DEPARTMENT OF HEALTH AND HUMAN SERVICES
NATIONAL INSTITUTES OF HEALTH
NATIONAL LIBRARY OF MEDICINE
MINUTES OF THE BOARD OF REGENTS
September 12-13, 2017

The 176th meeting of the Board of Regents was convened on September 12, 2017, at 9:00 a.m. in the Donald A.B. Lindberg 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 3:30 p.m., followed by a closed session for consideration of grant applications until 4:00 p.m. On September 13, the meeting reopened from 9:00 a.m. until adjourning at 11:45 a.m.

MEMBERS PRESENT [Appendix A]**:**
Ms. Jane Blumenthal, University of Michigan
Dr. Eric Horvitz, Microsoft Research
Ms. Sandra Martin, Wayne State University
Dr. Daniel Masys, University of Washington
Dr. Gary Puckrein, National Minority Quality Forum
Dr. Esther Sternberg, University of Arizona [Chair]
Dr. Jill Taylor, Wadsworth Center, New York State Department of Health

MEMBER NOT PRESENT
Dr. Alessandro Acquisti, Carnegie Mellon University

CONSULTANTS TO NLM PRESENT
Dr. Robert Greenes, Arizona State University
Dr. H. Kenneth Walker, Emory University School of Medicine

EX OFFICIO AND ALTERNATE MEMBERS PRESENT
RADM Christopher Bina, Office of the Surgeon General, PHS
Col. Thomas Cantilina, United States Air Force
Dr. Wayman Cheatham, United States Navy Bureau of Medicine and Surgery
Dr. James Deshler, National Science Foundation
Dr. Joseph Francis, Veterans Health Administration
Mr. Stan Kosecki, National Agricultural Library
Dr. Mary Mazanec, Library of Congress
Col. Michael Nelson, United States Army
Dr. Dale Smith, Uniformed Services University of the Health Sciences

SPEAKERS AND INVITED GUESTS PRESENT
Dr. Neil Smalheiser, University of Illinois, Chicago

MEMBERS OF THE PUBLIC PRESENT
Mr. Glen Campbell, Friends of the National Library of Medicine
Ms. Carla Funk, Friends of the National Library of Medicine

Dr. Sheldon Kotzin
Dr. Barbara Redman, New York University
Dr. Elliot Siegel, Consultant
Mr. Thomas West, Krasnow Institute

FEDERAL EMPLOYEES PRESENT
Dr. Patricia Flatley Brennan, Director, NLM
Mr. Jerry Sheehan, Deputy Director, NLM
Dr. Milton Corn, Deputy Director for Research and Education, NLM
Ms. Dianne Babski, Division of Library Operations, NLM
Ms. Joyce Backus, Division of Library Operations, NLM
Ms. Gabrielle Barr, Division of Library Operations, NLM
Ms. Hua Florence Chang, Division of Specialized Information Services, NLM
Ms. Kathy Cravedi, Office of Communications and Public Liaison, NLM
Mr. Ivor D'Souza, Office of Computer and Communications Systems, NLM
Mr. Todd Danielson, Office of the Director, NLM
Dr. Kathel Dunn, Division of Library Operations, NLM
Dr. Valerie Florance, Division of Extramural Programs, NLM
Dr. Dina Demner-Fushman, Lister Hill Center, NLM
Dr. Dan Gerendasy, Office of Health Information Program Development, NLM
Ms. Rebecca Goodwin, Office of Health Information Program Development, NLM
Dr. Zoe Huang, Division of Extramural Programs, NLM
Dr. Michael Huerta, Office of Health Information Program Development, NLM
Ms. Christine Ireland, Division of Extramural Programs, NLM
Ms. Janice Kelly, Division of Specialized Information Services, NLM
Ms. Elizabeth Kittrie, Office of Health Information Program Development, NLM
Dr. Peter Kozel, Center for Scientific Review, NIH
Ms. Michelle Krever, Division of Extramural Programs, NLM
Ms. Lisa Lang, Division of Library Operations, NLM
Dr. Clement McDonald, Lister Hill Center, NLM
Mr. Dwight Mowery, Division of Extramural Programs, NLM
Dr. James Ostell, National Center for Biotechnology Information, NLM
Dr. Barbara Rapp, Office of Health Information Program Development, NLM
Ms. Shannon Sheridan, Division of Library Operations, NLM
Dr. Hua-Chuan Sim, Division of Extramural Programs, NLM
Ms. Nicole Strayhorn, Division of Library Operations, NLM
Dr. George Thoma, Lister Hill Center, NLM
Ms. Victoria Townsend, Division of Library Operations, NLM
Dr. Alan VanBiervliet, Division of Extramural Programs, NLM

I. OPENING REMARKS

NLM Director Dr. Patricia Flatley Brennan welcomed members, alternates, and guests to the Board's 176th meeting. She introduced NLM's new Board of Regents Chair, Dr. Esther Sternberg, the founding director of the University of Arizona Institute on Place and Wellbeing and the Founding Research Director for the Arizona Center for Integrative Medicine at the

University of Arizona at Tucson. She holds joint appointments at the University of Arizona as a Professor in Medicine and Psychology; is the author of more than 200 scholarly articles; and was named one of the 300 women featured in the NLM exhibition, "Changing the Face of Medicine."

Dr. Sternberg thanked Dr. Brennan and then introduced Rear Admiral Christopher Bina, representing the Office of the Surgeon General.

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

Christopher Bina, Commissioned Officer of the Public Health Services, announced that the 20th Surgeon General of the United States, Dr. Jerome Adams, was sworn in September 5, 2017 by Vice President Mike Pence. Adams, a former Indiana Health Commissioner, announced that his priorities are opioids, childhood obesity, and mental health. His goal is better health through stronger partnerships.

Bina said about 550 officers of the 5,600 Commissioned Corps were deployed to areas hit by Hurricane Harvey, and 143 are assisting in sites struck by Hurricanes Irma and Jose. Partnerships were established between the OSG and the Department of Defense, the Uniformed Services University of the Health Sciences (USUHS), and remote area medical facilities in underserved areas.

Sternberg asked how the Corps is deployed and what they do. Bina said that deployment teams staff medical stations, handle logistics, and direct patient care. Deployment missions are flexible to address newly identified needs.

Board member Dr. Eric Horvitz said that people stock up on water during natural disasters but not medical supplies. Is there literature on this? Ex-officio member Dr. Dale Smith said that there is a National Center for Disaster Medicine and Public Health at USUHS—a collaboration of five agencies that develops educational materials for providers and victims of disasters. Horvitz said that most responses address acute care needs, not the cross-cutting influences on the health care system.

Ms. Florence Chang, acting director of NLM's Specialized Information Services (SIS) division, described NLM's Disaster Information Management Research Center (DIMRC) and its role in disasters. She said that DIMRC worked with National Institute of Environmental Health Sciences (NIEHS) and the Assistant Secretary for Preparedness and Response (ASPR), Health and Human Services, to respond to the recent hurricanes. Through social media, SIS distributes health information on disasters and works with local libraries to reach affected communities.

Sternberg asked if the important role played by emergency responders gets recognition. Bina said that many responsive agencies after disasters are invisible to the public.

Ex-officio member Col. Thomas Cantilina said that the Air Force sent about 400 officers to Louisiana to help move more than 3,000 people out of the area and distribute alternative care to them.

The Lister Hill Center's Dr. George Thoma mentioned that NLM's People Locator is deployed during disasters like Harvey and Irma. The system helps find missing people during disasters. The problem, said Thoma, is that people don't know about the website. In the case of the Philippines typhoon, some local non-government organizations helped spread the word. In Colombia last March, the Colombian government set up a website featuring information on People Locator. So, the system gets used in different ways.

III. MINUTES AND FUTURE MEETINGS

The Regents approved without change the minutes from the May 2017 meeting. A brief discussion followed led by Dr. Brennan which sought to elicit ways to streamline future minutes – replacing Board member dialogue with a summary of highlights. Board member Dr. Daniel Masys offered support for retention of current transcriptions. Members were encouraged to offer their feedback as well. It was agreed that the winter meeting will take place on February 13-14, 2018, the spring meeting on May 8-9, 2018. The Board approved holding the fall meeting on September 25-26, 2018.

IV. REPORT FROM THE DIRECTOR

Brennan asked Kathel Dunn, NLM's Associate Fellow Coordinator, to present the 2017-18 NLM Associate Fellows. Ms. Dunn introduced the new Associates who are beginning their year-long residency at NLM: Shannon Sheridan who received her MLIS degree from the University of Pittsburgh in 2016; Nicole Strayhorn, who received her MLIS degree from Florida State University in 2017; and Gabrielle Barr, who received her MIS degree and a certificate in science, technology, and society from the University of Michigan in 2015.

Before reporting on recent NLM accomplishments, Brennan asked the Audiovisual Program Development Branch to show a video they prepared, conveying how NLM is undergoing transformation but remaining true to its core mission.

Brennan said the National Center for Biotechnology Information (NCBI) is making the NIH-wide Commons Pilots sustainable via the cloud—a $20 million initiative—and is partnering with the NIH Center for Information Technology (CIT) and awardees of the Commons Pilots OTA (Other Transaction Authority) Solicitation towards a scalable resource. In addition to data management, NLM is active in the areas of preprints and open science, reviewing MEDLINE journal policies, and shepherding NIH-wide data science planning efforts.

Brennan presented updates from NLM's other divisions too. SIS supports HealthReach, a multilingual information resource API linked to MedlinePlus. Together with the National Network of Libraries of Medicine (NNLM), SIS's DIMRC responded to hurricanes Harvey and Irma, and coordinated chemical pollution responses with NIEHS and HHS/ASPR. The Office of Computer and Communications Systems (OCCS) is developing the technical platform for NLM's CDE repository and will move AccessGUDID to the cloud. They enhanced the Digital Collections site to support the storage of born-digital documents, and developed a FHIR Terminology Service for VSAC (the Value Set Authority Center), making it easier for hospitals to link our value set authority to their quality monitoring. The Extramural Programs division has

awarded 132 grants, including 45 new awards and 25 administrative supplements, in 76 days. The Library Operations division is partnering with the "All of Us" project, the NNLM, and the Public Library Association. A new illustrated history of NLM was published by the History of Medicine Division

The Office of Health Information Programs Development (OHIPD), under the Office of the Director, now houses the Library's data science activities and is focusing on workforce excellence in data science at NIH.

Brennan said that NLM's 2017 budget is $406 million. For the 2018 budget, the Senate bill calls for a 3.8 percent increase over 2017, while he House bill seeks a 1.9 percent increase. Both figures are higher than what the President requested. NIH anticipates success for the Senate's recommendation.

Jerry Sheehan was appointed NLM Deputy Director on July 30, 2017 and, as of yesterday, Jim Ostell is director of the NCBI. Brennan called upon both to make brief remarks.

Sheehan recounted the many presentations he made to the Board in his 11 years at NLM. Most were made during his tenure as NLM Assistant Director for Policy Development, including his work on the 21st Century Cures Act, Common Data Elements and clinical trials registration, open science, and public access. He now sees his role as helping to bring NLM into its third century.

Ostell said that he began his doctoral training at Harvard in the 1970s because they had a new technology called DNA sequencing. Some thought computers would play a role in this, but there were no personal computers at the time; it was all mainframes. He started writing software, and people started using it. But then Ostell heard that NLM was starting a center on biotechnology, using computers for medicine. He was soon recruited. Ostell noted that NCBI went from 12 people in its earliest days, before the word "bioinformatics" really existed, to over 700 staff today, processing the data needs of over 4 million users daily at rates of about 10,000 web hits a second. Today, there are petabytes of data moving into NCBI, through NCBI, and back out of NCBI every day. Ostell is the former head of the Information Engineering Branch, a name chosen to emphasize that NCBI was not made up of software developers but, rather, information engineers. Among other resources, that group developed PubMed, GenBank, and dbGaP (the database of Genotypes and Phenotypes). Where should NCBI go in the future? There is no way that any one NIH Institute, especially one as small as NLM, can pay for storing and processing all this data and that there would need to be an enabling function for the other Institutes.

Board consultant Dr. Robert Greenes asked if the $420 million that NLM may receive for FY 2018 will pay for data science. Brennan said that for FY 2018, NLM freed up about $10 million to expand data science investments, including improvement to the dbGaP interface that the Library will look at new ways to address workforce development, and strengthen its approach to curation. Together with NIH, NLM plans to lay out a set of activities that may lead to an increase of $20-50 million above the budget level currently under review.

Sheehan said that the Senate Appropriations report language encourages NLM to work with the National Institute of Allergy and Infectious Diseases (NIAID) on terminology related to Lyme

disease. During the next reporting cycle, NLM will be asked to describe what was done in response to the encouragement outlined in the report.

Board consultant Dr. Kenneth Walker asked Ostell what his vision was for NCBI in the next 10-12 years. He responded that NCBI cannot continue growing its staff. Instead, they need to find a way to work with large data sets that we do not own. That is challenging because one of the aspects of moving data into NCBI is that they make it uniform, so that it becomes a consistent corpus to communicate and work over. At what point does NCBI step in and do what they have traditionally done—set standards, curate, and support long-term archives? The hardware answer is that they need to be on large commercial clouds, where others can play at their own expense and NCBI can reach in. That would create a staffing issue, because people who are facile in working in a cloud environment are incredibly valuable, and NCBI can't afford to hire them. So, while NCBI trains its own people, that also makes them employable to leave. Brennan said that she and Ostell met with about 10 NIH Institutes to discuss how NLM can make space in the cloud accessible with proper access rights and protections. Halfway through the conversation, an NIH employee recalled that they have a data center at a university and they have a cloud, so they do not need NLM's help. Ostell noted that storage on a commercial cloud is costly—roughly $1-2 million a year—and unfortunately NLM can't shoulder those expenses alone. So, moving to the cloud where, ideally, each Institute pays a share, is a good thing. One Institute Director asked, "Are you talking about $1 million every year?" "Yes," replied Ostell, "and it is cumulative."

Brennan suggested that NLM engage with the National Academies or another research institution to build a forecasting tool to guide how long data should be maintained and accessible. The suggestions would result in different price tags. To date, NLM has maintained in perpetuity everything that it has received, but it has to start thinking differently. Ostell observed that putting data in cold storage is also costly. Masys commented that the IC Directors sometimes do not know the impact that their decisions will have. NLM, as the center for data science at NIH, will get them the expertise they need for data management.

Board member Mr. Gary Puckrein said that clearly the problem is data storage. Brennan agreed and said that data must be locatable and have sets of protections. Every time NLM changes the underlying operating system, it has to update how that piece of data is stored.

V. ADVANCED COMPUTING AT NLM

OCCS Director Mr. Ivor D'Souza reviewed the current infrastructure at NLM and the benefits of cloud technology. Ostell spoke about PubMed moving to the cloud, creating a service-oriented architecture with the idea that, if it works for PubMed, it could work for other systems, and about PubMed Labs, a test site for experimenting with features that may be incorporated in PubMed.

Ex-officio member Dr. James Deshler, representing the National Science Foundation, discussed issues concerning standards, incentives for scientists to work with computer experts, how the BRAIN Initiative was an example of moving genomics data and literature data, and how cloud computing serves neuroscience researchers.
Horvitz spoke of how data storage was a major area for NLM and, more broadly, for NIH. He

said it makes sense for NLM to move to the cloud and he suggested that NLM determine what it wants and make sure that competition includes education and customization. He also mentioned multi-cloud solutions. Smith discussed customization, standards, and an open competition.

D'Souza talked about the balance between functionality, infrastructure, and getting locked into a service provider. He said that it would be mostly public facing activities moving to the cloud. He talked about multiple connection paths to the cloud for high-availability. Ostell addressed how PubMed would need to be on different cloud providers, be cost effective, and reliable.

VI. NLM STRATEGIC PLAN

Brennan summarized the strategic planning process, which included stakeholder panels, audits, and site visits. She talked about the need to support data-driven discovery and data-powered health, the public trust, pathways for dissemination and engagement, and workforce excellence. She said NLM can look to the future with optimism. She discussed three objectives: 1) addressing interoperable digital objects, articles, datasets, analytic strategies, and visualization tools so they are fair, findable, accessible, interoperable, and reusable; 2) employing modern, industrial-strength R&D methods to create discovery services and advance analytical methods and pathways for dissemination and engagement. She said NLM needs to know its users and engage with persistence; and 3) addressing workforce training, including biomedical informatics, data science, and supporting and accelerating workforce diversity.

She thanked the Board, particularly Masys and Board member Dr. Jill Taylor, for their leadership, and commended Dr. Mike Huerta, Director of the NLM Office of Health Information Programs Development (OHIPD), and OHIPD staff member Dr. Barbara Rapp for their excellent work on the document. She asked for the Board's continued input throughout the planning process.

Brennan also talked about the possibility of creating an organizational home for data science, the need to advance opportunities in biomedical research, fostering innovations, NIH priorities, enhancing scientific stewardship, and managing results.

Huerta talked about the overall vision of NLM as a platform for biomedical discovery and data-powered health. He urged Board members to provide input on the document. Taylor remarked that the final version will need "more pop," and Masys emphasized the need to know if there are any potential blind spots in the plan.

VII. NLM STRATEGIC PLAN - DISCUSSION

There was a lively, freewheeling, and philosophical discussion about the strategic plan and about NLM.

Masys opened the discussion asking for feedback on the plan, emphasizing the need to know about the content and if there were any omissions. Blumenthal thought the document "hit the right points" but that it needed "passion." There was also a conversation about the changing meaning of the Library as an active and engaged institution. This led to a discussion about the

draft title of the report and word choice. Huerta said that the working title conveyed that NLM was a platform for biomedical discovery and data-powered health. Others expressed the view that the word "platform" was unclear and too passive. Some saw the word "engine" as being a more descriptive word. Greenes said that "data" and "knowledge-powered" could be in the title, but that "data" doesn't have to be the primary focus here. He said there needs to be more of a balance in the pipeline from data to knowledge to application. Masys said that he felt "data" should be in the title.

Ex-officio member Dr. Mary Mazanec, representing the Library of Congress, urged the Board to identify the audience for the strategic plan. Some of the group expressed concern that "data" means different things to different people. Brennan expressed a desire for language that reminds readers that NLM is a federal library with a responsibility to do things that aren't done in the private sector. Sternberg felt that "data-powered health" was a good phrase to have in the title and she emphasized the Library's role in public health and the importance of privacy issues and open science.

Attendees addressed issues related to marketing and the fact that that NLM is a federal institution. Smith spoke about the Library as a social institution and the challenge of strengthening its branding. Ex-officio member Dr. Wayman Cheatham of the US Navy Bureau of Medicine and Surgery spoke about the challenges that the Library faces as a federal institution, because it cannot spend money to market itself, but that the Library and its products need to be higher in the list of Google search results.

Horvitz talked about figuring out how to disseminate information and deliver and understand the user and how the Library might engage with companies like Amazon, Google, and Microsoft to explore those issues. He addressed the challenges of search engines bringing up health information from the Library. Greenes said the Library had an opportunity to define what is meant by a national or international library as an entity that coordinates access to and use of information that will positively affect health. He said that knowledge starts with data, and that "data-powered" is just the start of a new role for NLM.

Puckrein spoke about the challenge of working with the marketplace to make sure that the American public gets the information that it needs. NLM can play a role in filling in the gaps to meet people who can't go elsewhere for all kinds of reasons. Walker spoke about the need for information at the point of care and in the electronic health record.

At the end of the session, Brennan said that the Library would need to remain consumer-focused while continue to serve the scientific community.

VIII. EXTRAMURAL PROGRAMS REPORT

EP Director Dr. Valerie Florance discussed the NIH Next Generation Researcher's Initiative (NGRI), new NIH guidelines for support and tracking of clinical trials, and FY 2017 grant program highlights.

NGRI's goals are to stabilize the workforce, balance investment across career stages, keep meritorious scientists in research, and increase diversity. In FY 2016, NLM supported four early stage investigators (ESIs) and four early established investigators (EEIs). In FY 2017, NIH asked NLM to support five ESIs and NLM supported six ESIs. NIH also asked NLM to support two EEIs in FY 2017 and NLM supported three EEIs, exceeding our targets.

Florance told the Board about the new policy for tracking clinical trials, which will affect more people than before. Grantees whose studies involve one or more human subjects may now be classified as clinical trials requiring the grantee to register their study trial and file a report when the trial ends. Grantees are not pleased with this policy, which requires a new grant application and reporting requirements. As a result of these guidelines, NIH is beginning training on clinical trials for staff and has established a working group to oversee implementation, and resources for training. The next step is to look at NLM's funded research grants and identify projects that will need to be categorized as clinical trials and assist the grantees with this process.

In FY 2017, NLM received NIH Common Fund money for three digital curation awards totaling $1.096 million and for two high risk-high reward awards totaling $2.72 million. NLM funded 14 supplements this year for curriculum/faculty development for $1.3 million and received $1 million for data science research that supported personal health libraries for consumers and patients. Three awards were made in 2017.

In summary, Florance told the Board that Extramural Programs had exceeded NLM's NGRI targets, awarded 16 new institutional training programs with data science/curriculum-faculty development support, 14 of which received data science curriculum supplements. Extramural Programs also obtained $4.9 million from the NIH common fund for five new data science awards.

Walker asked about the total EP budget. Florance said that NLM's budget for grant was about $44 million in 2017, or 10 percent of NLM's total budget.

IX. *EN BLOC* APPROVAL OF GRANTS (CLOSED PORTION)

X. NLM STRATEGIC PLAN - CONTINUED

Sternberg opened the discussion. The goals are to reach consensus on an outline of the strategic plan and to provide Brennan with key points she can use to convey the excitement of the plan to her various stakeholder audiences.

Taylor hoped for a more energized tone. Huerta agreed, saying NLM writers will make the plan's ideas more compelling. Major themes are: discovery; collections; outreach; and workforce.

Consensus was that the plan be a six-page document. Appendices could describe how the plan will benefit NLM's stakeholders: the public; researchers; health professionals; NIH; libraries and librarians; NLM staff; and the pharmaceutical and technology industries, among others.

Greenes described a pipeline concept that could structure the plan: data to information to knowledge to patient care. After lively deliberation, the group instead suggested that an image appear in the report, with the terms health, data, discovery, and patient care in a circle.

Members suggested the plan include examples from NLM's intramural and extramural portfolios: how the Library is also on an exciting research trajectory, and data science is the next step. Mazanec suggested the inclusion of a one-sentence vision statement. Brennan recommended that it align with the NIH tagline, *From Discovery to Health*.

Ex-officio member Col. Nelson, representing the United States Army, and others expressed the importance of milestones and benchmarks for implementation of the plan, to measure success. Brennan noted that part of the vision for this plan is that NLM is going from processing data to packaging it, for medical decision making.

Greenes and Puckrein agreed that outreach to the public is incredibly important. The pursuit of knowledge is essential but if you don't get it into the hands of the citizens, in a form they can understand, you've missed the mark.

Rapp described the relationship between NLM and the National Institute on Minority Health and Health Disparities (NIMHD). NLM can quote part of NIMHD's existing goals in its strategic plan and weigh in on theirs, a new version of which is on the horizon.

Puckrein suggested that the rural population is often overlooked as an underserved population. The disabled, too, said Blumenthal. NLM should include these groups in its outreach efforts. The Board recalled how NLM led the way, educating the public about HIV/AIDS in the early days epidemic. It can take a lead role now, providing guidance for health literacy efforts and the reduction of health disparities.

Brennan asked the Board whether any mention of ethics and values should appear in the plan. Yes, members responded. That all search information is confidential and that all NLM holdings remain open, with free access and no borders. A discussion of Jupyter Notebooks, an interactive computational environment, sparked a debate about NLM hosting pre-print information and still maintaining its reputation for authority and reliability. That conversation will continue.

XI. ADVENTURES IN TEXT MINING: Presentation by an NLM-supported Investigator

This adventure of Dr. Neil Smalheiser's began in about 1990, with a call from information science pioneer Dr. Don Swanson. Smalheiser was familiar with Swanson's work, having read about it in the journal, *Perspectives in Biology and Medicine*. Swanson's groundbreaking approach was to look at complementary but disconnected literatures with the goal of discovery.

For example, from a MEDLINE search, he found a common thread in research on Raynaud's disease and dietary fish oil. In a separate search of another dataset, he found a body of research that showed dietary fish oil could reduce blood viscosity. The implication of bringing these two literatures together was powerful. A clinical trial three years later validated the use of fish oil for Raynaud's patients. Spurred on by these and other findings, Swanson and Smalheiser developed

Arrowsmith, software that assists investigators in identifying connections between two sets of MEDLINE articles. The tool is freely available on their website, where it has been improved and maintained for 15 years. NLM helped fund the research.

Other tools followed. ADAM is "a database of biomedical abbreviations in MEDLINE" that includes both acronyms and non-acronyms. ANNOTATE is a PubMed interface that researchers wrap around additional functions that PubMed doesn't have yet. And Author-ity is an author name disambiguation tool that identifies which individuals wrote which articles in PubMed which is a big problem. All are freely available on the team's website.

Smalheiser's current project focuses on evidence-based medicine (EBM). The goal is to re-engineer the way that people write systematic reviews, developing a series of tools to help different steps in this process. The first is a meta-search engine that sends a single query to the five most important databases that systematic reviewers use. It de-duplicates the set so that the same article doesn't come back multiple times, also throwing out the uninteresting ones without losing any of the relevant ones. The most important type of study is the randomized controlled trial (RCT), so they've developed a tagger to increase probability of finding those.

Other tools are in development, such as one connecting trials in ClinicalTrials.gov to their resulting publications. Throughout, the research communities served range from scientists who test hypotheses, systematic reviewers assessing evidence, social scientists, and economists. The researchers provide a variety of infrastructure metrics that can be used by a community. He hopes to give an update in time for the next NLM strategic plan.

Smith expressed admiration for the openness of the tools described. He wondered how dynamic they are in their current utilization, and whether researchers are able to update changing definitions. Smalheiser noted that updating is a problem for the Author-ity tool, because new articles are not in the data set. Taylor asked whether the average scientist has the skills needed to properly utilize these tools. Smalheiser said that the situation continues to evolve as the research community learns how to use these tools best.

XI. DISCUSSION OF FUTURE BOR TOPICS

Brennan reminded the Board that former chair Greenes had invited members to share their ideas for future meetings.

Taylor suggested an in-depth look at NLM's interaction with the National Institute on Minority Health and Health Disparities. There might also be lessons from NLM's work with HIV that would apply to outreach efforts regarding health disparities.

Masys suggested that, rather than work that's already complete, and where a presentation on it is professional education for the Board, it might be instructive to hear about something that is in the throes of development—where it needs some seasoned advice about its next steps. That would be meaningful for the Board. It could be an individual project similar to what the Board has already heard about, but in an earlier step in the process, where it could go in different directions.

Building on that idea, Walker suggested presentations on projects that have questions about them—and these very specific questions could be posed to the Board for their reactions.

Sternberg liked that approach. Questions could include, what are the issues you are struggling with? What are the pros and cons? What is the Board's recommendation for next steps, based on these pros and cons?

Brennan asked for the group's thoughts on how to frame those questions in a way that it makes the proper use of the Board's time, because the Library doesn't want to draw them into management-level issues. Are there parts of those that we take, or suggested levels of discussion that we can include?

Horvitz observed that, generally, the question-and-answer periods are very short in comparison to the presentations. There may be a growing interest in involving the Board in advisement vs. briefing.

Walker suggested that the director of a division of the library present what their major problems are and challenges, like Joyce Backus in Library Operations.

Sternberg suggested including have the strategic plan as an item at future meetings, and to take a close look at its implementation.

Brennan suggested meeting with everyone in late December, and make plans for February's meeting. NLM will be replacing two members next September. She asked for recommendations for Board replacements. It takes about six months to get nominations processed.

XII. PRESENTATION OF REGENTS AWARD

Sternberg expressed pleasure at awarding this year's Board of Regents Award for Scholarship or Technical Achievement to Dr. Thomas Rindflesch of the Lister Hill Center, in recognition of his leadership in the development of methods and tools for extracting facts from biomedical text. Established in 1970, the Regents Award is the highest honor the Board can give NLM staff.

XIII. ADJOURNMENT

Sternberg adjourned the Board of Regents meeting at 11:45 a.m. on September 13th, 2017

ACTIONS TAKEN BY THE BOARD OF REGENTS:
Approval of the May 9-10, 2017 Board Minutes
Approval of the September 25-26, 2018 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.

Patricia Flatley Brennan, RN, PhD   Esther M. Sternberg, MD
Director, National Library of Medicine   Chair, NLM Board of Regents