ICD 11
Revision Update

NCVHS

February 21, 2008

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ICD-11 Revision Steering Group Chair

World Health Organization

Professor and Chair, Biomedical Informatics

Mayo Clinic

ICD-11 Use Cases

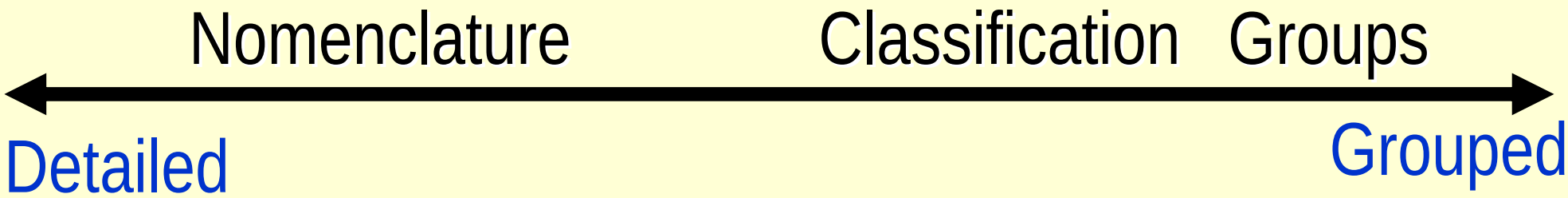
- Morbidity and Mortality public health reporting
- Scientific consensus as high-level clinical phenotypes
- Patient data characterization for clinical and research applications
- Primary Care

ICD-11 Revision Goals

- Evolve an ontologically coherent classification
- Linked logically to underpinning terminologies (e.g. SNOMED, GO)
- Rubrics “defined” by aggregation logics of associations and details
- Human language definitions will be explicit
- Incorporate genomic disease definitions
- Maintain longitudinal consistency through linear derivatives

Familiar Points Along Continuum
Modern Health Vocabularies

- Nomenclature – Highly Detailed Descriptions (SNOMED)
- Classification – Organized Aggregation of Descriptions into a Rubric (ICDs)
- Groupings – High Level Categories of Rubrics (DRGs)



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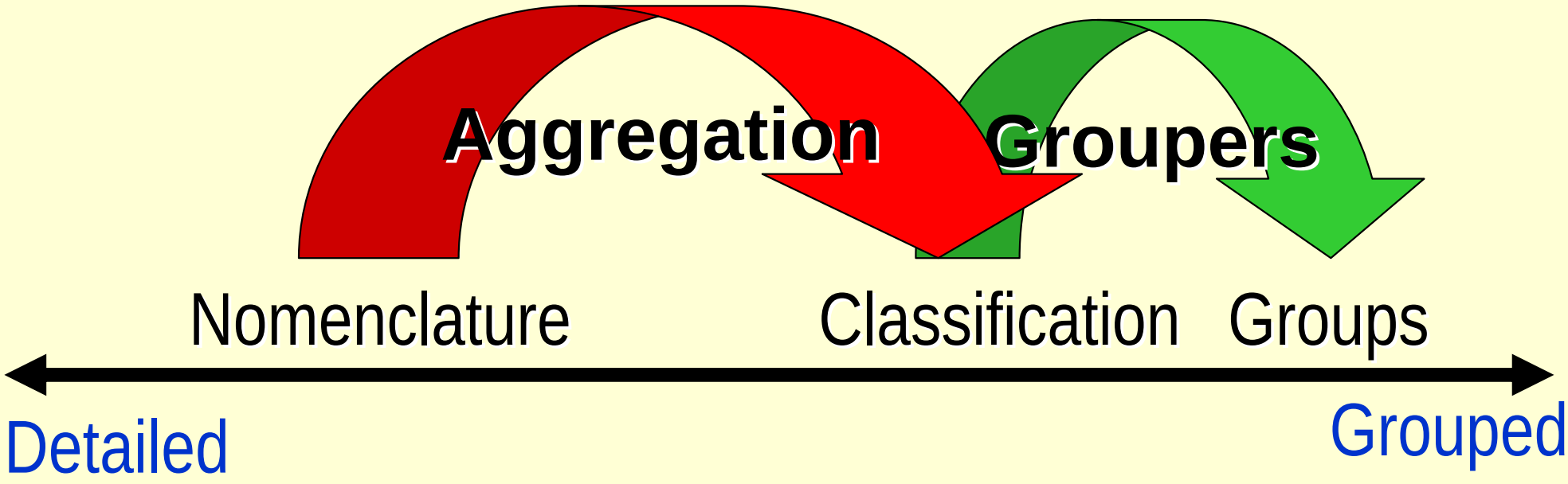
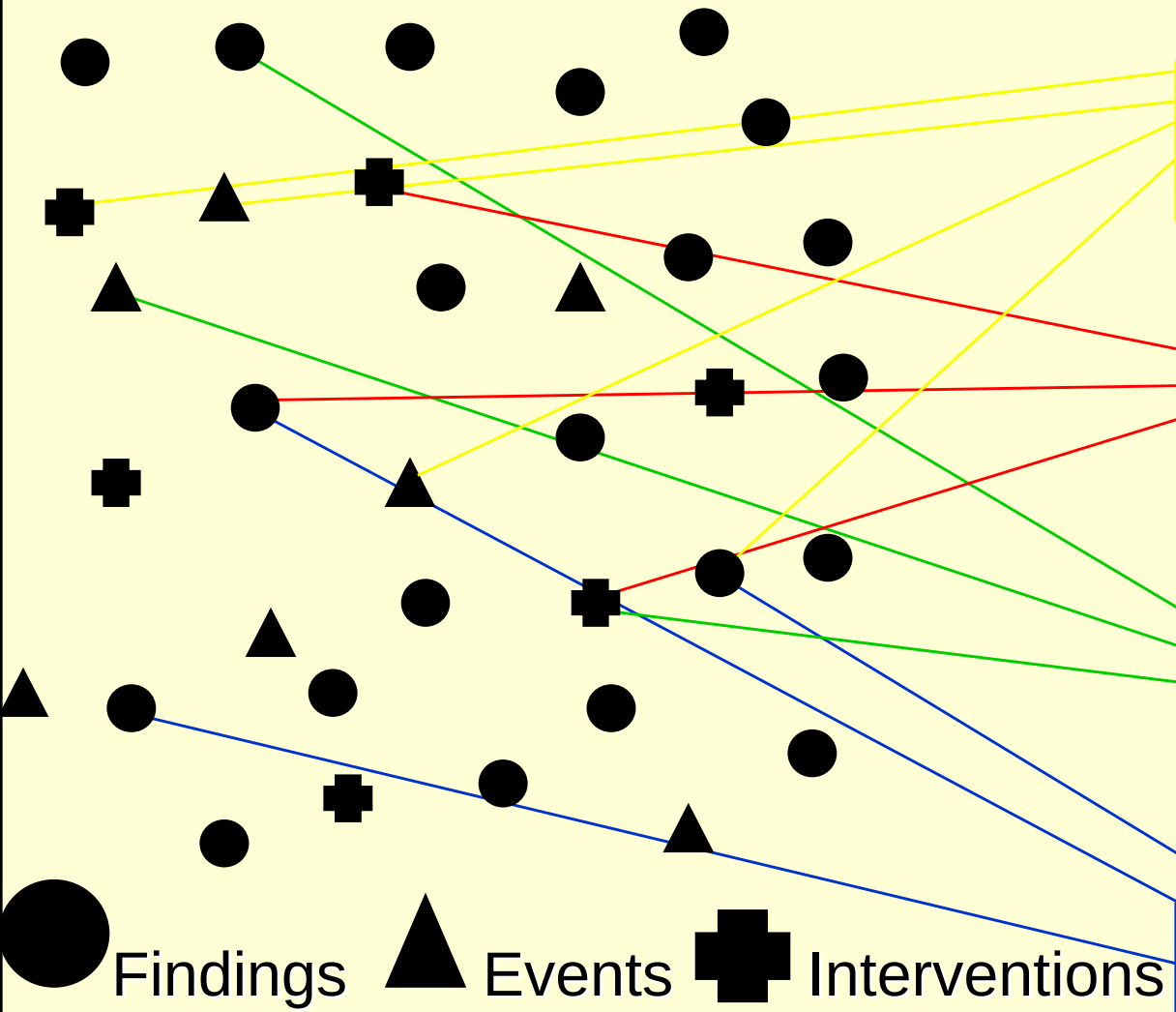
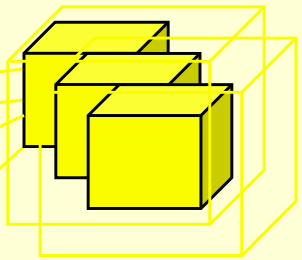
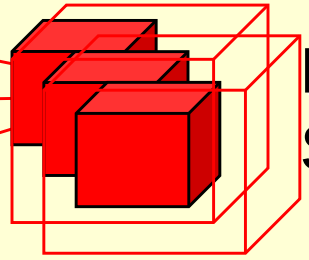


Aggregation Logics by domain rule-based aggregations

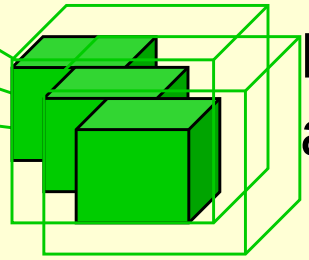




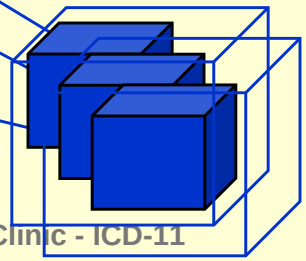
Decision Support and Error Detection



Public Health and Surveillance



Reimbursement and Management

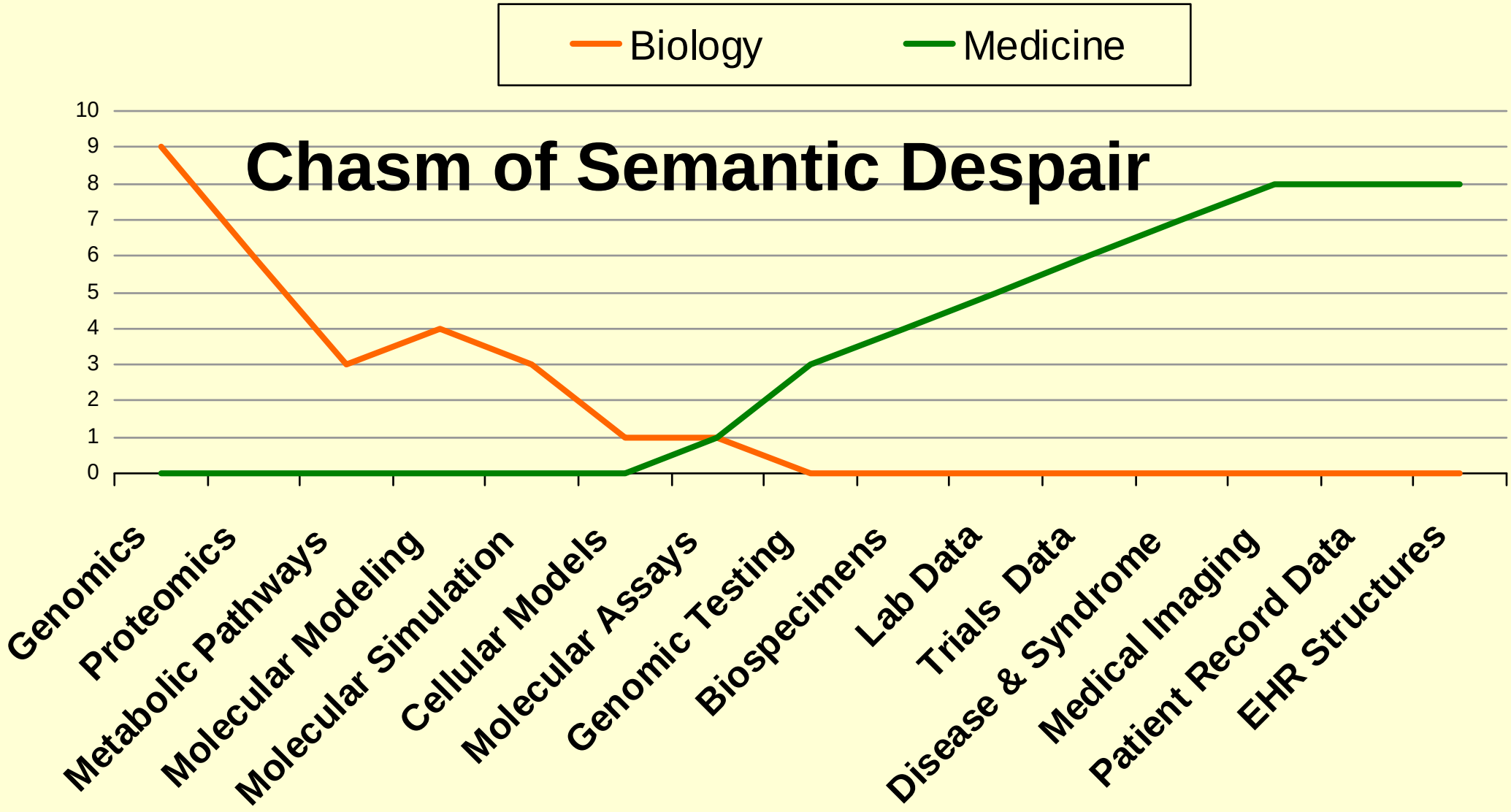


Outcome Research and Epidemiology

The Genomic Era

- The genomic transformation of medicine far exceeds the introduction of antibiotics and aseptic surgery
- The binding of genomic biology and clinical medicine will accelerate
- The implications for shared semantics across the basic science and clinical communities are unprecedented

The Continuum Of Health Classification
Biology meets Clinical Medicine



WHO

Highly Aggregated

Fine Detail

Molecular

Clinical

Molecule

Amino Acid

Nucleotide

Lysine

Amino Acid Sequence

Protein

has translation

Peptide

Enzyme

Immunoglobulin

IgE

TPMT

HNMT

Thr105Ile allozyme

Immunology

Anatomy

Disease

Airway

Nose

Lung

Pulmonary Disease

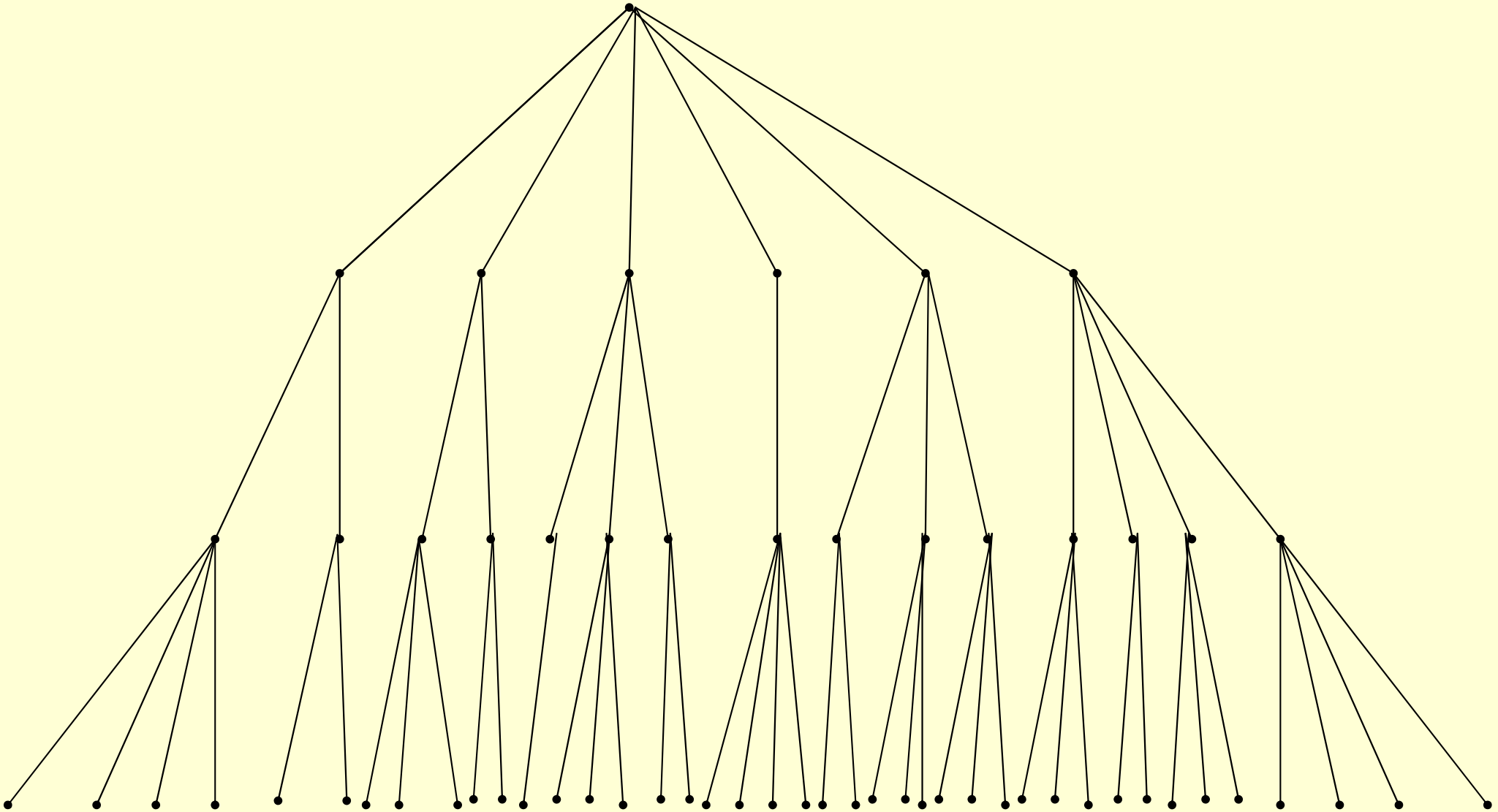
Nasal Disease

allergic rhinitis

asthma

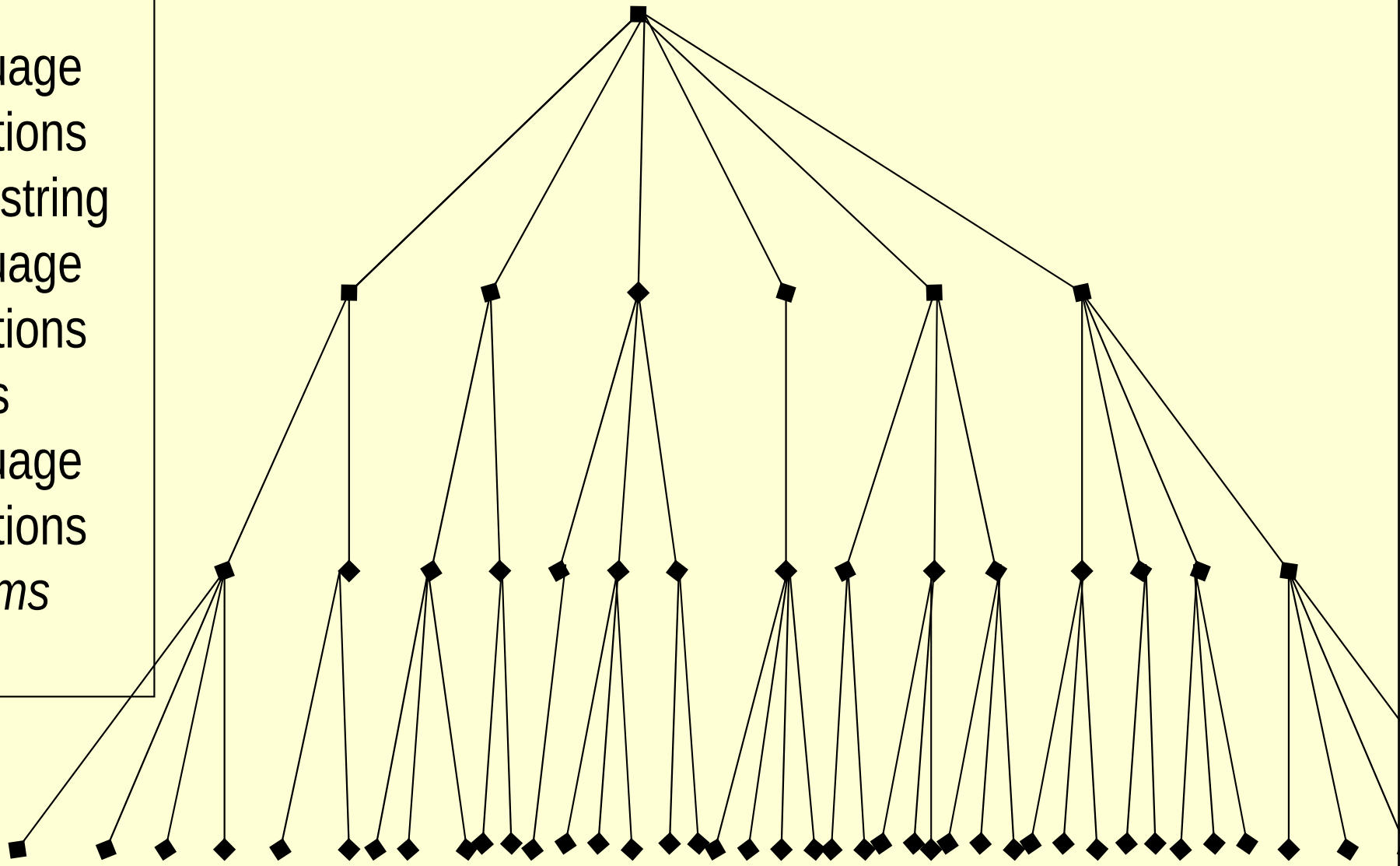
pneumonia

Traditional Hierarchical System
ICD-10 and family



Addition of structured attributes to concepts

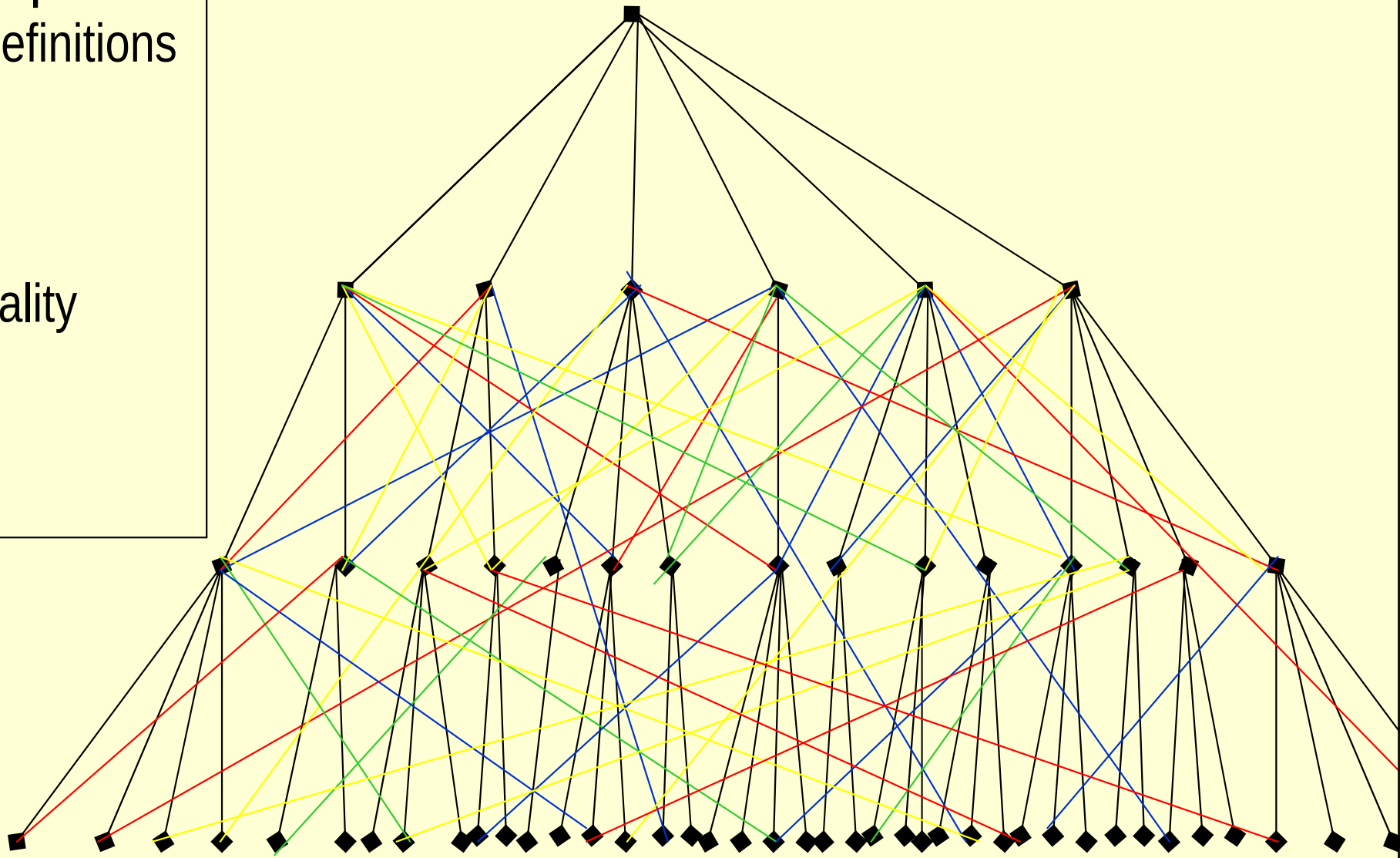
Concept name
- Definition
  - Language translations
- Preferred string
  - Language translations
- Synonyms
  - Language translations
- *Index Terms*



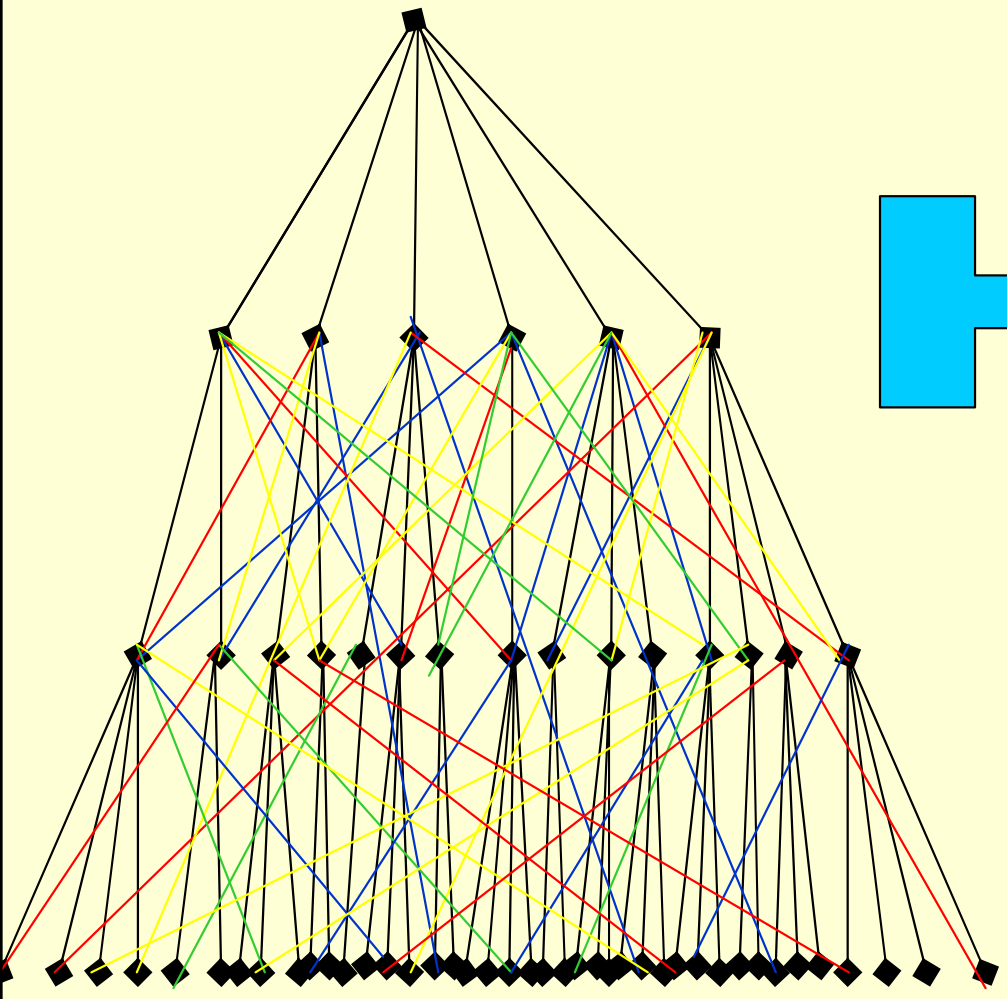
Addition of semantic arcs - Ontology

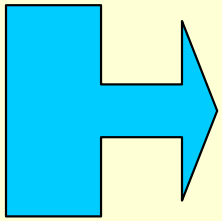
Relationships

- Logical Definitions
- Etiology
- Genomic
- Location
  - Laterality
- Histology
- Severity
- Acuity



Serialization of “the cloud” Algorithmic Derivation





[–] ICD10WHO
[–] ICD10 Certain conditions originating in the perinatal period (CHAPTER XVI)(P00-P96)
[–] ICD10 Birth trauma(P10-P15)
[–] ICD10 Birth injury to peripheral nervous system(P14)
[+] ICD10 Birth injuries to other parts of peripheral nervous system(P14.8)
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[+] ICD10 Phrenic nerve paralysis due to birth injury(P14.2)
[–] ICD10 Birth injury to scalp(P12)
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[+] ICD10 Other intracranial lacerations and haemorrhages due to birth injury(P10.8)
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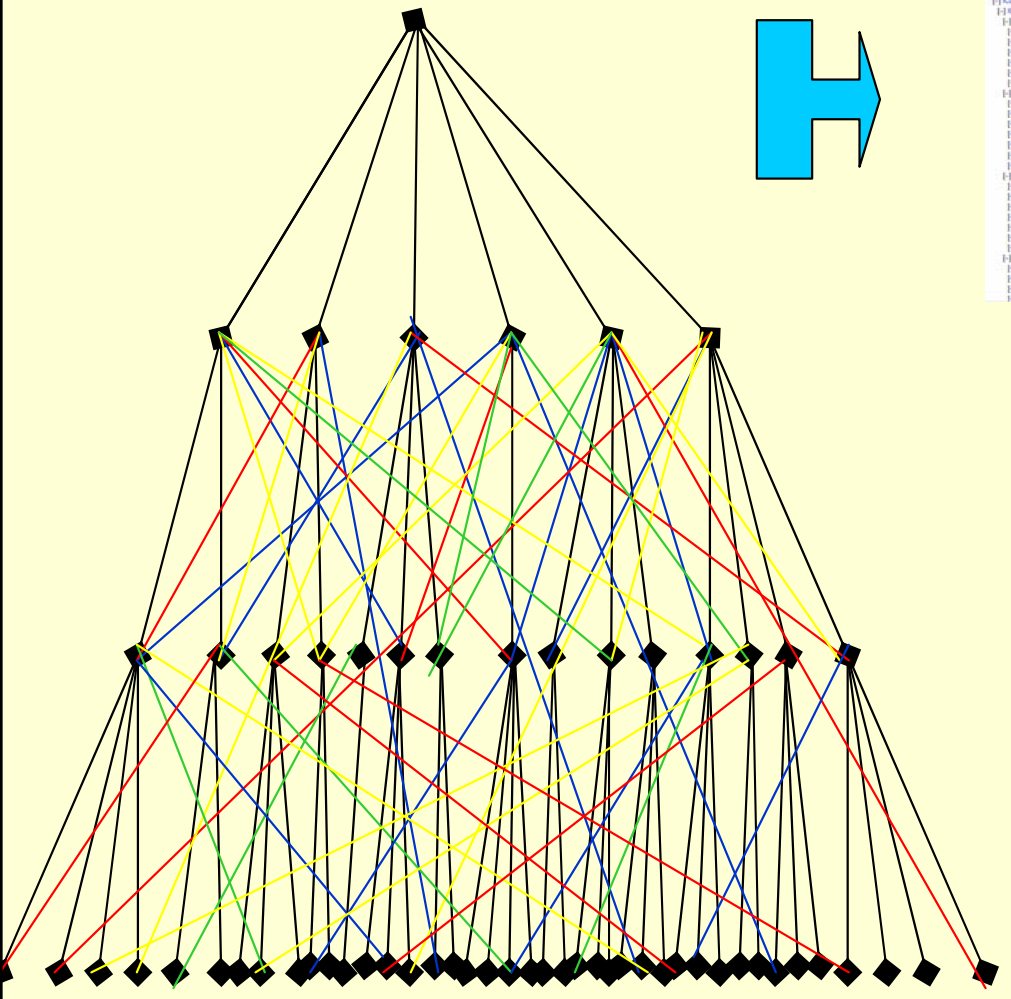
Linear views may serve multiple use-cases Morbidity, Mortality, Quality, …



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Task

- Distributed editing of a complex information resource (aka ICD family members)
- Intuitive and simple user interface
- No cost to users; open source resources
- Low-profile application; thin-client (web based)
- Capacity to set hierarchy of permissions

WHO

	ICD-10 Plus	ICD-11 draft	ICD Terminology
Application	**ICD-10 +** **WEB Application**	**Hi-Ki** **Joint-authoring Tool** **WIKI like application**	**Protégé/OWL** **LEXGRID**
Key Tasks	• **Clinical Modification Owners** enter their **CM** version Codes • **TAG** and **Workgroups** enter proposals	• **TAG Experts for ICD-11** • **WHO editors** •Taxonomic rules •Definitions •Diagnostic criteria	• **Ontology Model** • **Linkages between ICD and:** - SNOMED - Other ontology & terminologies • **Clinical interface algorithms**
Access	•ANY USER can **POST** proposals or comments. •ANY USER can **REVIEW** other proposals and discuss.	• **ALL USERS** can see drafts and comment.	•**ALL USERS** can see drafts and comment
Technical Layer	ICD-10 + - Proposals - Comments - Discussions - Evidence	ICD-11 - Comments - Discussions - Evidence	ICD Ontology - Entities - Attributes - Linkages

Dr. T. Bedirhan Üstün

Second Phase Requirements

1. Robust back-end for content
   - Capable of appropriate exports (e.g. ClaML)
2. Description Logic capability
3. Aggregation Logic (rule) support
4. Leverage industry and community standards
   - Semantic Web, DL, open-source tools
5. Integrate with existing terminologies
   - IHTSDO, Gene Ontology, LOINC,

Implies Suite of ICD 11 Development Tools

- Light-weight distributed editor
- Robust DL capable editor
- Robust persistence (storage) layer
  - Archival Back-end
  - Formats for input/output
    - RDF, XLM, ClaML, OWL, HL7, CSV (Excel), etc.
  - Interlinkage with Terminology content
- Workflow management
  - Workflow status

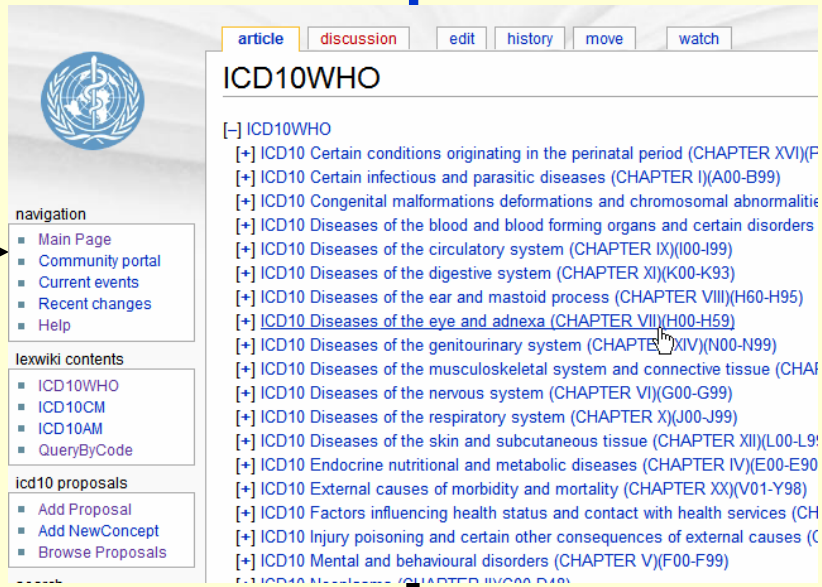
Tool Collaboration
Open-source distributed authoring

- Mayo Clinic, Division of Biomedical Informatics
- Apelon – terminology consultants
- NCI – National Cancer Institute
  - caBIG – Bioinformatics Grid
  - NCI Thesaurus development task
- Stanford – Biomedical Informatics Research
  - Developers of Protégé and Collaborative Protégé
  - National Center for Biomedical Ontologies

ICD 11 Editing Process in Development

ICD in LexGrid

Export and Load



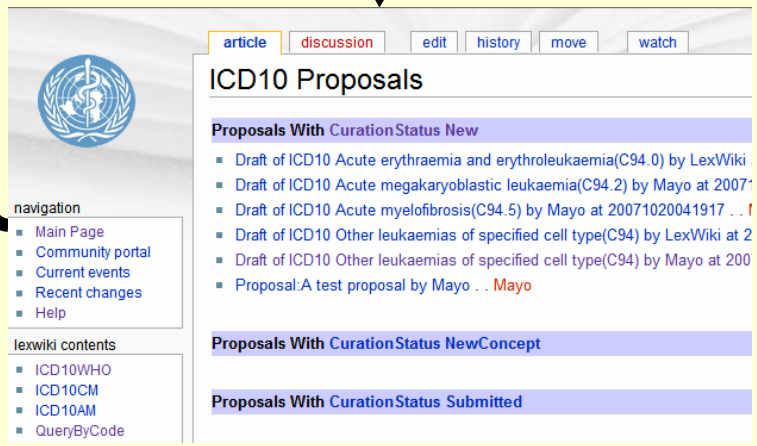
Review and select

OWL RDF dump

OWL DL Collaborative Protégé

HL7/ISO format

Change Sets



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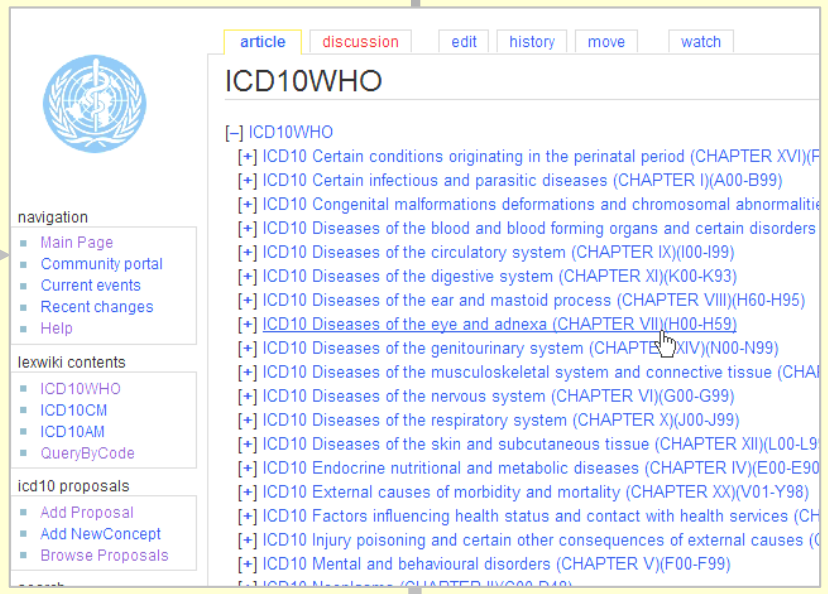

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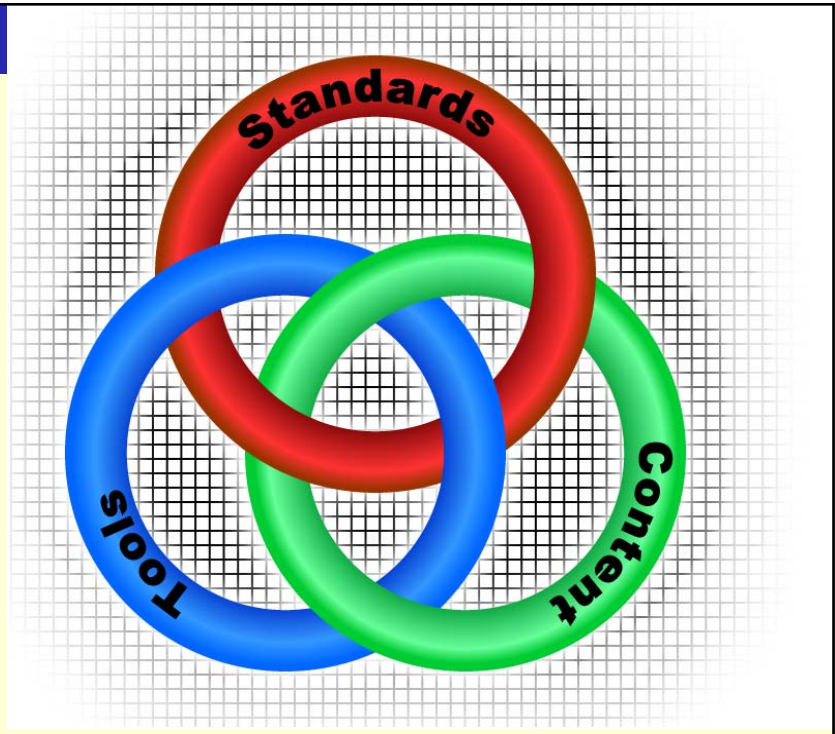
LexGrid Ontology Services as *Backend*



- HL7 ANSI Standard
- ISO DIS
- Open specification & source
- *Provide consistency and standardization required to support large-scale vocabulary adoption and use*
  - Common ***model***, tools, formats, and interfaces
- Standard terminology model (Excel to OWL)
- Grid-nodal architecture
- http://informatics.mayo.edu

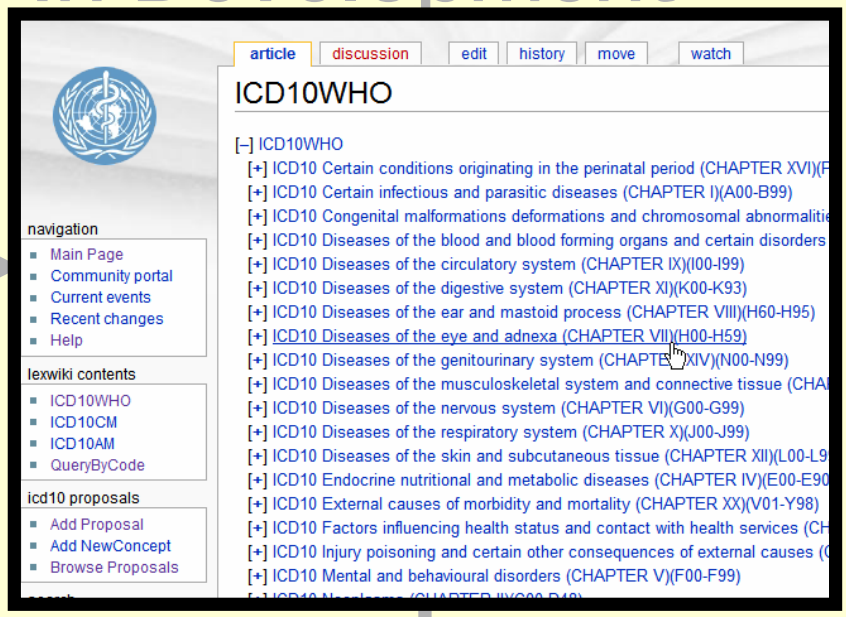
LexGrid aspects relevant to ICD-11

- Support for formal definitions, synonyms
- Standards-based import and export
- Supports multiple languages
  - Using 16-bit character sets (Asian languages)
- Cross-linking across codes systems
  - Terminology to classification linkage
- Can hold logic rules
  - OWL Description Logic style relationships
  - Can contain “coding rules,” index, entry points,…
- Capacity to serve as central archive
  - Support nodal replication, synchronization

ICD 11 Editing Process in Development

ICD in LexGrid

Export and Load



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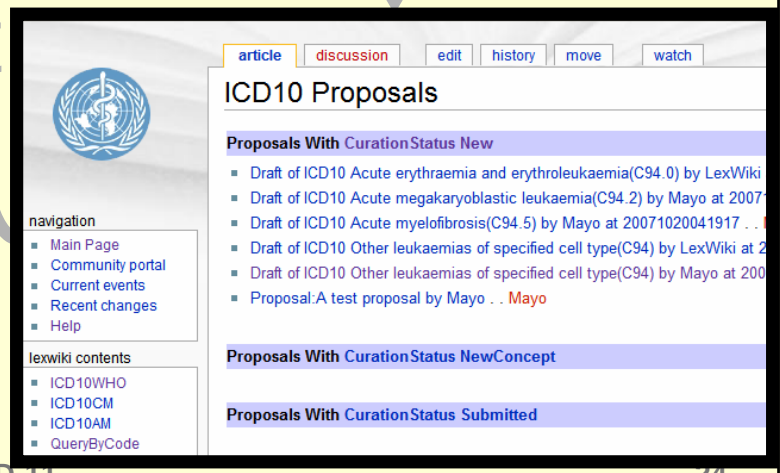


Wiki
Basis for *Light-weight editor*

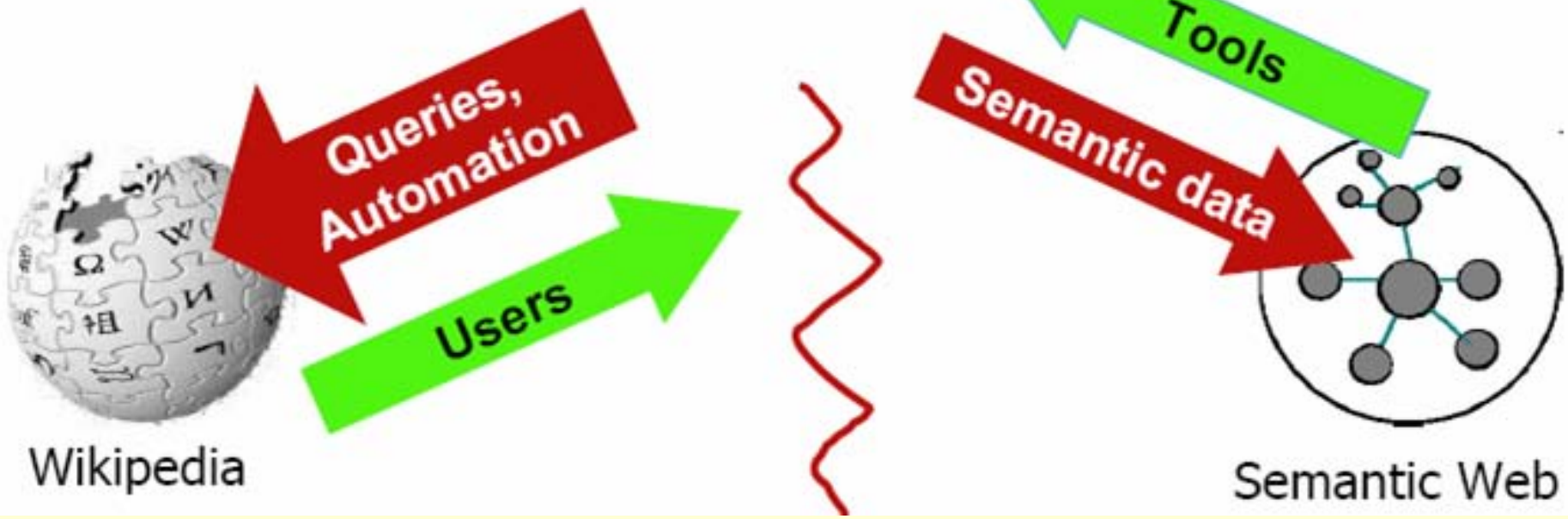
- The largest and most successful “social computing” project in history
- Tools and resources to permit huge communities to asynchronously author and edit complex resources
- Computer engineering of impressive capacity
  - Wikipedia manages >12,000 hits/second
  - Includes transactional edits

W3C Semantic Web

- Explosion of methods, standards, tools
- Transform the practicality of complex concept management
  - XML – simple, interoperable syntax
  - RDF – simple data structure for semantic content
  - OWL – ontology authoring and interchange

Goal: Marrying Wikipedia and the Semantic Web

- Wikipedia has many [illegible]s and [illegible],
  but: many manual pr[illegible] text-based search
- Semantic W[illegible] [illegible]ation processing,
  sophisticated [illegible]
  but: few data



From:

LexWiki ICD

search

Go Search

navigation

- Main Page
- Community portal
- Current events
- Task List
- Recent changes
- Help

icd10 classifications

- ICD10WHO
- ICD10CM
- ICD10AM
- QueryByCode

icd10 proposals

- Add Proposal
- Add NewConcept
- Browse Proposal
- By CurationStatus

toolbox

- What links here
- Related changes
- Upload file
- Special pages
- OntologyBrowser

LexWiki

(Redirected from Main Page)

Leave a comment ...

ICD10+ Collaborative Revision Platform

This is a ICD10+ collaborative content development platform based on Semantic MediaWiki.

See Quick Start Guide - A walk through the wiki and workflow process

ICD10 Classifications

- ICD10WHO - The Second Edition of the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10).
- ICD10CM - The 2007 release of International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM).
- ICD10AM - The Fifth Edition of International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM).

LexWiki SandBox

Users may play here to get familiar with ICD10 content representation and proposal creation. See Help Page.

[+] SandBox ICD10 Other leukaemias of specified cell type(C94)

User Scenarios and Usability

- User Scenarios - a page to describe the potential user roles and general user scenarios.
- ICD Collaborative Platform Integration - a collaborative effort for integration of the LexWiki with the WHO ICD Revision Platform .
- LexWiki Feature Request - a page to add your feature request.

testGraph

Getting started with Wikis

LexWiki ICD

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ICD10CM

This 2007 release of the **International Classification of Diseases, 10th revision, Clinical Modification (ICD-10-CM)** is being published by the United States Government in recognition of its responsibility to promulgate this classification throughout the United States for morbidity coding. **The International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10),** published by the World Health Organization (WHO), is the foundation of ICD-10-CM. [From ICD-10-CM PREFACE, July 2007 Release]

[–] ICD10CM
- [+] ICD10CM Accidents(V00-X58)
- [+] ICD10CM Certain conditions originating in the perinatal period (CHAPTER 16)(P00-P96)
- [+] ICD10CM Certain infectious and parasitic diseases (CHAPTER 1)(A00-B99)
- [+] ICD10CM Congenital malformations deformations and chromosomal abnormalities (CHAPTER 17)(Q00-Q99)
- [+] ICD10CM Diseases of the blood and blood forming organs and certain disorders involving the immune mechanism (CHAPTER 3)(D50-D89)
- [+] ICD10CM Diseases of the circulatory system (CHAPTER 9)(I00-I99)
- [–] ICD10CM Diseases of the digestive system (CHAPTER 11)(K00-K93)
  - [+] ICD10CM Diseases of appendix(K35-K38)
  - [+] ICD10CM Diseases of esophagus stomach and duodenum(K20-K31)
  - [–] ICD10CM Diseases of liver(K70-K77)
    - [+] ICD10CM Alcoholic liver disease(K70)
    - [+] ICD10CM Chronic hepatitis not elsewhere classified(K73)
    - [+] ICD10CM Fibrosis and cirrhosis of liver(K74)
    - [+] ICD10CM Hepatic failure not elsewhere classified(K72)
    - [+] ICD10CM Liver disorders in diseases classified elsewhere(K77)
    - [+] ICD10CM Other diseases of liver(K76)
    - [+] ICD10CM Other inflammatory liver diseases(K75)
    - [+] ICD10CM Toxic liver disease(K71)
  - [+] ICD10CM Diseases of oral cavity and salivary glands(K00-K14)

Proposed Hierarchy of Wiki Authority by ICD Domain (not implemented)

0 Revision Steering Committee

1 Revision Domain/Topic Working Groups & WHO-FIC Network

2 Accredited Experts

- Designated by Working Group Members & WHO-FIC Network

3 Accredited Persons

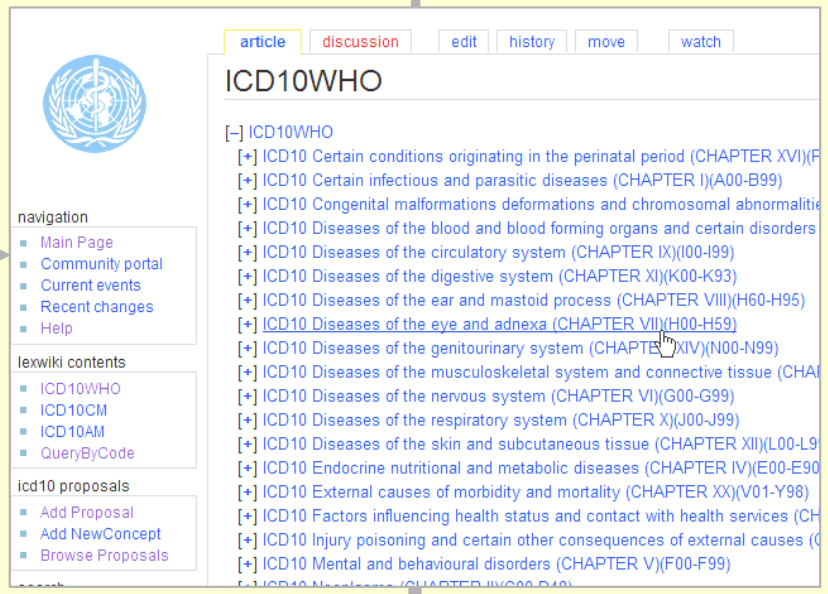
- Designated by Experts

4 Registered Interested Persons (Public)

ICD 11 Editing Process in Development

ICD in LexGrid

Export and Load



Review and select

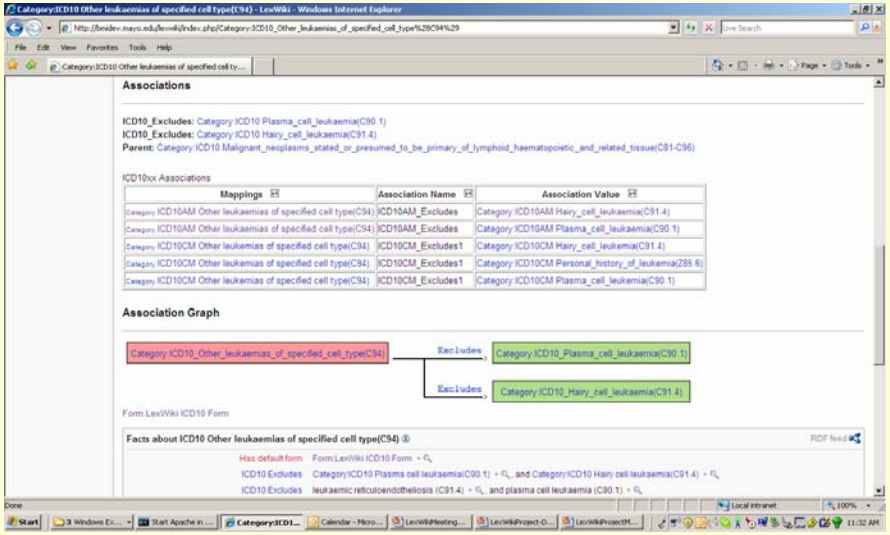
OWL RDF dump

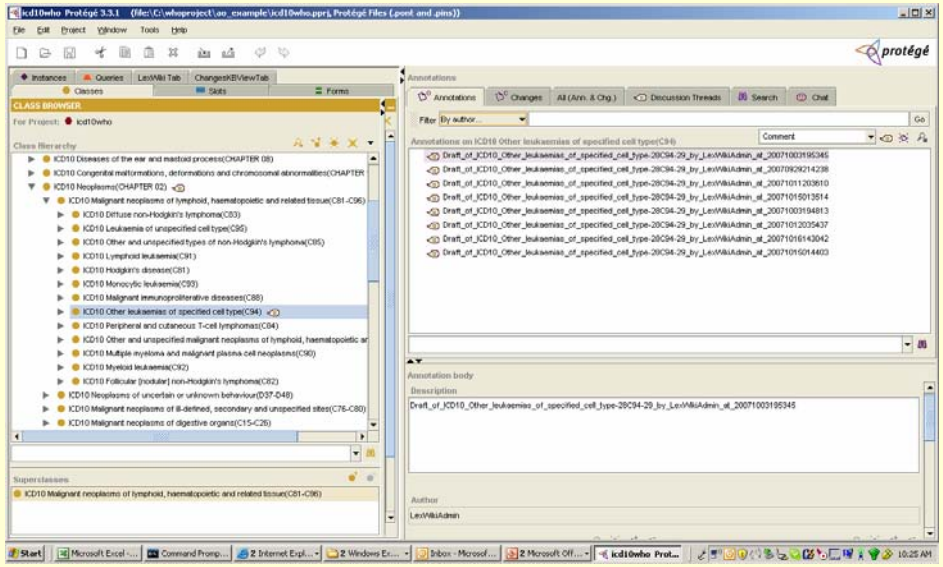
OWL DL Collaborative Protégé

HL7/ISO format

Change Sets

Changeset Model by Annotation Ontology (Protégé/LexWiki Interface)

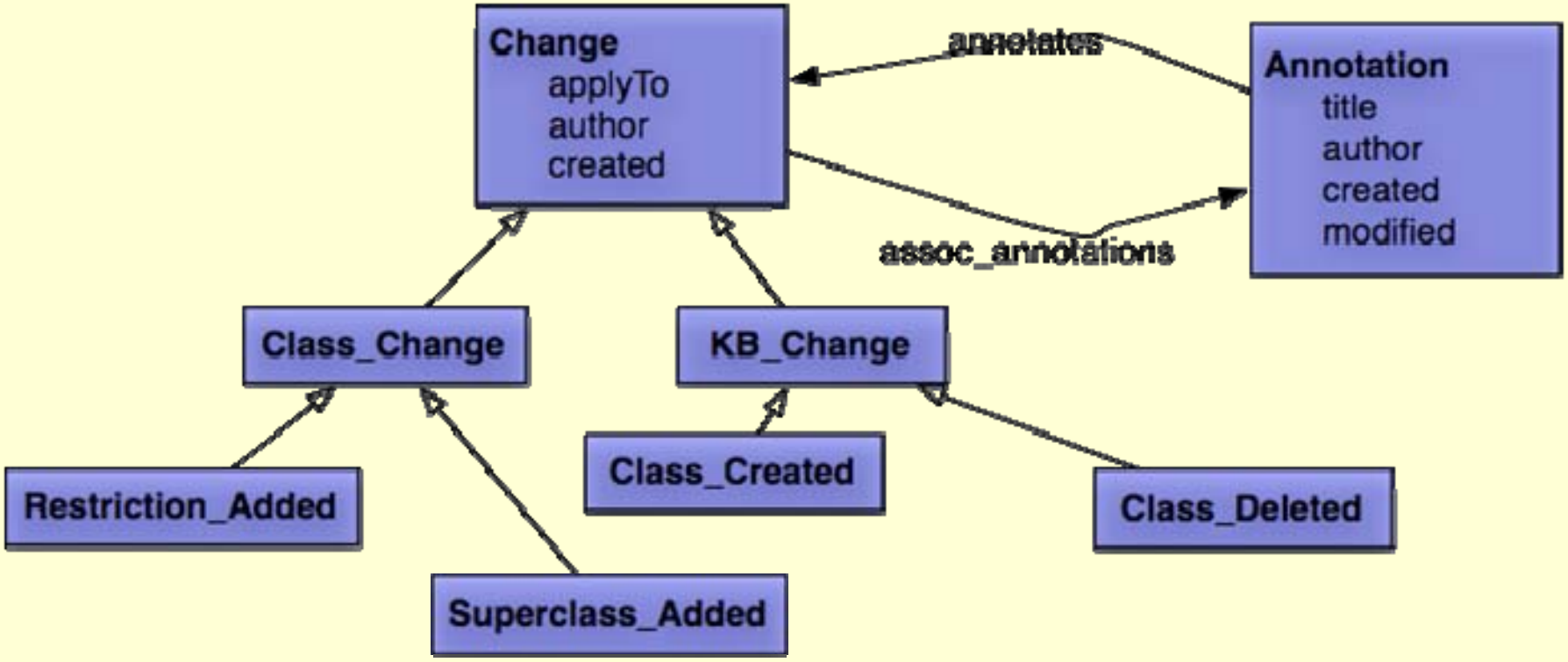




Portable ChangeSet
In RDF format

Export/Load Change Set
Into Collaborative Protege

ChAO: Change and Annotations Ontology

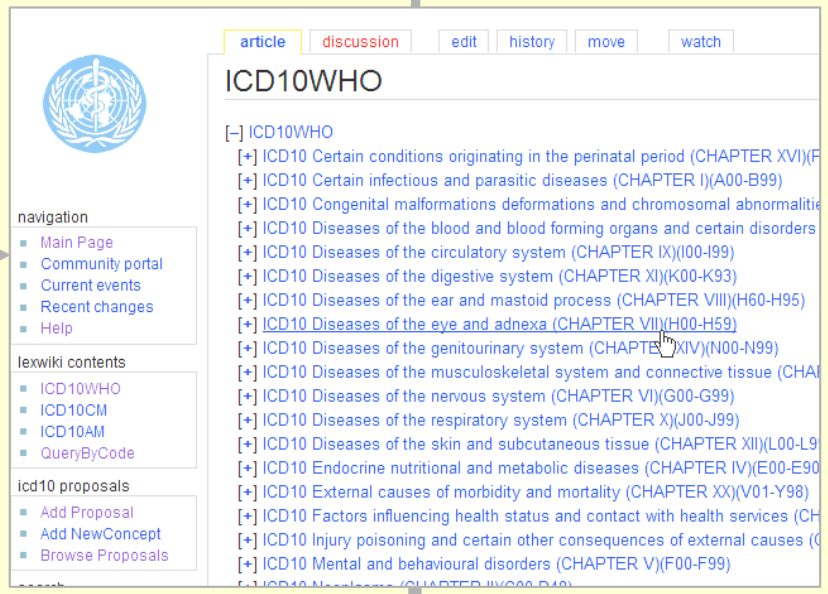


N. Noy, A Framework for Ontology Evolution in Collaborative Environments, ISWC06

ICD 11 Editing Process in Development

ICD in LexGrid

Export and Load



Review and select

OWL RDF dump

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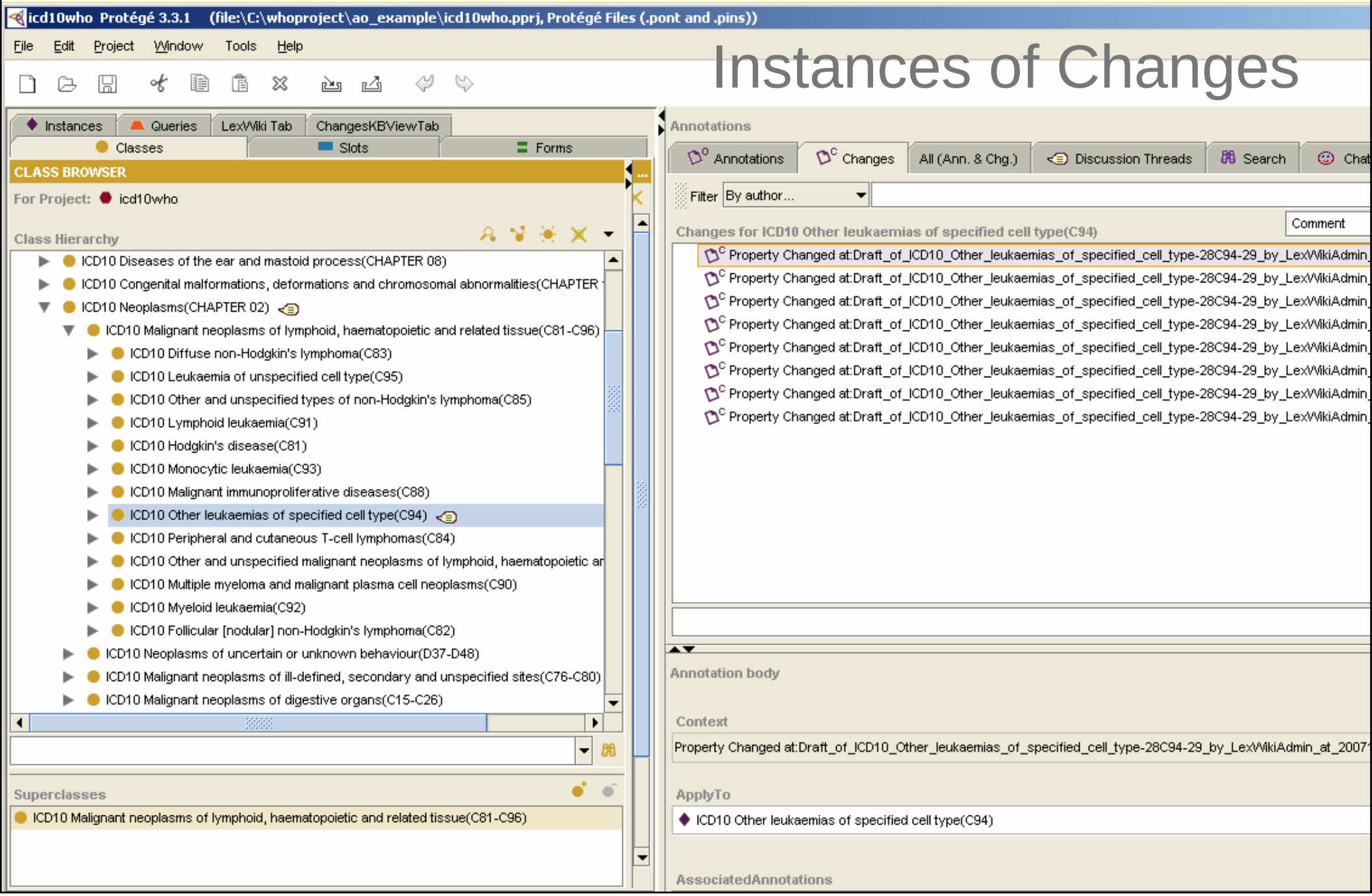
HL7/ISO format

Change Sets

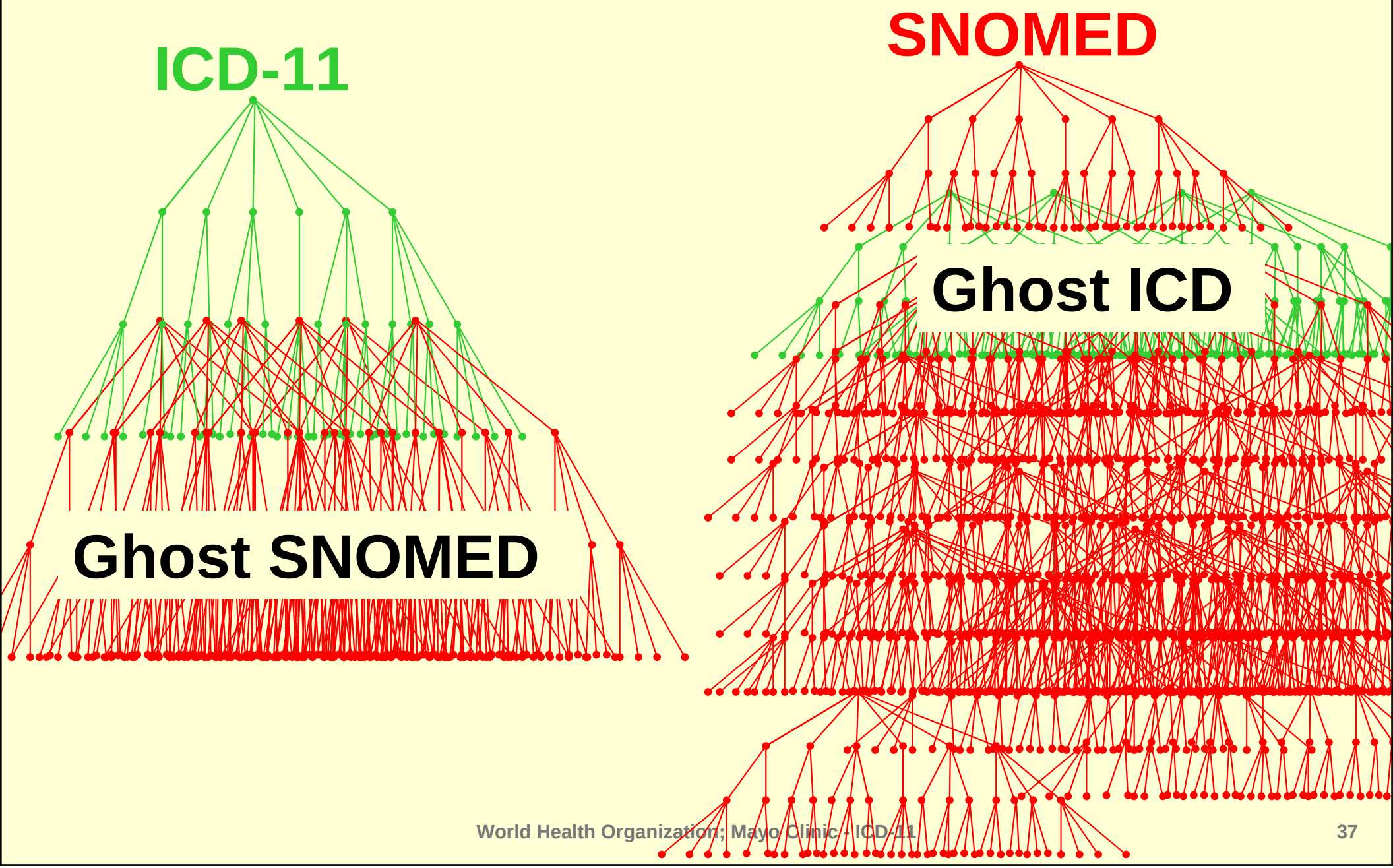
Authoring Support in Collaborative Protégé



Discussions with IHTSDO International Health Terminology (IHT)

- IHT (SNOMED) will require high-level nodes that aggregate more granular data
  - Use-cases include mutually exclusive, exhaustive,…
  - Sounds a lot like ICD
- ICD-11 will require lower level terminology for aggregation logic definitions
  - Detailed terminological underpinning
  - Sounds a lot like SNOMED

Potential Future States



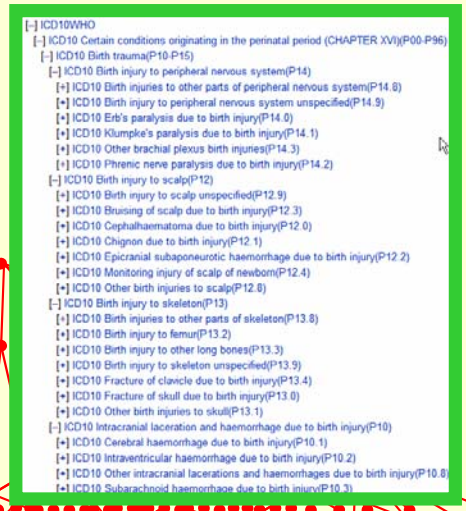
WHO

Joint Alternate Future Effort

ICD-11

ICD-IHTSDO

SNO



Advantages to Collaboration

- Both organizations avoid “Ghost” emulations
- Both organizations leverage expertise and content
  - More resources brought to the table
- Both organizations retain independent intellectual property and derivatives (e.g. Linear formats of ICD-11)
- Mappings become moot
  - Aggregation of SNOMED is definitional to ICD

Caveat
ICD and IHTSDO

- No agreements have been finalized
- Intellectual property sharing is expected
- Shared tooling is being discussed
- Harmonization Board has been proposed

WHO and NCHS statement April 2007

WHO has announced the beginning of the process to develop the 11th Revision of the International Classification of Diseases – ICD-11 – expected to be completed in 2015. The NCHS, maintainers of the ICD-9-CM and producers of the ICD-10-CM, welcome this new initiative, and agreed with the leadership of the ICD-11 revision on the implications for ICD-10-CM introduction in the United States.

ICD-11 and ICD-10CM – 1 of 2

- ICD-11 will be built upon a robust ontological framework, with definitional linkages to underlying terminologies such as SNOMED CT.
- ICD-10-CM development will migrate to the technical platform used in the development of ICD-11, benefiting from the state-of-the-art informatics environment.
- The new ICD-11 Revision will be informed by the clinical modifications of WHO Collaborating Center members, including ICD-10-CM.

ICD-11 and ICD-10CM – 2 of 2

- NCHS will work closely with the ICD-11 Revision Committee to ensure the gradual evolution of ICD-10-CM to ICD-11 content through the regular updating of ICD-10-CM; this will avoid a disruptive transition to ICD-11 some time after 2015.
- Transitioning to ICD-10-CM will provide a mechanism for tightening the linkages between classification and their applications in electronic medical records, with broad implications for improving patient quality, safety, public health surveillance, and the adoptions of clinical best practices