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

Directions for the Future

Dianne Babksi
Associate Director,
Library Operations

Current Directions and Engagement

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

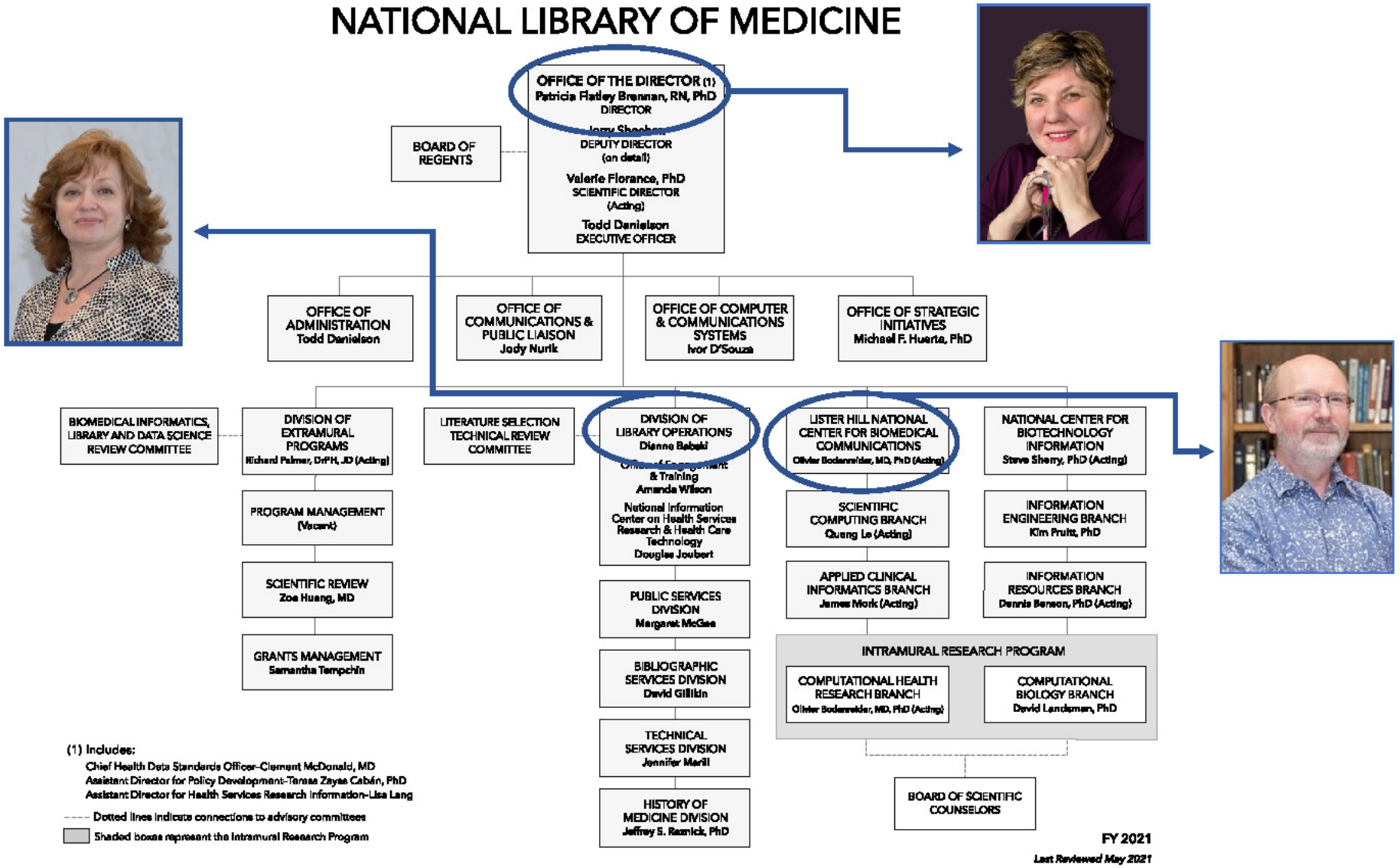
Health Data Standards

Directions for the Future

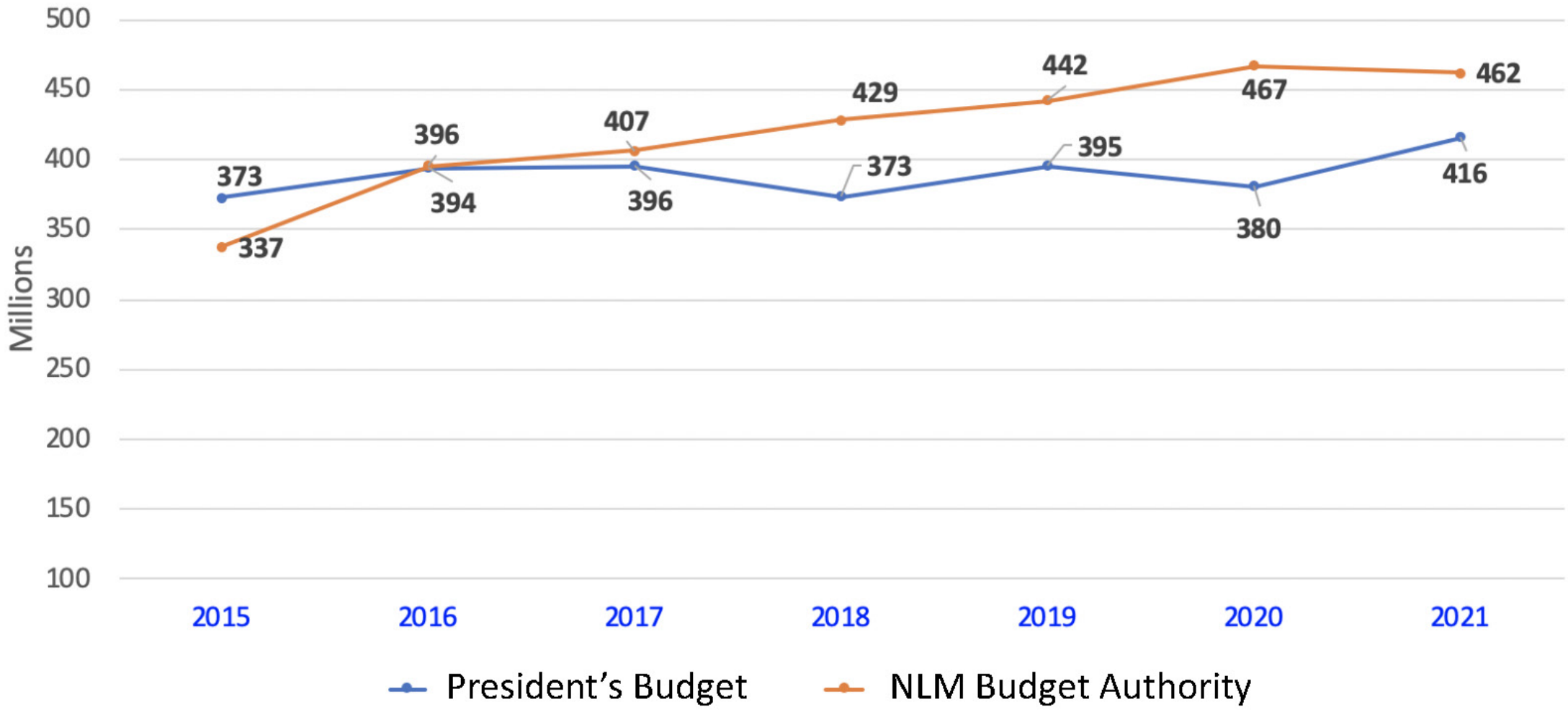
Patricia Flatley Brennan, RN, PhD

Director, National Library of Medicine

NLM Organizational Chart



2015 – 2021 NLM Budget Authority vs President's Budget



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

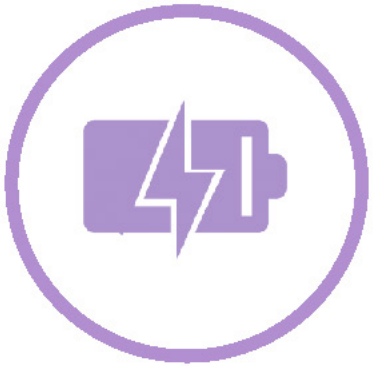
Valerie Florance, PhD
Acting Scientific Director,
NLM Intramural
Research Programs

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

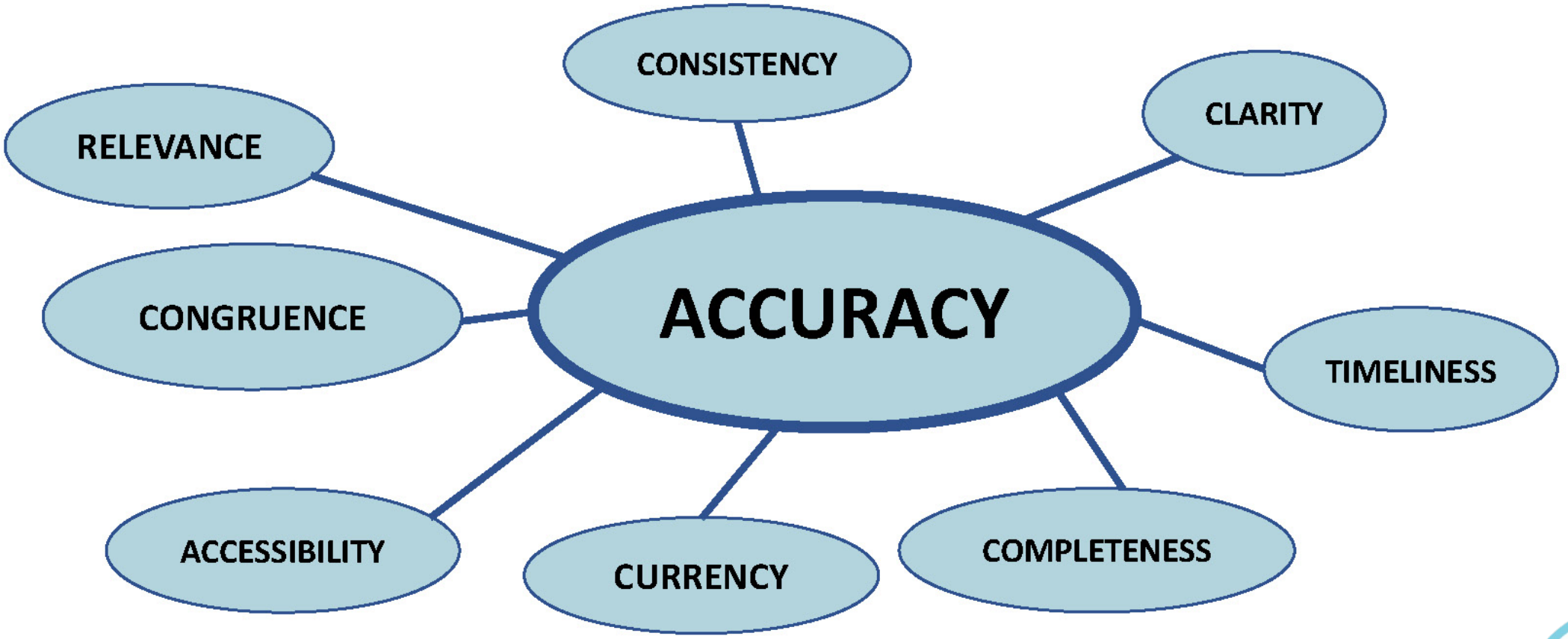
Life

Health

Family

Work

Getting It Right: The Importance of Information Accuracy (Reflect)



Promoting Diversity, Equity, and Inclusion in Biomedical Careers

UNITE

U nderstanding stakeholder experiences through listening and learning

N ew research on health disparities, minority health, and health equity

I mprove the NIH culture and structure for equity, inclusion, and excellence

T ransparency, communication, and accountability

E xtramural Research Ecosystem

Ending Structural Racism

The NIH Strategy: Improve Science through Diversity

Indexing

- How we **acquire, define,** and **locate** the literature

Reimagine

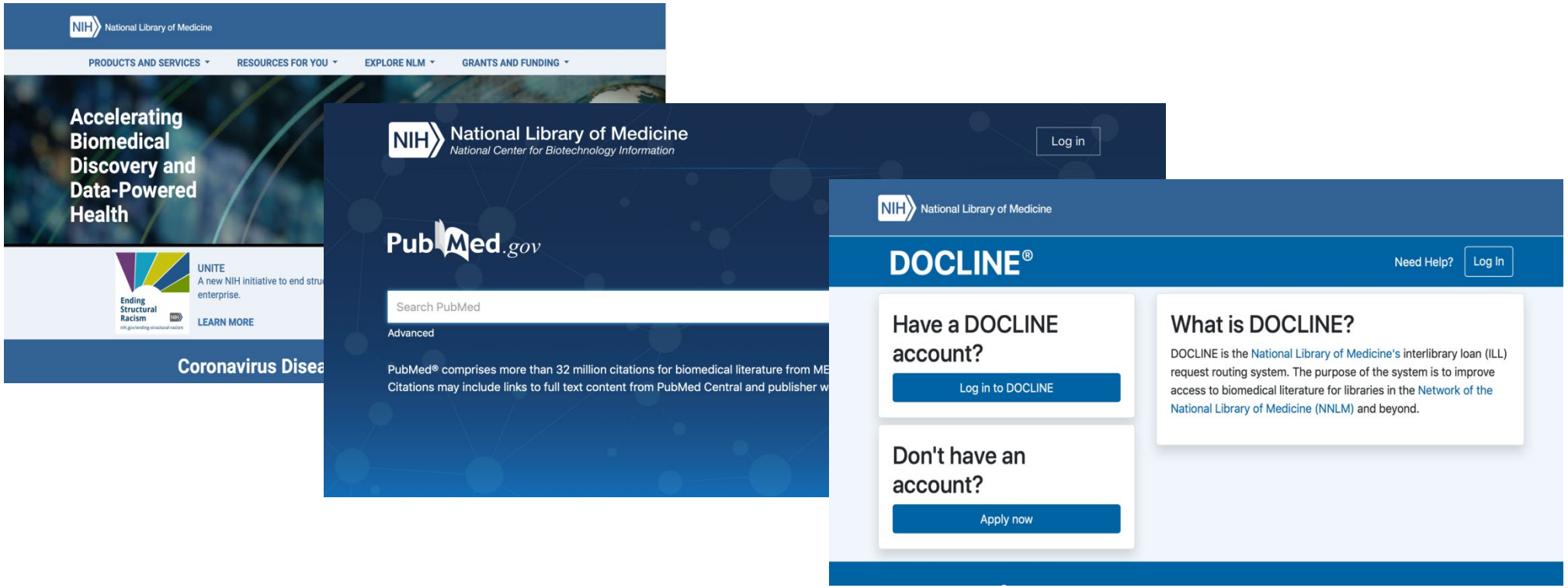
Live Poll 1

REFLECT

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?

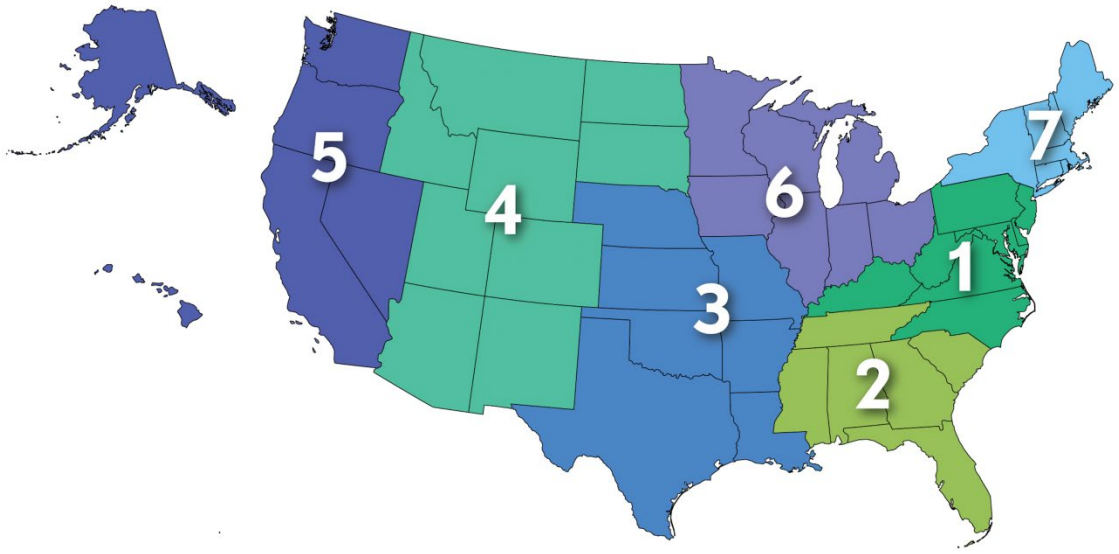
Rebuilding the public face of NLM's offerings



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

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

Library Operations: What We Do

Collect

Acquire and preserve unique and trusted collection of biomedical information

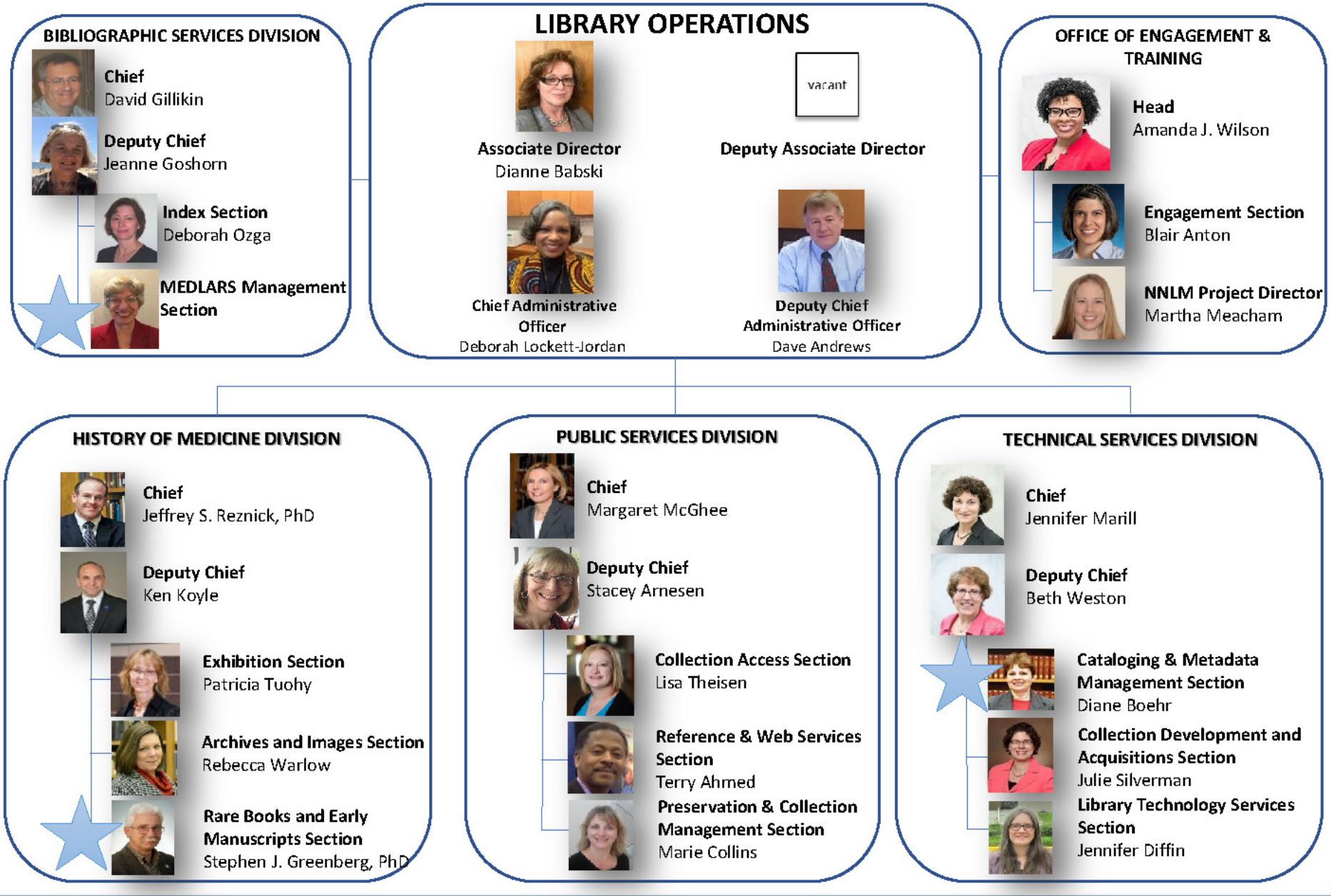
Curate

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

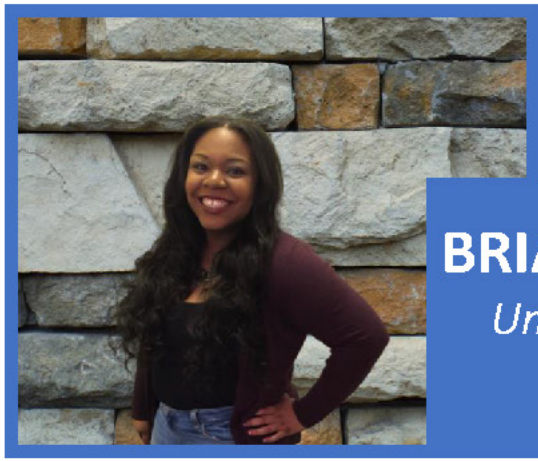
Our Leaders



Retired


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

NLM/AAHSL Leadership Fellows Program

Apply by June 15!

NLM/AAHSL Leadership Fellows Program

Advice and Guidance from the Library Community

Anne Seymour, MS
Welch Medical Library
Johns Hopkins University

Kristi Holmes, PhD
Galter Health Sciences Library
Northwestern University

Neil Rambo, MLS (Retired)
Health Sciences Library
New York University

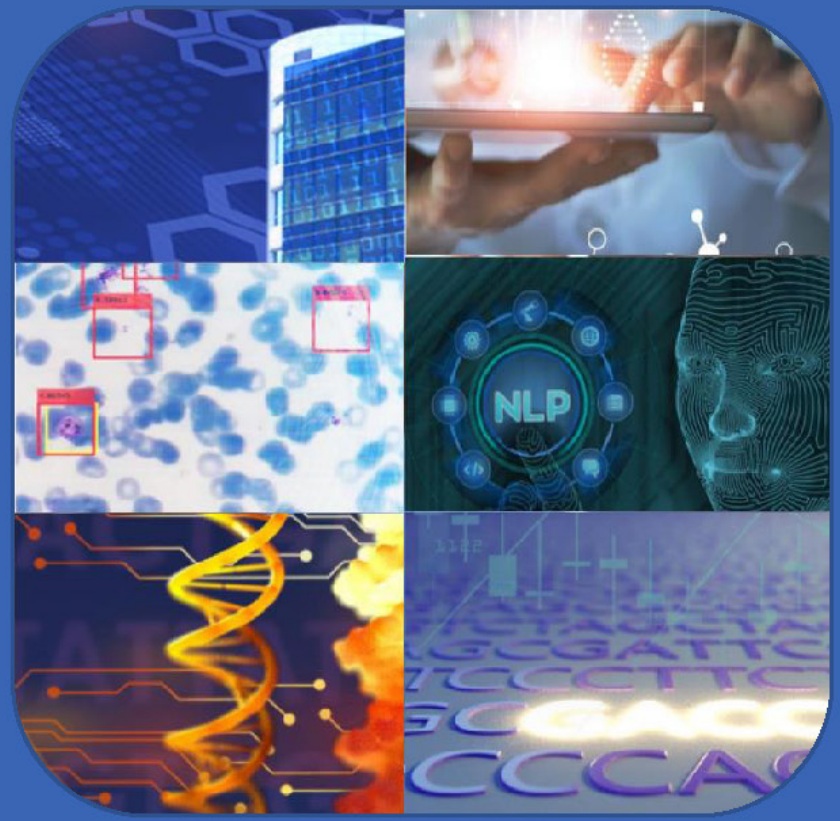
Marissa Conte
Taubman Health Sciences Library
University of Michigan

Pamela J. Bagley, PhD
Biomedical Libraries
Dartmouth College

Data Science Training Program

NLM Intramural Research Program

- Evolutionary Genomics and Biomolecular Structure
- Image Processing
- Networks, Gene Regulation, and Chromatin

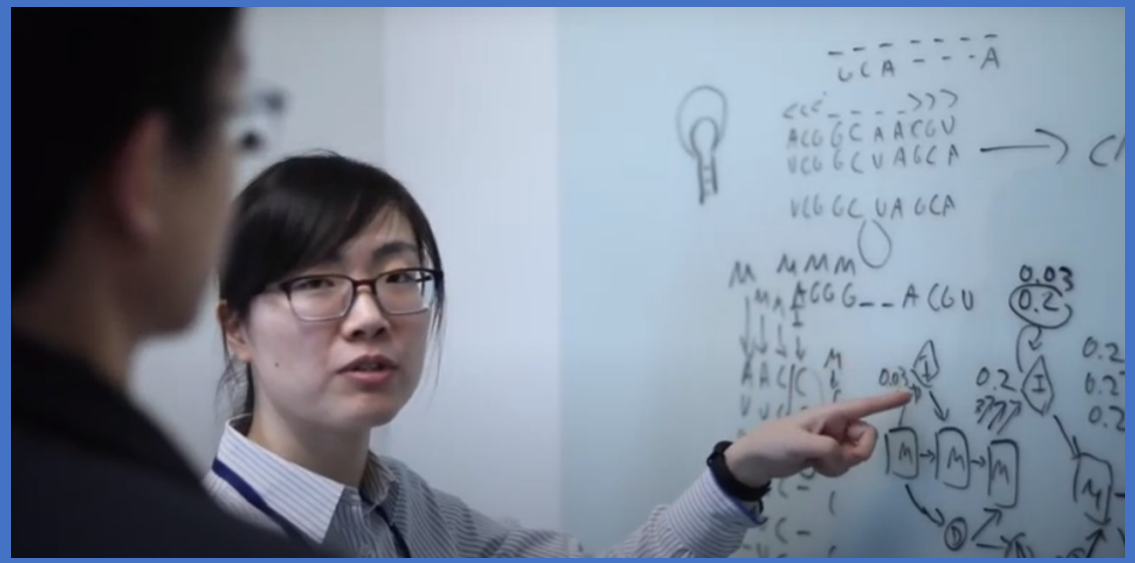


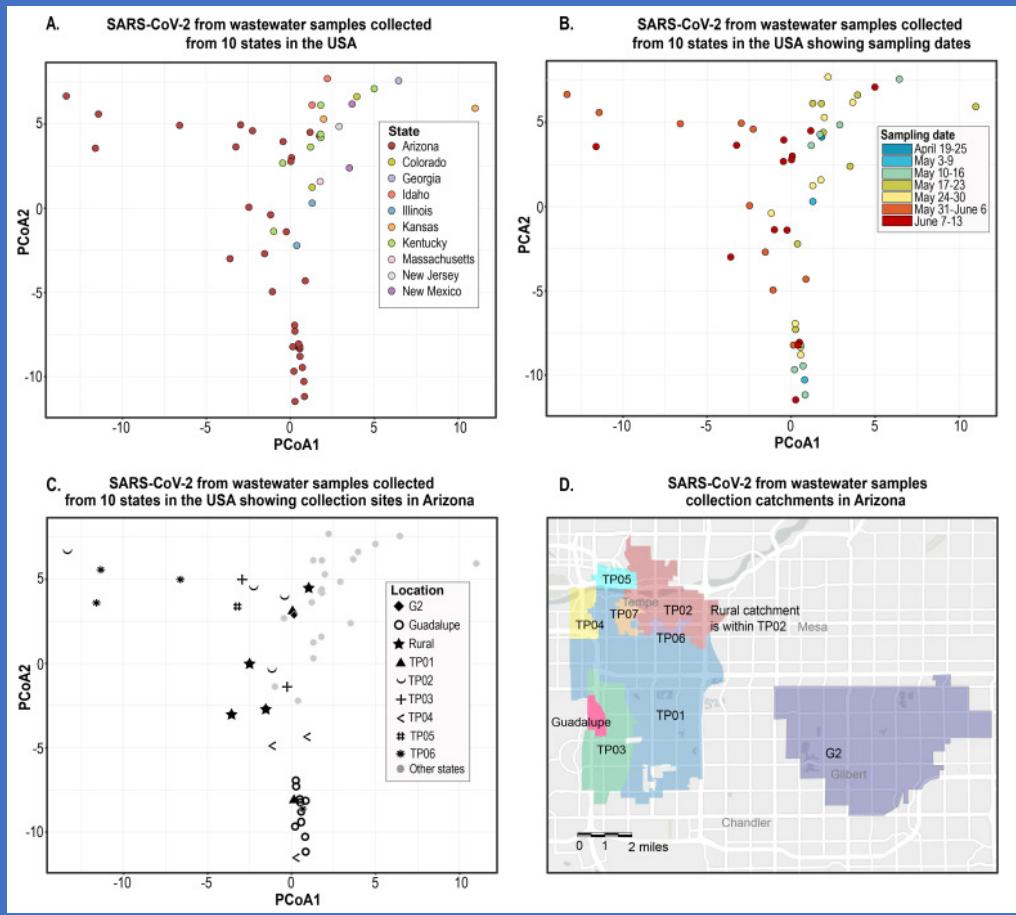
- Health Information Standards and Discovery
- Natural Language Processing
- Statistical Methods

Lauren Porter: The Study of Fold-Switching Proteins

LAUREN PORTER
STADTMAN TENURE-TRACK
INVESTIGATOR

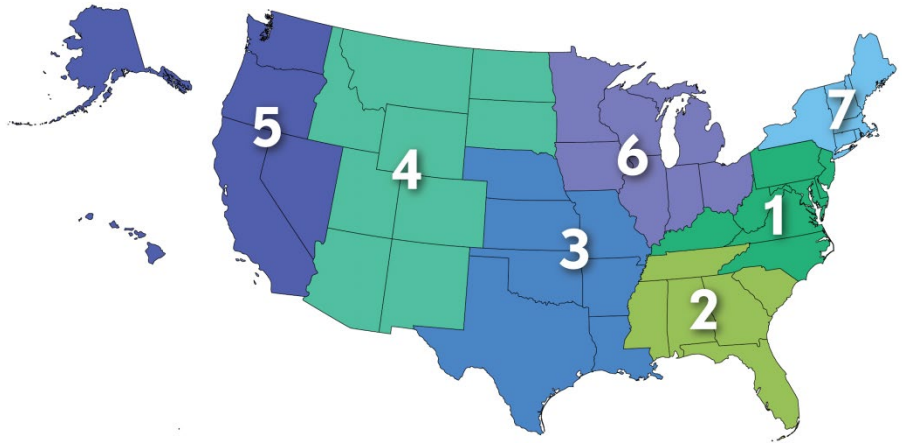
Xiaofang Jiang: COVID Wastewater Project





NNLM

Network of the
National Library of Medicine



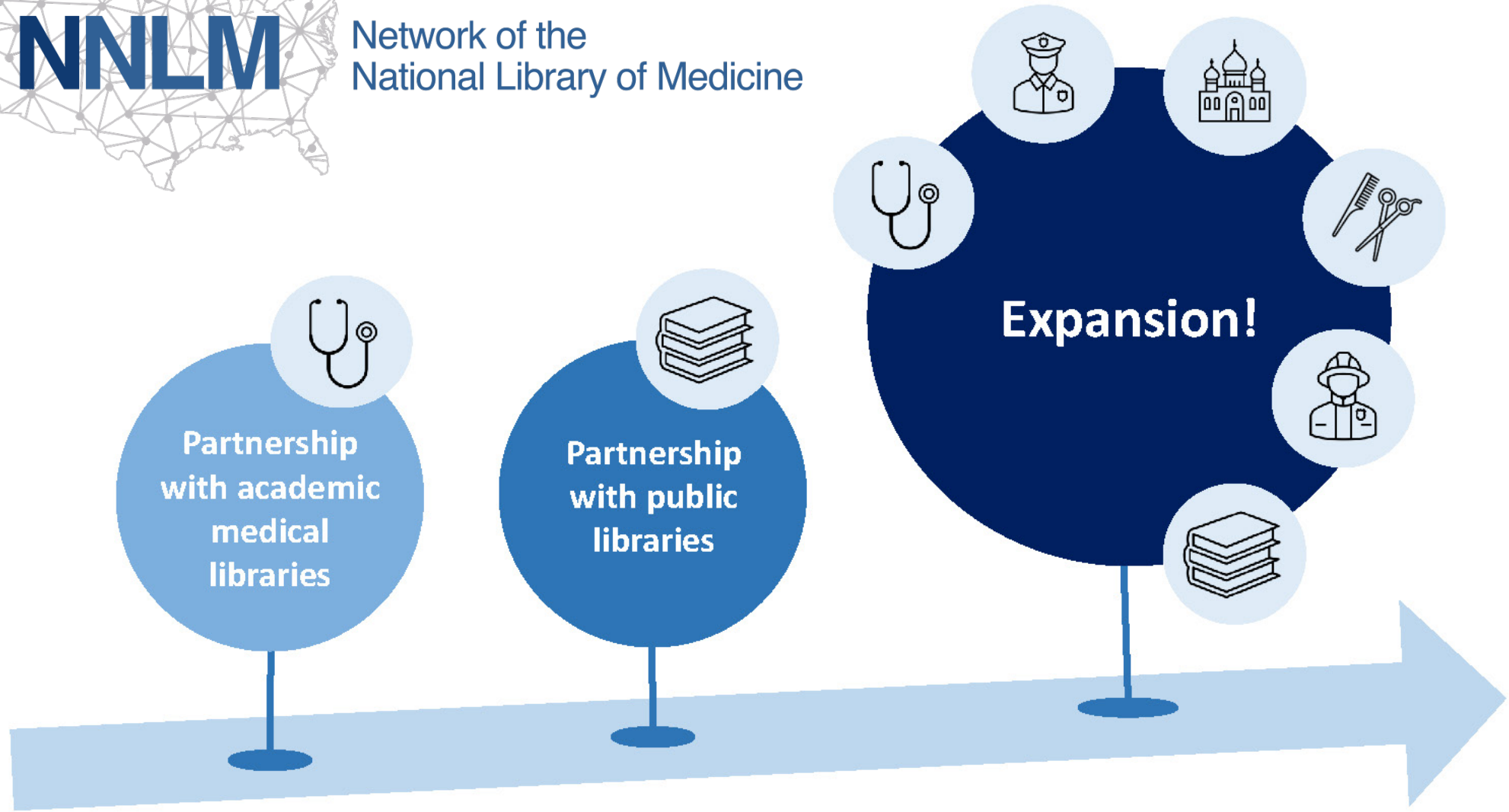
Advance health equity through information with a focus on serving underrepresented populations.





NLM Expansion

NNLM Network of the National Library of Medicine



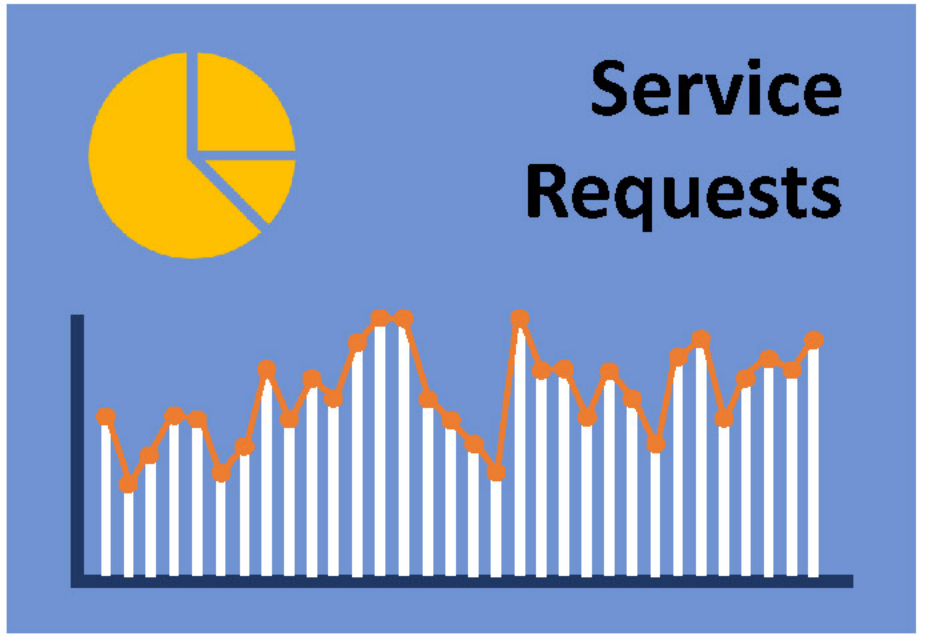
The Unaccompanied Children Program

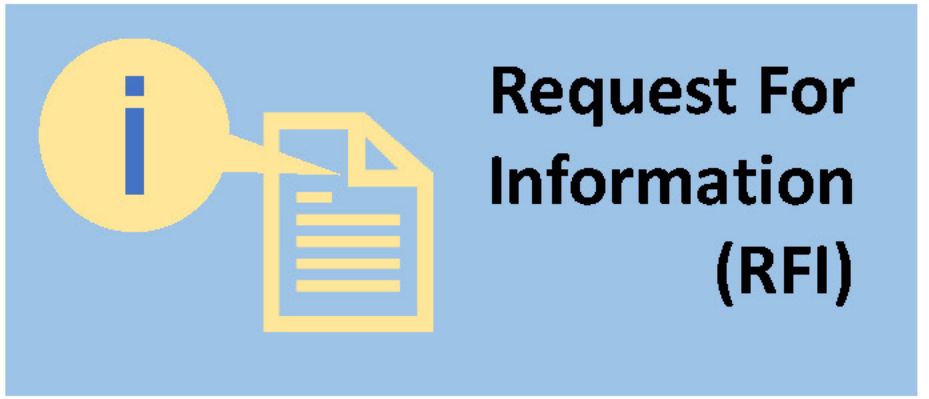
NLM@MLA21: Collaboration and Partnering

New activities now available at MLA

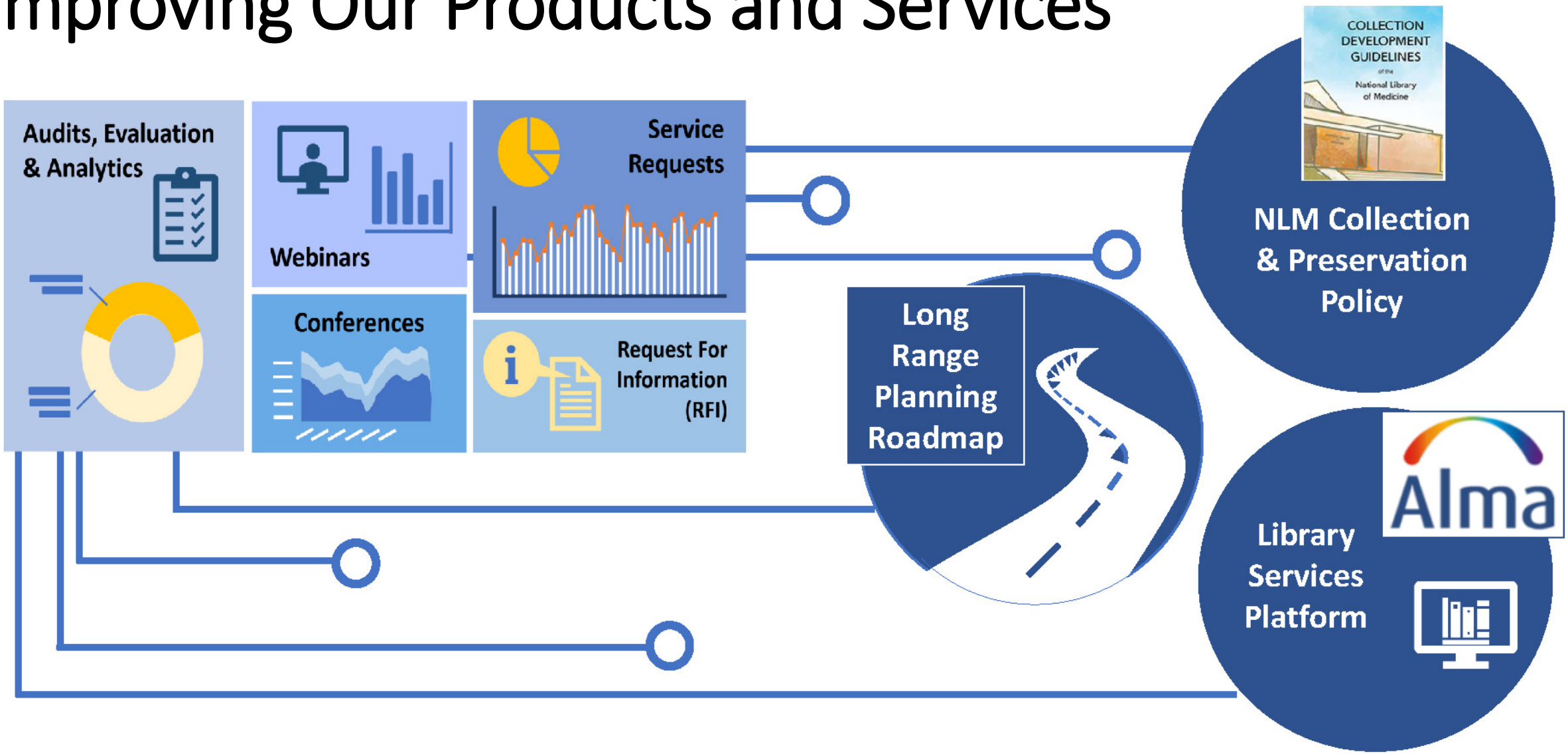
- The Electronic Fund Transfer System (EFTS) for DOCLINE
- MLA Data Services Specialization (DSS)
- Disaster Information Management Specialization (DIS)

Feedback and Data-Driven Decisions



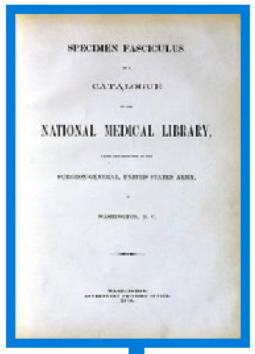


Improving Our Products and Services



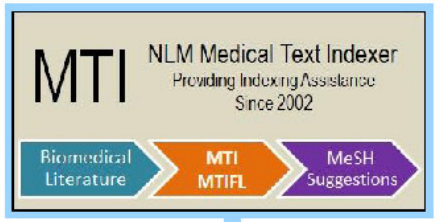
MEDLINE® Over The Years

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



1971 MEDLINE launches!

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



2022 MEDLINE 2022 Initiative implemented

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

1997 PubMed Begins, allowing Internet access to MEDLINE data

2021 New MEDLINE Website launches

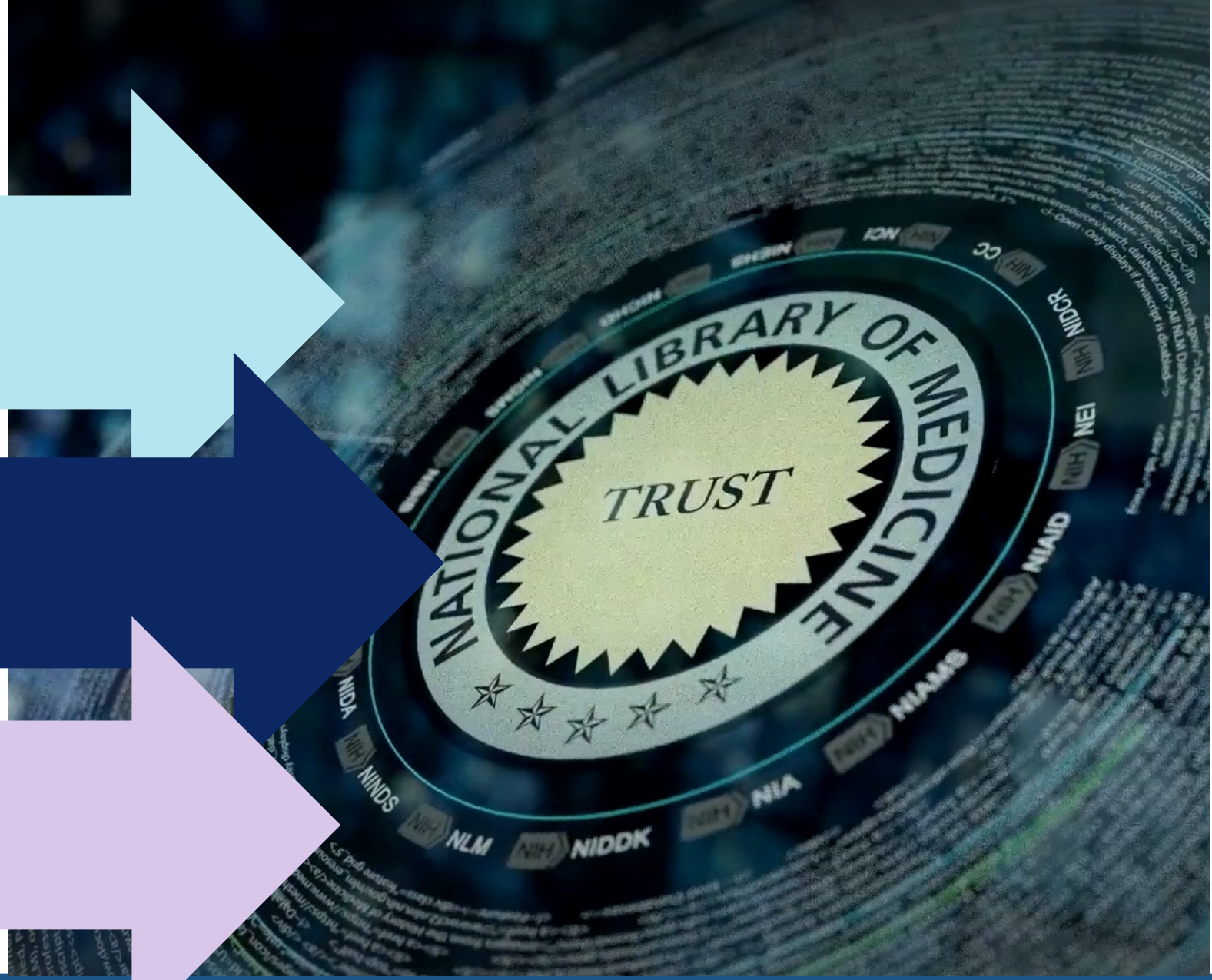
Library Renovation

BEFORE

AFTER


Compact
Shelving
+3,300
Linear Ft.

Call to Action



REFLECT

REIMAGINE

REENGERIZE

Live Poll 2

REENGERIZE

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

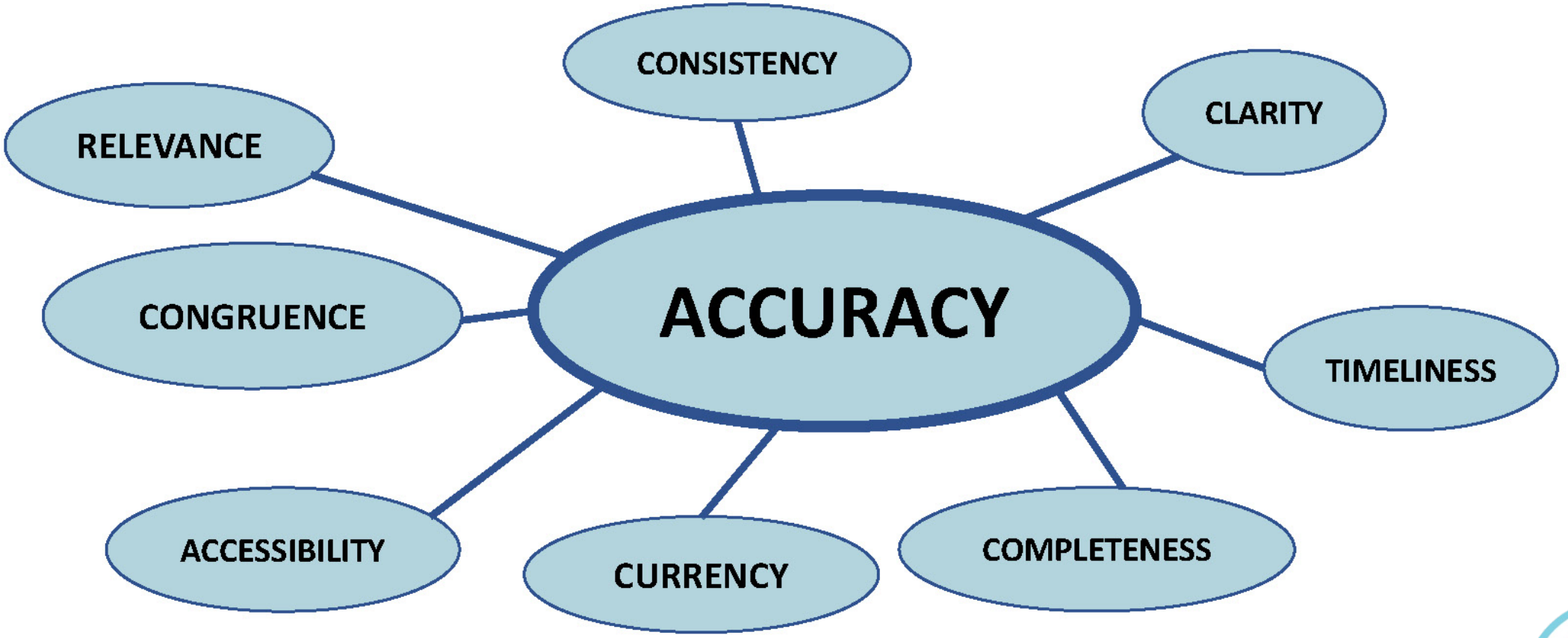
Health Data Standards

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)
  - Overview
  - Reflecting: 30 years and counting
  - Reimagining UMLS
  - Reenergizing UMLS

Getting it Right: The Importance of Information Accuracy (Data Standards)



Why Standards?

To Make Data **F**indable, **A**ccessible, **I**nteroperable, **R**eusable: ***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
  - Developed by NLM (MeSH, RxNorm)
  - Supported by NLM (Logical Observation Identifiers Names and Codes, (LOINC), SNOMED CT)
  - Integrated by NLM Unified Medical Language System (UMLS)
- Information model standards
  - Fast Healthcare Interoperability Resources (FHIR) – promoted by NLM to support exchange of clinical and research data
  - Observational Medical Outcomes Partnership (OMOP) – supported by NLM through grants (interoperable clinical data warehouses)
- Other NLM standard products and services
  - Value Set Authority Center (VSAC) – Reference sets of codes for clinical quality measures
  - Common Data Elements (CDE) – Reference data elements for research studies

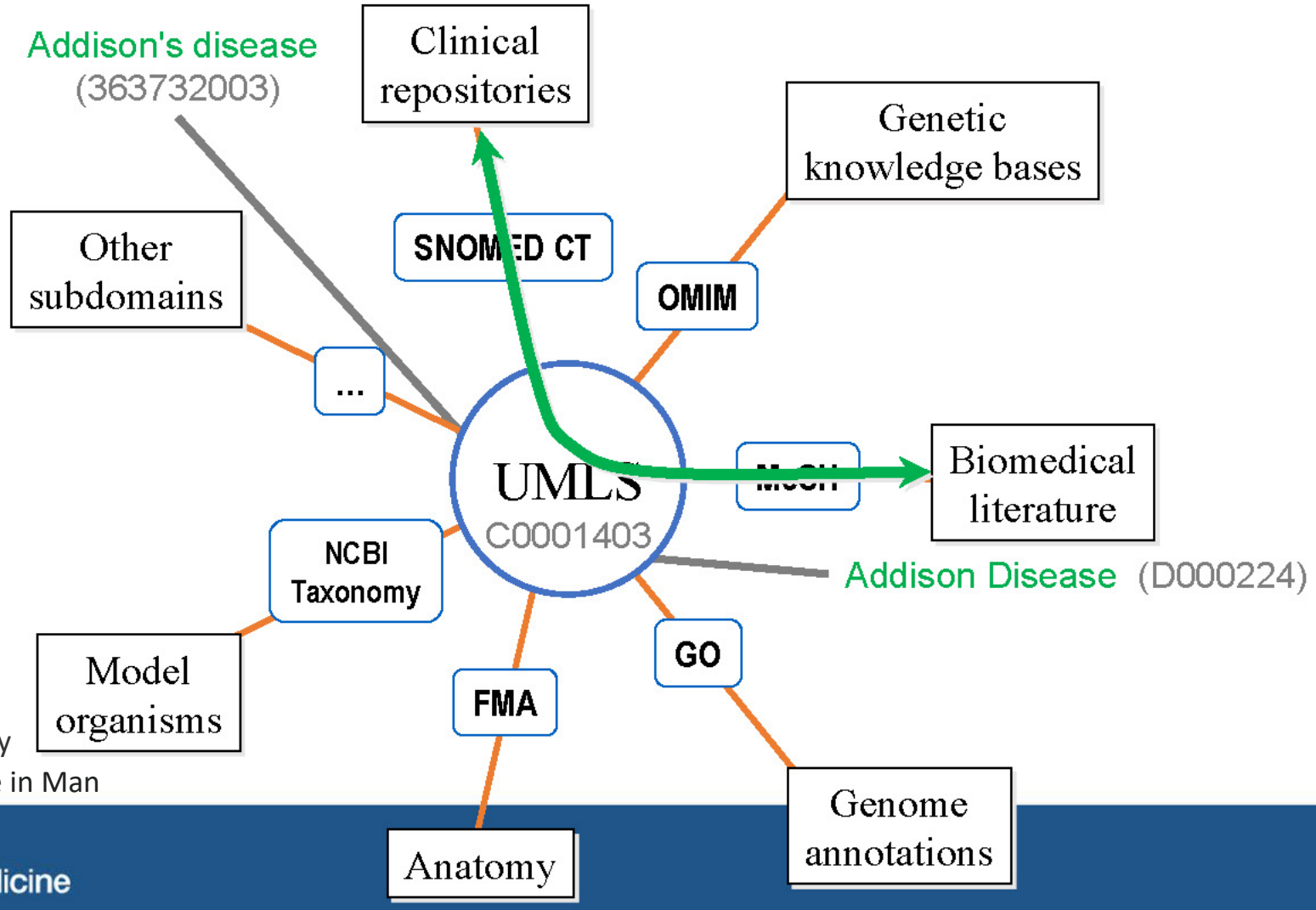
Why a Unified Medical Language System?

"[…] 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.

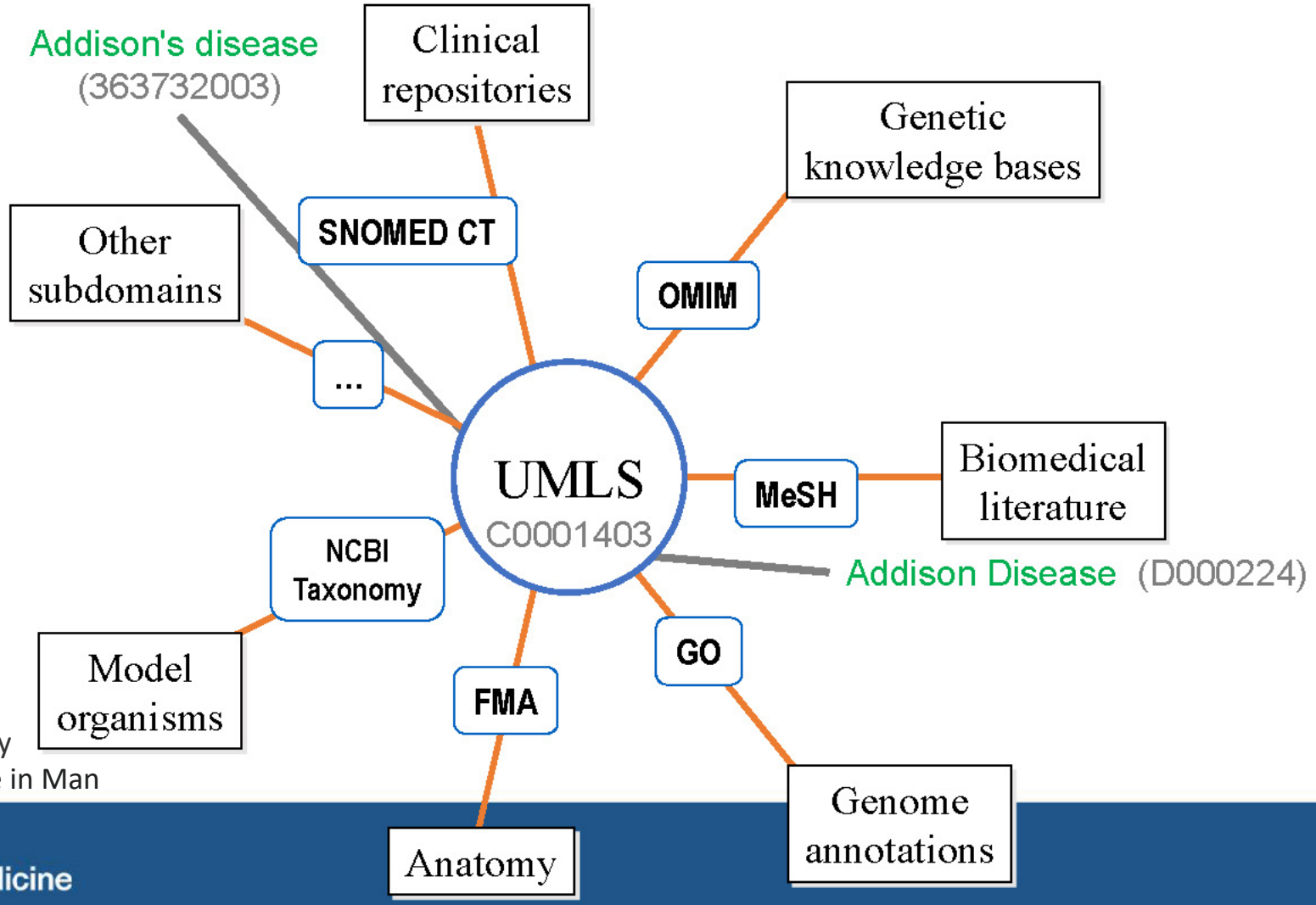
- The second is the **distribution of useful information** among many disparate databases and systems."

Biomedical Terminology Integration



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

Biomedical Terminology Integration (continued)



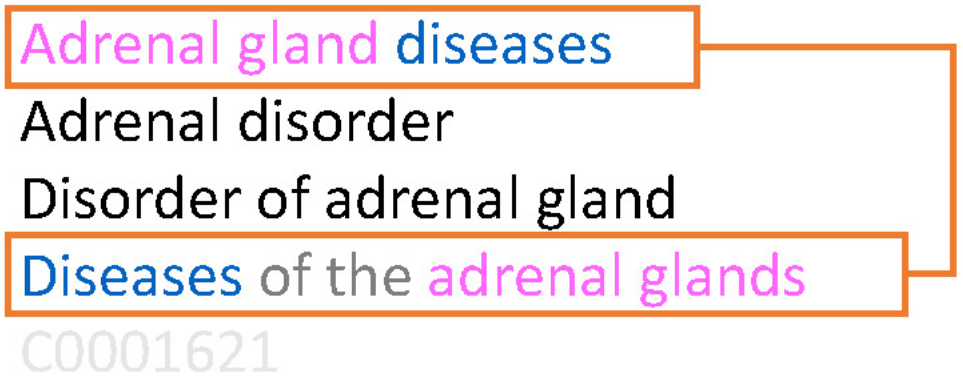
FMA: Foundational Model of Anatomy
OMIM: Online Mendelian Inheritance in Man

UMLS Content Today

- 157 families of source vocabularies
  - Not counting 61 translations
- 25 languages
- Broad coverage of biomedicine
  - 12.5M names (normalized)
  - 4.4M concepts
  - >10M relations
- Common presentation

How It’s Done

- Algorithmic pre-processing
  - Source synonymy
  - Lexical knowledge
  - Source semantics
- Manual curation
  - Metathesaurus editors



UMLS at 30

Main uses of the UMLS

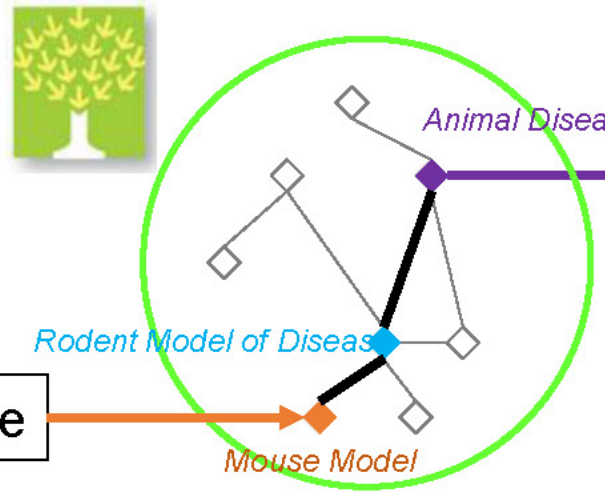
For what purpose(s) did you use the UMLS?	%
Processing of texts to extract concepts, relationships, or knowledge	51%
Facilitate mapping between terminologies	49%
Extract specific terminologies from the Metathesaurus (e.g., Medical Dictionary for Regulatory Archives (MedDRA), MeSH, National Drug File – Reference Terminology (NDF-RT)	29%
Develop an information retrieval system	19%
Creation and maintenance of local terminology	19%
Research terminologies and ontologies beyond any of the above categories	18%
Other	8%
Support of a terminology server or service	7%

Volume 27, Issue 10
October 2020

UMLS in Action: Supporting Automatic Indexing

MEDLINE abstract

Noun phrase



MeSH descriptor

Review. Curr Opin Neurol. 2003 Feb;16(1):27-33. doi: 10.1097/01.wco.0000053583.70044.ab.

Neurofibromatosis 2

Michael E Baser, D Gareth R Evans, David H Gutmann

Affiliations + expand

PMID: 12544854 DOI: 10.1097/01.wco.0000053583.70044.ab

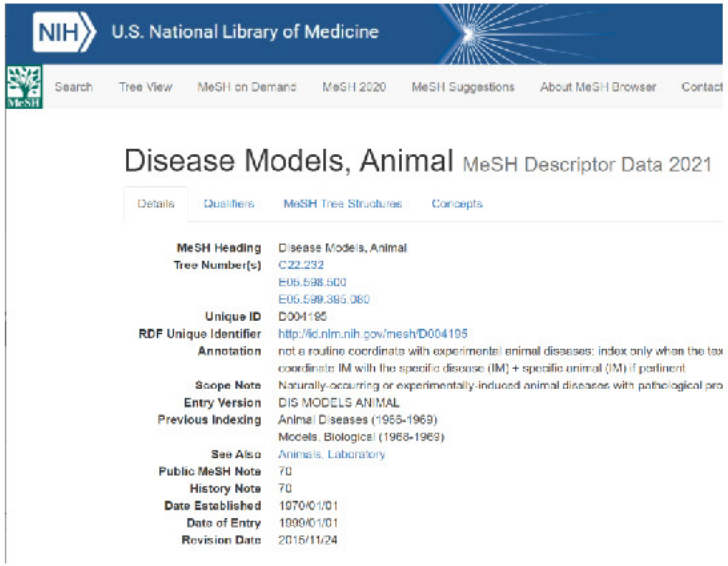
Abstract

Purpose of review: Recent clinical and molecular research on neurofibromatosis 2 (NF2) is reviewed, and the implications for clinical practice and research are discussed.

Recent findings: NF2 patients who are treated in specialty centers have a significantly lower risk of mortality than those who are treated in non-specialty centers. Vestibular schwannoma growth rates in NF2 are generally higher in younger people but are highly variable, even among multiple NF2 patients of similar ages in the same family. Radiation therapy is best reserved for NF2 patients who have particularly aggressive tumors, those who are poor surgical risks, those who refuse surgery, or those who are elderly. In-vivo studies have demonstrated that leptomeningeal cell activation of in mice results in leptomeningeal hyperplasia and meningioma formation. In-vitro studies have identified molecules that interact with the product (merlin or schwannomin), some of which (e.g., CD44 and paxillin) may play critical roles in merlin growth regulation.

Summary: NF2 patients should be referred to specialty treatment centers for optimal care. Clinical management of multiple patients in NF2 families cannot be based on the expectation of similar vestibular schwannoma growth rates, even when other clinical aspects of disease severity are similar. The availability of accurate mouse models of human NF2-associated tumors and the identification of molecules involved in merlin growth regulation now provide an opportunity to design targeted treatments for schwannomas and meningiomas.

The availability of accurate mouse models of human NF2-associated tumors [...] now provide an opportunity to design targeted treatments for schwannomas and meningiomas.



1091—8280/98/$5.00 © 1998 AMIA, Inc.

Beyond Synonymy:
Exploiting the UMLS Semantics in Mapping Vocabularies

Olivier Bodenreider, M.D., Ph.D.[1], Stuart J. Nelson, M.D.[2],
William T. Hole, M.D.[2], H. Florence Chang, M.S.[1]
[1]Management Systems Designers, Vienna, Virginia
[2]National Library of Medicine, Bethesda, Maryland

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

Biomedical Vocabulary Alignment at Scale in the UMLS Metathesaurus

Vinh Nguyen
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Bethesda, Maryland, USA

Hong Yung Yip
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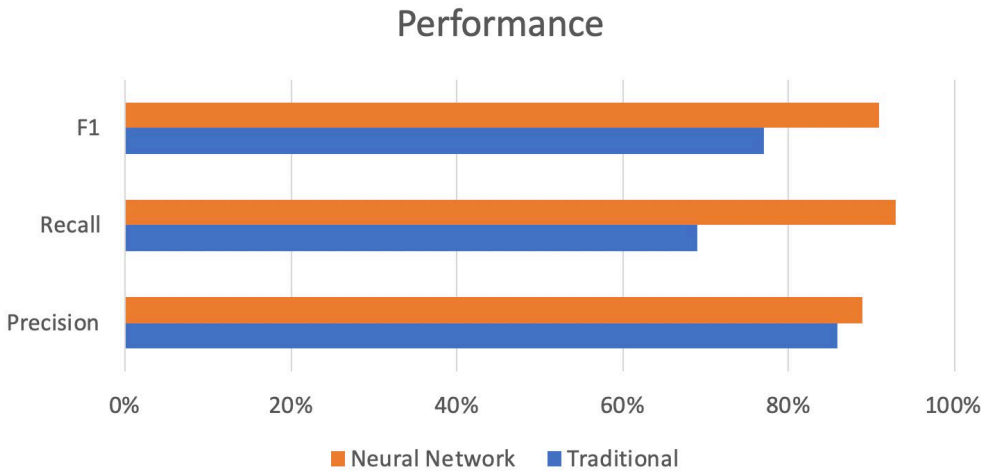
University of South Carolina
Columbia, South Carolina, USA

Olivier Bodenreider
olivier@nlm.nih.gov
National Library of Medicine
Bethesda, Maryland, USA

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



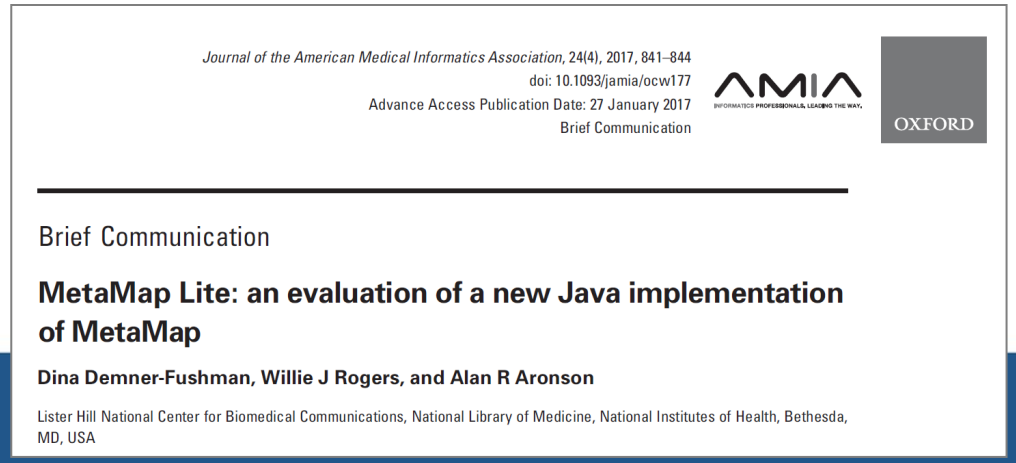
UMLS in Action: Reimagining Biomedical Named Entity Recognition

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



Journal of the American Medical Informatics Association, 24(4), 2017, 841–844
doi: 10.1093/jamia/ocw177
Advance Access Publication Date: 27 January 2017
Brief Communication

AMIA INFORMATICS PROFESSIONALS, LEADING THE WAY.

OXFORD

Brief Communication

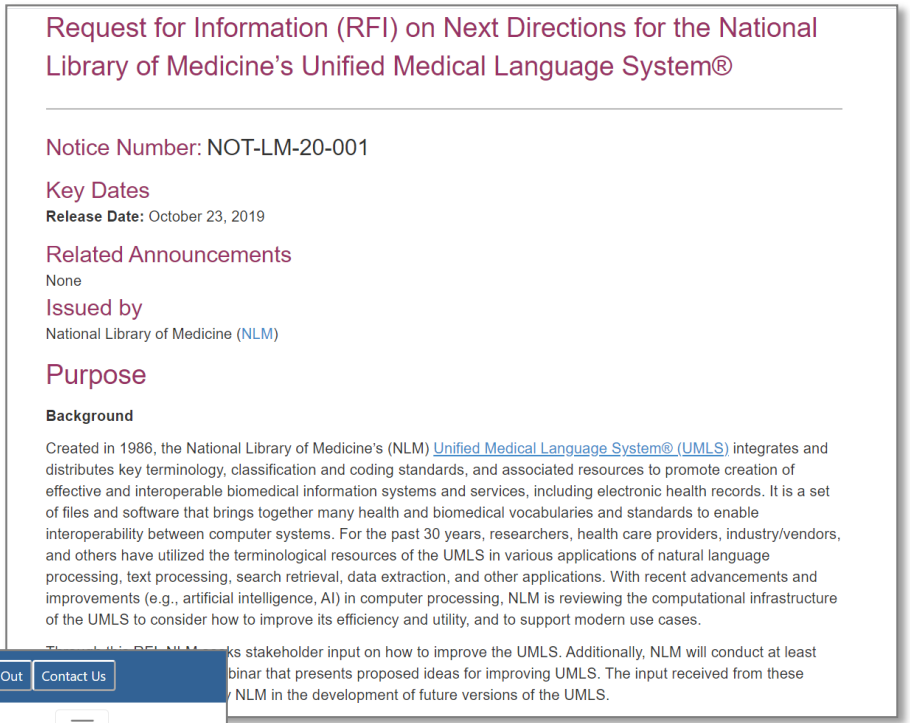
MetaMap Lite: an evaluation of a new Java implementation of MetaMap

Dina Demner-Fushman, Willie J Rogers, and Alan R Aronson

Lister Hill National Center for Biomedical Communications, National Library of Medicine, National Institutes of Health, Bethesda, MD, USA

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



Request for Information (RFI) on Next Directions for the National Library of Medicine's Unified Medical Language System®

Notice Number: NOT-LM-20-001

Key Dates

Release Date: October 23, 2019

Related Announcements

None

Issued by

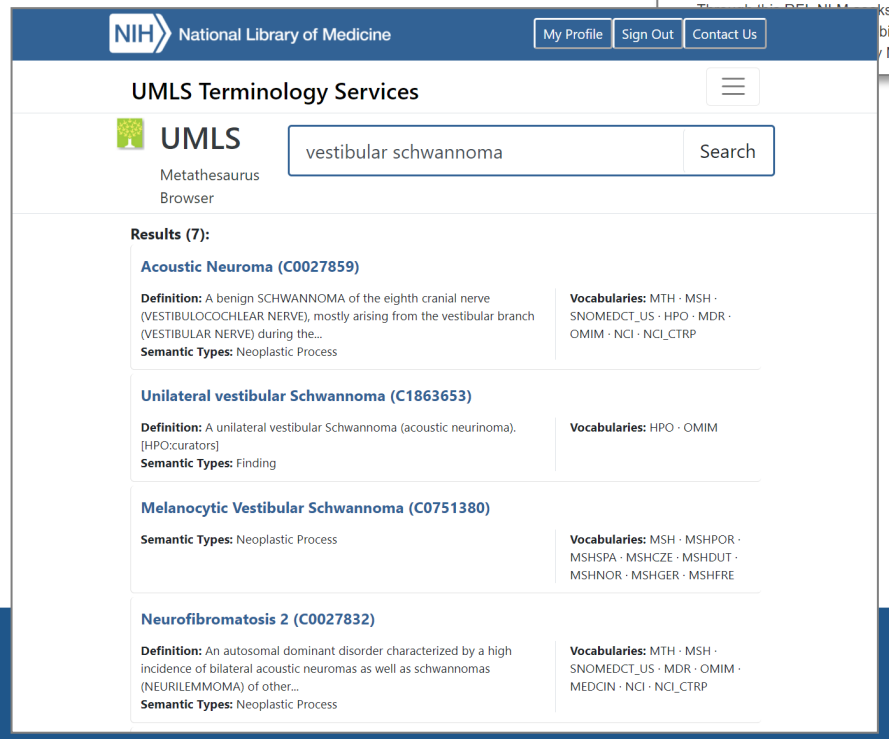
National Library of Medicine (NLM)

Purpose

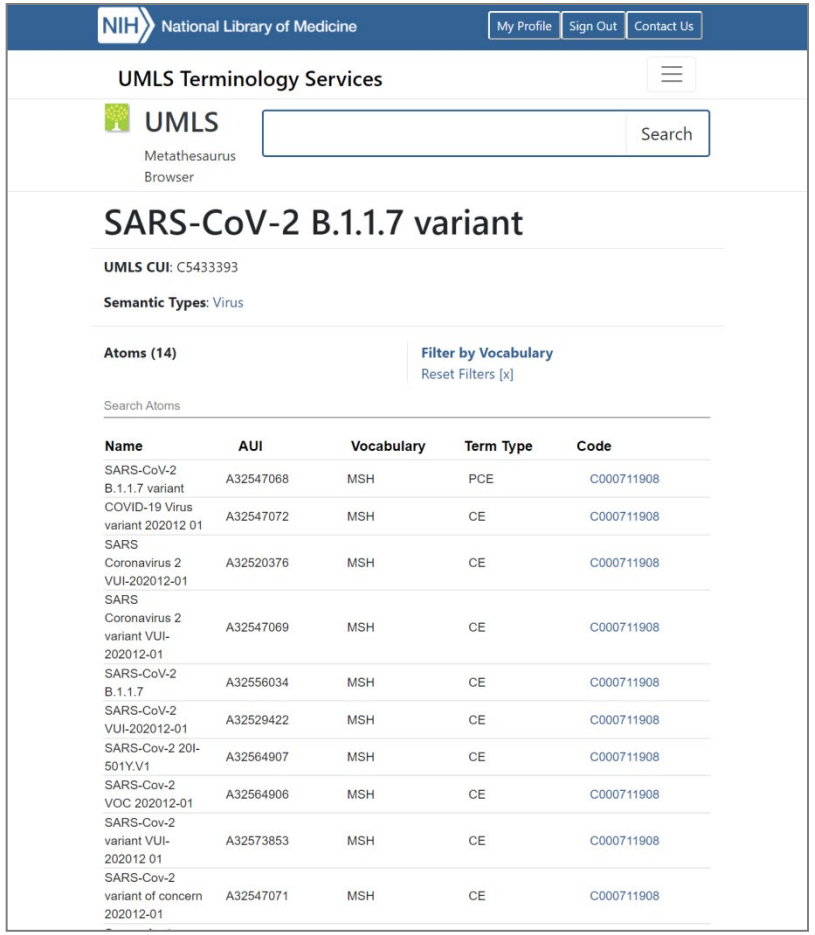
Background

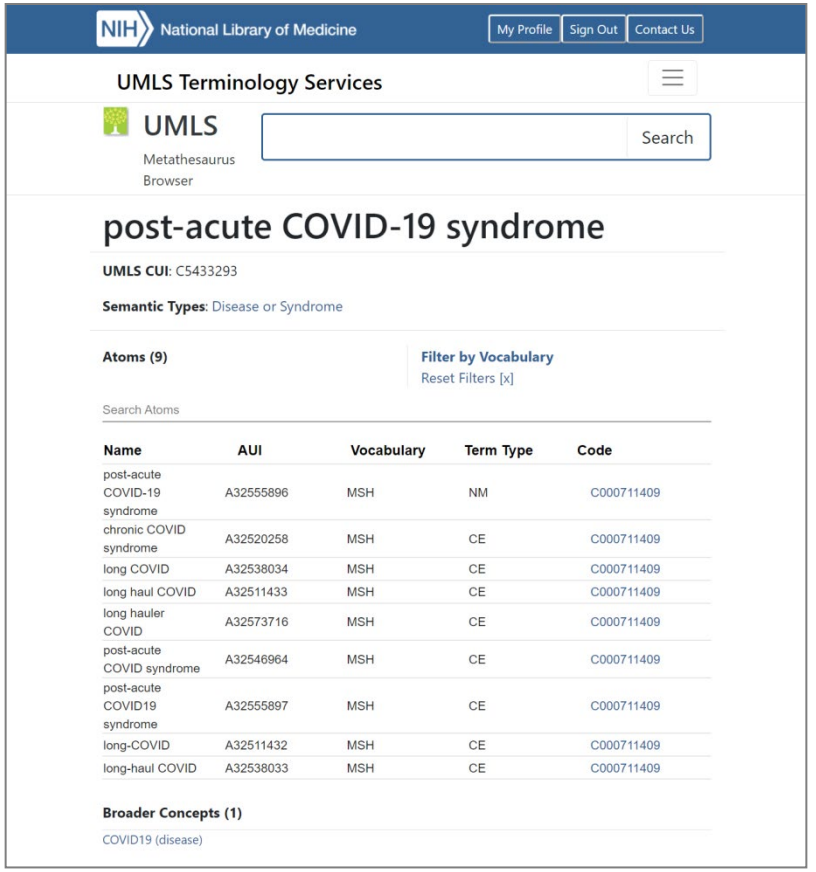
Created in 1986, the National Library of Medicine's (NLM) Unified Medical Language System® (UMLS) integrates and distributes key terminology, classification and coding standards, and associated resources to promote creation of effective and interoperable biomedical information systems and services, including electronic health records. It is a set of files and software that brings together many health and biomedical vocabularies and standards to enable interoperability between computer systems. For the past 30 years, researchers, health care providers, industry/vendors, and others have utilized the terminological resources of the UMLS in various applications of natural language processing, text processing, search retrieval, data extraction, and other applications. With recent advancements and improvements (e.g., artificial intelligence, AI) in computer processing, NLM is reviewing the computational infrastructure of the UMLS to consider how to improve its efficiency and utility, and to support modern use cases.

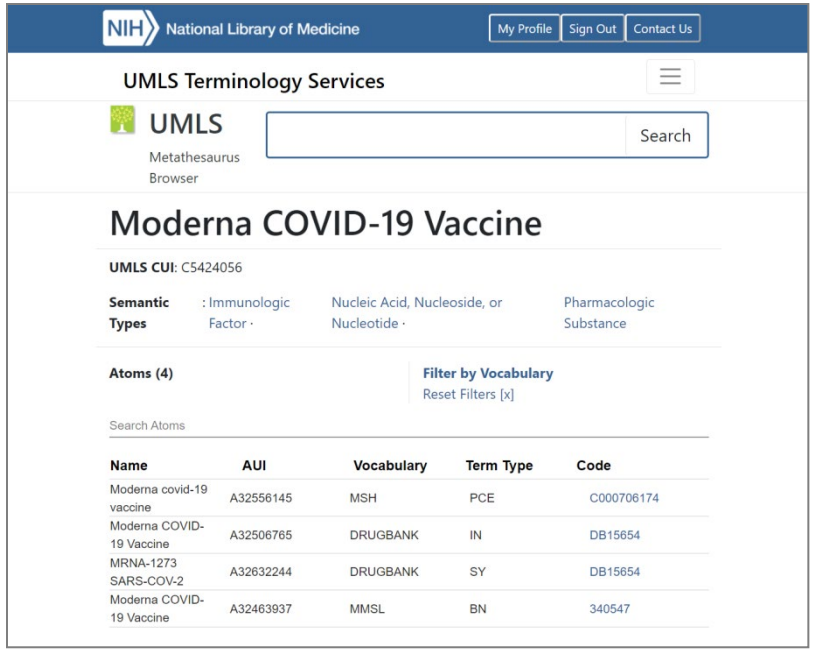
ks stakeholder input on how to improve the UMLS. Additionally, NLM will conduct at least binar that presents proposed ideas for improving UMLS. The input received from these NLM in the development of future versions of the UMLS.



UMLS in Action: Support for COVID-19







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