The National Library of Medicine Update

MLA 2021

10:15 am – 11:15 am (CT)

Continue the Conversation!

11:15 am – 12:15 pm (CT)
Presenters

Patricia Flatley Brennan, RN, PhD
Director, National Library of Medicine

Dianne Babksi
Associate Director, Library Operations

Olivier Bodenreider, MD, PhD
Acting Director, Lister Hill National Center for Biomedical Communications

Directions for the Future

Current Directions and Engagement

Health Data Standards
Directions for the Future

Patricia Flatley Brennan, RN, PhD
Director, National Library of Medicine
2015 – 2021 NLM Budget Authority vs President’s Budget

[Graph showing budget authority and president's budget from 2015 to 2021, with budget values in millions for each year.]
Accelerating Discovery and Data-Powered Health

Accelerate discovery and advance health through data-driven research

Reach more people in more ways through enhanced dissemination and engagement

Build a workforce for data-driven research and health
Progress Toward the NLM Strategic Plan

**Data-Driven Research**
- TRACE variant report
- Open Data Program (ODP) by Sequence read Archive (SRA)
- Sequence-based protein folding

**Engagement**
- Community Engagement through the NNLM - All of Us, PASC Initiative
- ClinicalTrials.gov Modernization webinar
- New MEDLINE web site launched
- Desirable Characteristics of Data Repositories

**Workforce Development**
- Data Science @ NLM Training Program
- Infrastructure Improvements
- Data Science Education: NLM Center for Data Science and Services
In Memory

Milton Corn, MD

A moment of thanks and recognition for our colleague and dear friend.
NLM Personnel Appointments 2021

Dianne Babski
Associate Director,
Library Operations

Teresa Zayas Cabán, PhD
Assistant Director,
Policy Development

Valerie Florance, PhD
Acting Scientific Director,
NLM Intramural Research Programs

Richard Palmer, DrPH, JD
Acting Director,
NLM Extramural Programs
NLM: Building on the Three R’s

Reflect  Reimagine  Reenergize
Reflect
How It Started and How It’s Going
Work-Life Balance

Life

Health

Family

Work
Getting It Right: The Importance of Information Accuracy (Reflect)
Promoting Diversity, Equity, and Inclusion in Biomedical Careers

UNITE

Understanding stakeholder experiences through listening and learning

New research on health disparities, minority health, and health equity

Improve the NIH culture and structure for equity, inclusion, and excellence

Transparency, communication, and accountability

Extramural Research Ecosystem

Ending Structural Racism
The NIH Strategy: Improve Science through Diversity

Indexing

• How we acquire, define, and locate the literature
Reimagine
Live Poll 1

How is your current practice different than a year ago and what modification(s) have you made?
How Do We Best Serve the Needs of Our Public?

Rebuilding the public face of NLM’s offerings
What is the Future of Work?
Network of the National Library of Medicine (NNLM)

NNLM Regions
May 2021 – April 2026

6 National Coordinating Centers

- NNLM Web Services Office (NWSO)
- NNLM Public Health Coordination Office (NPHCO)
- NNLM Training Office (NTO)
- NNLM Evaluation Center (NEC)
- NNLM All of Us Community Engagement Center
- NNLM All of Us Training and Education Center
Reenergize
Co-creating the New Normal
Reaching NLM

@NLM_NIH
@NLMdirector

patti.brennan@nih.gov
Current Directions and Engagement

Dianne Babski
Associate Director,
Library Operations

National Library of Medicine
The 3Rs: Our Guiding Force in 2021

REFLECT
- Maximum telework
- New skills and virtual capabilities

REIMAGINE
- Workforce flexibilities
- Digital solutions for servicing our patrons

REENERGIZE
- Forward thinking
- Growing and learning
Library Operations: Who We Are

**VISION** to be a leader in global health information to improve public health

**MISSION** to collect, preserve, and make accessible biomedical literature and other resources

**VALUES**
- Service
- Knowledge Sharing
- Trustworthiness
- User Focus
- Quality
Library Operations: What We Do

Collect
*Acquire and preserve* unique and trusted collection of biomedical information

Curate
*Make biomedical information findable* through data normalization, metadata and data standards

Connect
*Link our global audience* to biomedical data and resources to make informed health decisions
Over 30 new staff joined the NLM LO family in 2020
NLM Associate Fellows 2020 - 2021

BRIANNA CHATMON  
*University of Missouri - Columbia*

ALLISON CRUISE  
*University of North Carolina - Greensboro*

LEVI DOLAN  
*University of Missouri - Columbia*

AMANDA SAWYER  
*University of Pittsburgh*
Apply by June 15!
Data Science Training Program
NLM Intramural Research Program

- Evolutionary Genomics and Biomolecular Structure
- Image Processing
- Networks, Gene Regulation, and Chromatin
- Health Information Standards and Discovery
- Natural Language Processing
- Statistical Methods
Lauren Porter: The Study of Fold-Switching Proteins
Xiaofang Jiang: COVID Wastewater Project
Advance health equity through information with a focus on serving underrepresented populations.
The Unaccompanied Children Program
NLM@MLA21: Collaboration and Partnering

New activities now available at MLA

• The Electronic Fund Transfer System (EFTS) for DOCLINE
• MLA Data Services Specialization (DSS)
• Disaster Information Management Specialization (DIS)
Feedback and Data-Driven Decisions

- Audits, Evaluation & Analytics
- Webinars
- Conferences
- Service Requests
- Request For Information (RFI)

National Library of Medicine
Improving Our Products and Services

Audits, Evaluation & Analytics

Webinars

Conferences

Service Requests

Request For Information (RFI)

Long Range Planning Roadmap

LM Collection & Preservation Policy

Library Services Platform

NIH National Library of Medicine
Over The Years

1879
Index Medicus is published, establishing the Library's groundbreaking role in systematic indexing of medical journal articles.

1971
MEDLINE launches!

1997
PubMed begins, allowing Internet access to MEDLINE data.

2002
MTI (Medical Text Indexer) is created, with continuous updates based on indexer feedback.

2021
New MEDLINE Website launches.

Circa 1870
John Shaw Billings indexes medical journals at his home in Washington, DC.

1960
MeSH introduced as a controlled vocabulary used for indexing, cataloging, and searching biomedical information.
Library Renovation

BEFORE

AFTER
Compact Shelving +3,300 Linear Ft.
Call to Action

REFLECT

REIMAGINE

REENERGIZE
How do you stay informed about NLM products and services?

- Technical Bulletin
- NNLM
- NLM News & Announcements
- NLM Website
- Social Media (Twitter, Facebook, etc.)
- Listservs
- Other
Health Data Standards

Olivier Bodenreider, MD, PhD
Acting Director,
Lister Hill National Center for Biomedical Communications
Health Data Standards at NLM

• Health Data Standards at NLM

• Unified Medical Language System (UMLS)
  o Overview
  o Reflecting: 30 years and counting
  o Reimagining UMLS
  o Reenergizing UMLS
Getting it Right: The Importance of Information Accuracy (Data Standards)

- Accuracy
- Consistency
- Clarity
- Timeliness
- Completeness
- Currency
- Accessibility
- Congruence
- Relevance
Why Standards?
To Make Data **Findable, Accessible, Interoperable, Reusable:** FAIR

**Findable**
- Indexing with MeSH helps retrieve MEDLINE articles
- Coding clinical data with Systemized Nomenclature of Medicine – Clinical Terms (SNOMED CT) helps retrieve clinical records

**Interoperable**
- Clinical data warehouses transformed to clinical terminology standards
  - Aggregate hospitals protocols results
- Protein products annotated with the Gene Ontology (GO) across species
  - Enable functional genomics
Health Data Standards at NLM (UMLS)

• Terminological standards
  o Developed by NLM (MeSH, RxNorm)
  o Supported by NLM (Logical Observation Identifiers Names and Codes, (LOINC), SNOMED CT)
  o Integrated by NLM Unified Medical Language System (UMLS)

• Information model standards
  o Fast Healthcare Interoperability Resources (FHIR) – promoted by NLM to support exchange of clinical and research data
  o Observational Medical Outcomes Partnership (OMOP) – supported by NLM through grants (interoperable clinical data warehouses)

• Other NLM standard products and services
  o Value Set Authority Center (VSAC) – Reference sets of codes for clinical quality measures
  o Common Data Elements (CDE) – Reference data elements for research studies
Why a Unified Medical Language System?

“[...] the UMLS project is an effort to overcome two significant barriers to effective retrieval of machine-readable information.”

• The first is the **variety of ways the same concepts are expressed** in different machine-readable sources and by different people.

• The second is the **distribution of useful information** among many disparate databases and systems.”
Biomedical Terminology Integration (continued)

FMA: Foundational Model of Anatomy
OMIM: Online Mendelian Inheritance in Man
UMLS Content Today

• 157 families of source vocabularies
  o Not counting 61 translations
• 25 languages
• Broad coverage of biomedicine
  o 12.5M names (normalized)
  o 4.4M concepts
  o >10M relations
• Common presentation
How It’s Done

• Algorithmic pre-processing
  o Source synonymy
  o Lexical knowledge
  o Source semantics

• Manual curation
  o Metathesaurus editors

- Adrenal gland diseases
- Adrenal disorder
- Disorder of adrenal gland
- Diseases of the adrenal glands
Main uses of the UMLS

<table>
<thead>
<tr>
<th>For what purpose(s) did you use the UMLS?</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing of texts to extract concepts, relationships, or knowledge</td>
<td>51%</td>
</tr>
<tr>
<td>Facilitate mapping between terminologies</td>
<td>49%</td>
</tr>
<tr>
<td>Extract specific terminologies from the Metathesaurus (e.g., Medical Dictionary for Regulatory Archives (MedDRA), MeSH, National Drug File – Reference Terminology (NDF-RT))</td>
<td>29%</td>
</tr>
<tr>
<td>Develop an information retrieval system</td>
<td>19%</td>
</tr>
<tr>
<td>Creation and maintenance of local terminology</td>
<td>19%</td>
</tr>
<tr>
<td>Research terminologies and ontologies beyond any of the above categories</td>
<td>18%</td>
</tr>
<tr>
<td>Other</td>
<td>8%</td>
</tr>
<tr>
<td>Support of a terminology server or service</td>
<td>7%</td>
</tr>
</tbody>
</table>
The availability of accurate mouse models of human NF2-associated tumors [...] now provide an opportunity to design targeted treatments for schwannomas and meningiomas.
Reimagining Metathesaurus Curation

• Traditional curation model
  • Algorithms
    • Preserve synonymy as indicated by sources
    • Group lexically-similar terms as potential synonyms
    • Prevent similar terms from being grouped if they have different semantics
  • Manual curation

• Reimagined curation model
  • Algorithms
    • Use AI techniques (neural networks) to predict synonymy among terms
  • Manual curation

Biomedical Vocabulary Alignment at Scale in the UMLS Metathesaurus

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UMLS in Action: Reimagining Biomedical Named Entity Recognition

Original MetaMap
- Created in 1994
- Developed in Prolog
- Widely used but...
- Slow
- Very complex

MetaMapLite
- Created in 2015
- Developed in Java
- Streamlined
- Supports real-time processing
- Increased performance
Reenergizing the UMLS

• What do UMLS users need?
  • UMLS Request for Information (RFI)
  • UMLS workshop (upcoming)

• Updated tooling
  • Federated login
  • UMLS browser redesign
  • Cloud migration
UMLS in Action: Support for COVID-19

SARS-CoV-2 B.1.1.7 variant

post-acute COVID-19 syndrome

Moderna COVID-19 Vaccine
Why Are Data Standards Important?

Standards
• Contribute to make data findable and interoperable
• Are a key component of the data ecosystem

Standardized Datasets
• Can be integrated
• Can be exploited more easily
Why Should Medical Librarians Care?

Medical Librarians...

• Are the pathway to connecting your researchers to research data
• Are the ears of NLM in community – you can help us
• Have an important role to play in hospitals
Thank you!

Continue the Conversation