the data are available, adds value. It can expand use of the data by other researchers and the public. A data catalog workshop was held earlier in the year, and Dr. Huerta reported on the ideas that came from that.

Dr. Huerta then introduced Kevin Read, a second-year NLM Associate Fellow currently working at the New York University Health Sciences Libraries. During his first year of the fellowship at NLM, Mr. Read worked on an exploratory study to get a sense of the data landscape at NIH. The study grew out of work he did with the Trans-NIH Biomedical Informatics Coordinating Committee, curating and collecting all the data-sharing repositories produced or funded by NIH (currently there are 45). For the study, Mr. Read said they searched PubMed and PubMed Central for 2011 NIH-funded articles with data that was not shared in a specific place, generated a random sample of 383 articles to analyze, and recruited 30 members of NLM and BD2K staff to look at 25 articles each. The annotators looked at a number of different things such as what category of data set was used and whether live human and/or animal subjects were involved. Mr. Read said the study found: almost three data sets were used per article (which he said is an enormous amount of data); 54% of data sets include data from live subjects; 87% used new data and 13% used pre-existing data. The overwhelming feedback from the exercise was that it was very hard to count and categorize the datasets used in published research studies funded by NIH. The study raised a number of questions such as how do we define a data set; where in the

collection/processing pipeline should data be described; how do we assign data types to NIH-funded data sets; what data should be shared in an NIH Data Catalog. For the last question, they found the focus should be on data sets that can be repurposed.

Mr. Read also noted two other points regarding NLM. The Library's resources, such as ClinicalTrails.gov and the Protein Database, are among the most popular repositories. And as a result of this study, data repositories have been added to the search fields in PubMed and PubMed Central so it will be easier to retrieve articles that discuss repositories in the future.

In questions following the presentation, Dr. David Fleming asked why BD2K is being done and if there's a concern that we don't know how to use all the data that's out there. Dr. Huerta said these efforts exist to make better use of the investment in research. He said NCBI and NLM have made a noticeable difference with genomic data and the basic notion of BD2K is to apply that to broader types of data. BD2K is a trans-NIH effort; all the NIH IC's (institutes and centers) have a stake in this. Dr. Huerta noted that while NLM has thought about organizing and sharing data for its entire existence, this is really the first time these issues have been addressed across NIH. Board Chair Dr. Evens asked who will store the data. Dr. Huerta said the notion is not to store everything, but to encourage people to give more thought to good data management practices and which data should be shared.

XIII. REPORT FROM THE SUBCOMMITTEE ON OUTREACH AND PUBLIC INFORMATION

Ms. Mary Ryan, who chairs the Subcommittee on Outreach and Public Information, briefed the Board on the group's meeting yesterday. Gale Dutcher, Deputy Associate Director of the Division of Specialized Information Services (SIS), talked about two SIS projects. She played a video that NLM Associate Fellow Karen Gutzman wrote, produced, voiced and edited with the help of others in SIS. The video highlights NLM genetics resources for high school science teachers and includes interviews with teachers who use GeneEd and other products. The video will be available on the NLM Web site, YouTube, and shown in the SIS exhibit booth at science teacher conferences. Ms. Dutcher also talked about the Teen Health Leadership program that SIS supports. Between 10- to-20 students at St. John's High School on Johns Island, South Carolina participate in the after-school program. It's designed to improve health literacy as well as professional development and leadership skills. The students identify a health topic, use MedlinePlus to research it, and then develop ways to communicate the health information to others in their community. The students come to NLM at the end of each school year to present their projects. It's a pilot program and they are looking to expand it to the local middle school. Rob Logan, PhD, NLM senior staff, mentioned the Association for Healthcare Journalists Fellowship program. Now in its fifth year, the cohort coming to NLM next week will be the largest yet with eight members. Angela Ruffin, head of NLM's Network Office, discussed NN/LM activities related to the Affordable Care Act. NLM is working with CMS and other groups to develop ways libraries can provide information on the ACA to the public. David Nash, Education and Outreach Liaison, gave an update on the Mentoring in Medicine program that NLM supports to encourage minorities to pursue health careers.

XIV. NLM COLLECTIONS SPACE UPDATE

Mary Kate Dugan of the Public Services Division of Library Operations provided an update on NLM's expansion of its collection space. When NLM was constructed in 1961, it was designed to hold 1.5 million volumes. But NLM has seen steady growth and adds about 37,000 bound serials and monographs to the collection every year. In the 1970s, NLM recognized space would become a problem and added compact shelving to the lowest level of the library which sits on bedrock. But that solution would only last until 2010 when NLM would reach maximum capacity. So, NLM began a major construction project in 2007 to increase collection space within the Library building. First, an off-site location was found for lesser-used collections which provided a swing-space onsite. The project included strengthening the ceiling on the B-3 level and the floor on the B-2 level above it so that compact shelving could be installed on the B-2 level as well. Ms. Dugan passed around a sample of the strengthening material, which she said is used in many situations, including parking garages. She also showed a map of the B-2 level showing six stages of the construction process. Ms. Dugan said that although the entire project is only about 70% complete, NLM has already gained a lot of collection growth space. The current capacity is now 2.6 million volumes and the material that was being stored off-site is back at NLM. Between 2014 and 2016, the goal is to install more compact shelving on the B-2 level for the History of Medicine Division (HMD) and move HMD staff to improved space closer to their collections. The project should be completed in 2016, if funding continues to be available. The completed project will give NLM room to grown until 2030 with 25 miles of shelving on the B-3 level and 21 miles on the B-2 level. And, it will improve the security and preservation of the collections. Ms. Dugan also noted it's a "green" project because we're using existing space and updating existing shelving. She noted that when the project is over, every single item in the collection will have been moved. She then played an animated video showing year by year how the collection has been shifted from space to space to accommodate the construction. Before concluding, Ms. Dugan gave special thanks to Ken Koyle, Deputy Chief, HMD, for his work with that collection and Mehryar Ebrahimi, head of NLM's Office of Administrative Management and Analysis Services, for making this project happen.

After the presentation, Ms. Kathryn Mendenhall from the Library of Congress congratulated NLM for its work and advance planning. She asked Ms. Dugan to address how much the space project was driven by NLM's role as a national library. Ms. Dugan said NLM's mission is to retain the print and make it available, and NLM is the last resort in the network of libraries of medicine. Many of those libraries are downsizing for a number of reasons and will be more dependent on us, especially for older items. Ms. Mendenhall also asked if NLM foresees needing another space project given that more current content coming in digital form. Deputy Director Betsy Humphreys noted the amount of print NLM takes in is going down because of electronic publishing, but it would be a long time before it goes to zero. She also said libraries see potential for growth, and the need for space, to handle the original materials from 20th century pioneers in science and medicine. The session ended with a lively discussion of the issues all types of libraries face today when it comes to budget, space, copyright and digital content.

XV. ADJOURNMENT

Dr. Evens adjourned the Board of Regents meeting at 12:00 p.m. on September 11, 2013.

ACTIONS TAKEN BY THE BOARD OF REGENTS:

- Approval of the May 21-22, 2013 Board Minutes
- Approval of the September 9-10, 2014 Future Meeting Dates

Appendix A - Roster - Board of Regents

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

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

Ronald G. Evens, M.D.
Chair, NLM Board of Regents