

NATIONAL LIBRARY OF MEDICINE, NIH
BOARD OF SCIENTIFIC COUNSELORS
MEETING MINUTES
October 26, 2023

The Board of Scientific Counselors of the National Library of Medicine (NLM) convened by webcast on October 26, 2023, between 11:00 a.m. and 2:30 p.m. The meeting was open to the public for viewing via NIH VideoCast except for several closed sessions.

BSC Members

Peter Tarczy-Hornoch, MD, University of Washington (*BSC Chair*)
Bonnie Berger, PhD, Massachusetts Institute of Technology
Noemie Elhadad, PhD, Columbia University
Behnaz Ghoraani, PhD, Florida Atlantic University
Graciela Gonzalez Hernandez, PhD, University of Pennsylvania
King Jordan, PhD, Georgia Tech
Hyun Min Kang, PhD, University of Michigan
Maricel Kann, PhD, University of Maryland, Baltimore
Lucila Ohno-Machado, MD, PhD, University of California, San Diego
Eric Rouchka, DSC, University of Louisville
Andrey Rzhetsky, PhD, University of Chicago
Joan-Emma Shea, PhD, University of California, Santa Barbara

NIH Staff Presenting

Stephen Sherry, PhD, NLM
Richard Scheuermann, PhD, NLM

NLM Tenure-Track Investigator Receiving Review

Sameer Antani, PhD, LHNCBC, NLM

1. Welcome and Logistics – Peter Tarczy-Hornoch

Dr. Tarczy-Hornoch welcomed participants to the meeting and introduced the new members of the Board: Drs. Elhadad, Ghoraani, Jordan, Kann, Rzhetsky, and Shea.

2. Remarks from the Acting NLM Director – Stephen Sherry

Dr. Sherry outlined NLM's commitment to its mission targets:

- To collect, curate, and preserve biomedical information and connect to the world
- To provide credible, equitable, accessible information resources at scale to advance research and health
- To conduct and support transformative research to advance information and library science, engineering, and technology
- To lead excellence for resilience, reliability and representation for information sciences

Dr. Sherry noted that the federal budget is still on a continuing resolution and that NLM isn't sure what its budget levels will be next year. NLM will program its 2024 budget in alignment with its mission targets and has developed some organizing principles to help navigate what might be challenging decisions on where to place investments. The guiding principles are:

- Intentional strategies for developing NLM's unified collection
- Access to NLM collections while protecting the rights of users and contributors
- Support of early career researchers
- High value technical infrastructure that embraces the future
- Decisions driven by data

Dr. Sherry provided an overview of Digital NIH, NIH's strategy for new approaches to manage and govern its technology investments in a way that will provide institute and center staff with access to more powerful tools to support research and operations than single ICs could support on their own. Implementing Digital NIH will be a multi-year effort that will iteratively explore solutions to prioritize capabilities over the next several years. The initial focus of implementation planning efforts will be on building the foundation of a common architecture and standards and establishing workforce development strategies that will equip NIH's entire workforce with the digital skills needed to facilitate science of the future.

Dr. Sherry also described NIH's 2023-2028 Strategic Plan for Data Science, which has several cross-cutting themes:

- Support capabilities that will develop and adopt common services, tools, workflows and standards
- Increase data discovery and broaden use of clinical and healthcare data, while preserving participants' rights
- Leverage resources, standards and capabilities from industry and other agencies
- Integrate ethics, policy, health equity, and transparency in the development of data science methods and tools
- Engage researchers and communities in data science training across biomedical and behavioral disciplines

To help NLM capitalize on the strategic NIH opportunities, NLM leadership has been working on a model that fosters a culture of continuous innovation and positions NLM to assist with the changing needs of the biomedical community. The intent is to create a broader culture that both emulates the best practices around how to design and implement the most impactful concepts for innovation and how to clear pathways to get resources that will allow the ideas to be tested and built.

3. Remarks from NLM Scientific Director – Richard Scheuermann

Dr. Scheuermann thanked the Board for their service and noted that he joined NLM in mid-September. He briefly described his background, including previous positions (most recently the director of informatics and campus director at the J. Craig Venter Institute) and areas of

research and development (e.g., molecular biology, clinical research informatics, biomedical research informatics, computational biology and artificial intelligence, and biomedical informatics resources).

Dr. Scheuermann outlined the structure of NLM's Intramural Research Program (IRP), which combines the Computational Health Research Branch that is under the Lister Hill National Center for Biomedical Communications (LHNCBC) and the Computational Biology Branch that is under the National Center for Biotechnology Information (NCBI).

As the new NLM Scientific Director, Dr. Scheuermann is working on developing an emerging vision of where he thinks the IRP will be going in the future. He said he plans to focus on three priority areas in his first few months:

- Emphasize strategies that maximize the impact of NLM's IRP
 - Build upon and extend existing IRP programs and expertise into new data science research areas
 - Coordinate bioinformatics, computational biology and health, and artificial intelligence research areas across NIH
 - Play leadership roles in global computational initiatives
- Develop an IRP Strategic Plan with short-term and long-term objectives
 - Engage key stakeholders in NLM and across NIH
 - Assess implementation of IRP Blue Ribbon Panel recommendations
 - Evaluate current research priorities, add new emerging areas, and reorganize around major themes
 - Define investigator recruitment objectives, with a focus on emerging technologies
 - Coordinate diverse education and training activities and foster diversity, equity, inclusion and accessibility
 - Outreach to the NIH, national, and international research communities
- Major focus on data to computable knowledge translation
 - Dr. Scheuermann presented the example of how looking at transcriptional profiles at the single cell level allows researchers to understand the cellular complexity of complex tissues.

4. Presentation and Review of Sameer Antani, Tenure-Track Investigator

Dr. Antani's research aims to advance medical imaging AI for reliable, explainable, and trustworthy clinical health predictions. His goals are to conduct research in biomedical image processing toward achieving reliable and interpretable machine learning (ML) and AI, and to concentrate on challenging computational health problems where ML/AI-driven mechanisms can augment and benefit biomedical research and clinical care.

Dr. Antani provided a brief overview of his group's main research areas, but focused his presentation on two: echocardiography analysis for cardiac disease, and generalizing across data sets using ML/AI.

Echocardiography analysis for cardiac disease

Dr. Antani's work in this area is in collaboration with the NIH Clinical Center (CC) and the NIH Heart Lung and Blood Institute (NHLBI). Through the collaboration they developed a fully automated, multi-stage ML/AI system to estimate inferior vena cava (IVC) and right atrial pressure (RAP) values. The system was trained and validated on data from 255 patients and has been filed for patent protection, which would allow NIH to license it out.

Generalizing adult chest X-ray lung segmentation models to the pediatric images

Dr. Antani described the approach his group took to developing a model that would accurately and reliably perform well on pediatric chest X-rays. He noted that there is a progressive change in lung outline from infancy to adulthood, and that models need to be trained on the variations and changes, which provided an opportunity for the researchers to focus on the domain shift from the large number of models and data sets available for chest X-rays.

Next steps

Dr. Antani briefly noted his group's next areas of work:

- Advances to ML/AI in medicine
 - Multimodal learning
 - Generalization of methods to data diversity
 - Advancing open-world learning
 - Prediction reliability in the face of limited or noisy data
 - Characterizing data for prediction reliability
 - Estimating risk from ML/AI models
- Medial image synthesis (generative AI for medical images)
 - Self-supervised contrastive learning in GAN frameworks
 - Stable diffusion and prompt design
 - Experiments with various transformer networks, pretrained foundation models, loss functions

Following Dr. Antani's presentation there was a Q&A session, after which the BSC went into closed session with his postdoctoral fellow only, followed by a closed session with Dr. Antani only.

5. Report to NLM Scientific Director and NIH Deputy Director for Intramural Research Designee (Closed Session)

This closed session was held between the BSC members, Dr. Scheuermann, Dr. David Landsman (NLM/IRP), and NIH Office of Intramural Research Director of Program Development and Support Chuck Dearolf, PhD.

Peter Tarczy-Hornoch 1/25/24

Dr. Tarczy-Hornoch, Chair (Date)
NLM Board of Scientific Counselors

Richard Scheuermann 1/31/24

Dr. Richard Scheuermann (Date)
Scientific Director, NLM IRP