Terminologies and Classifications Health Data Interoperability and the ICD

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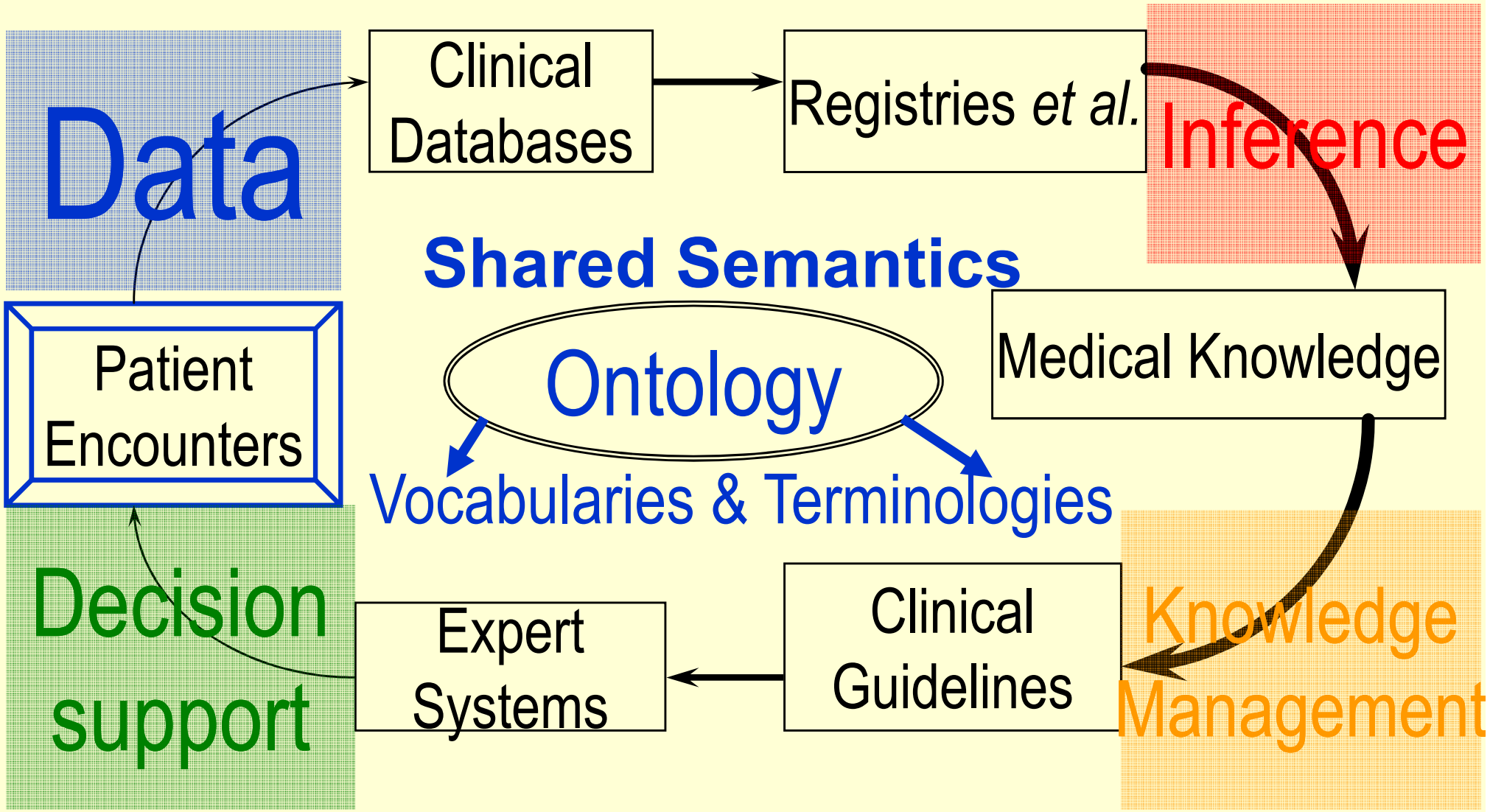
10th International HL7 Interoperability Conference
Kyoto, May 2009

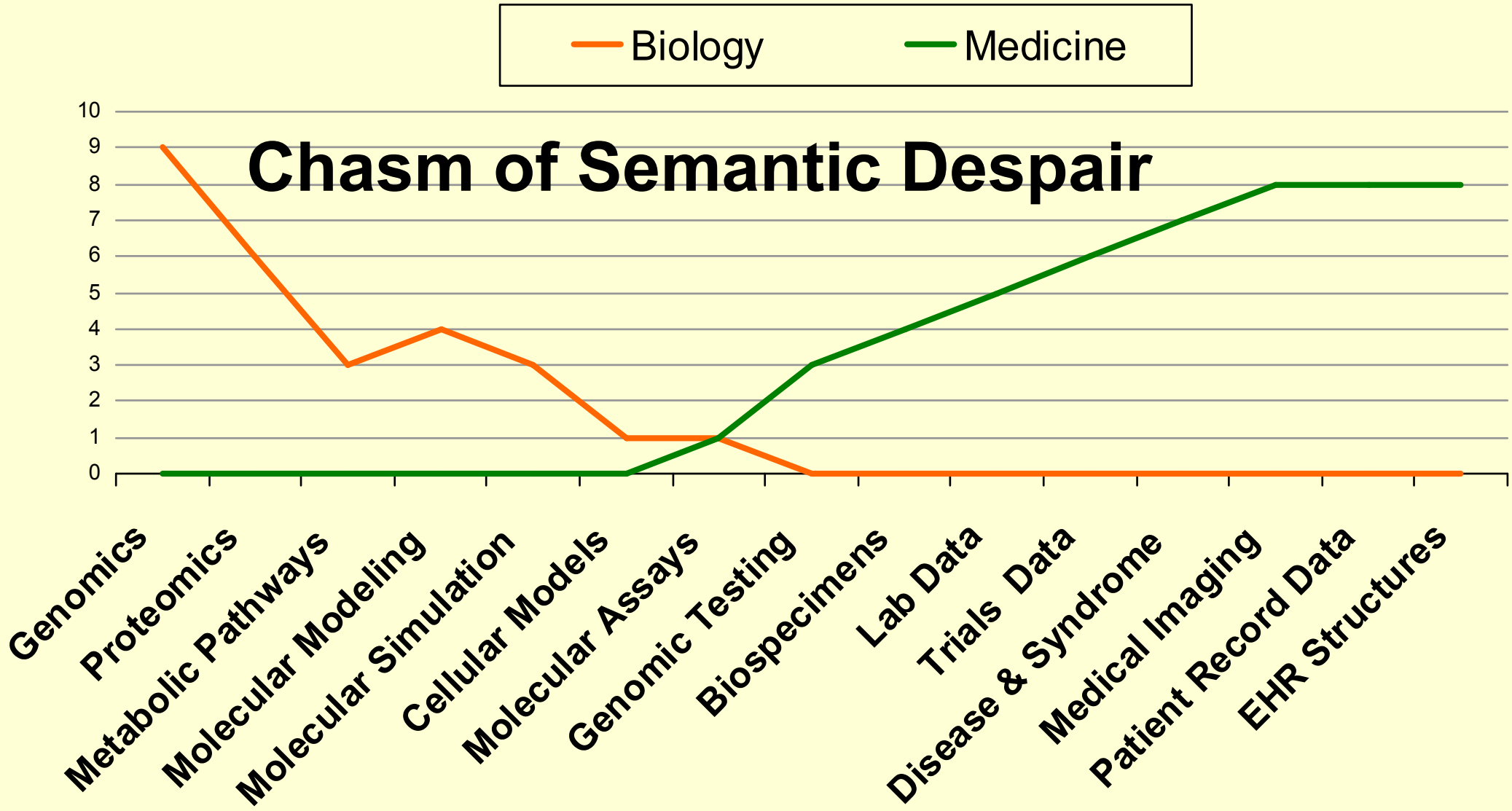
From Practice-based Evidence to Evidence-based Practice



Blois, 1988
Medicine and the nature of vertical reasoning

- Molecular: receptors, enzymes, vitamins, drugs
- Genes, SNPs, gene regulation
- Physiologic pathways, regulatory changes
- Cellular metabolism, interaction, meiosis,…
- Tissue function, integrity
- Organ function, pathology
- Organism (Human), disease
- Sociology, environment, nutrition, mental health…

The Continuum Of Biomedical Informatics
Bioinformatics meets Medical Informatics



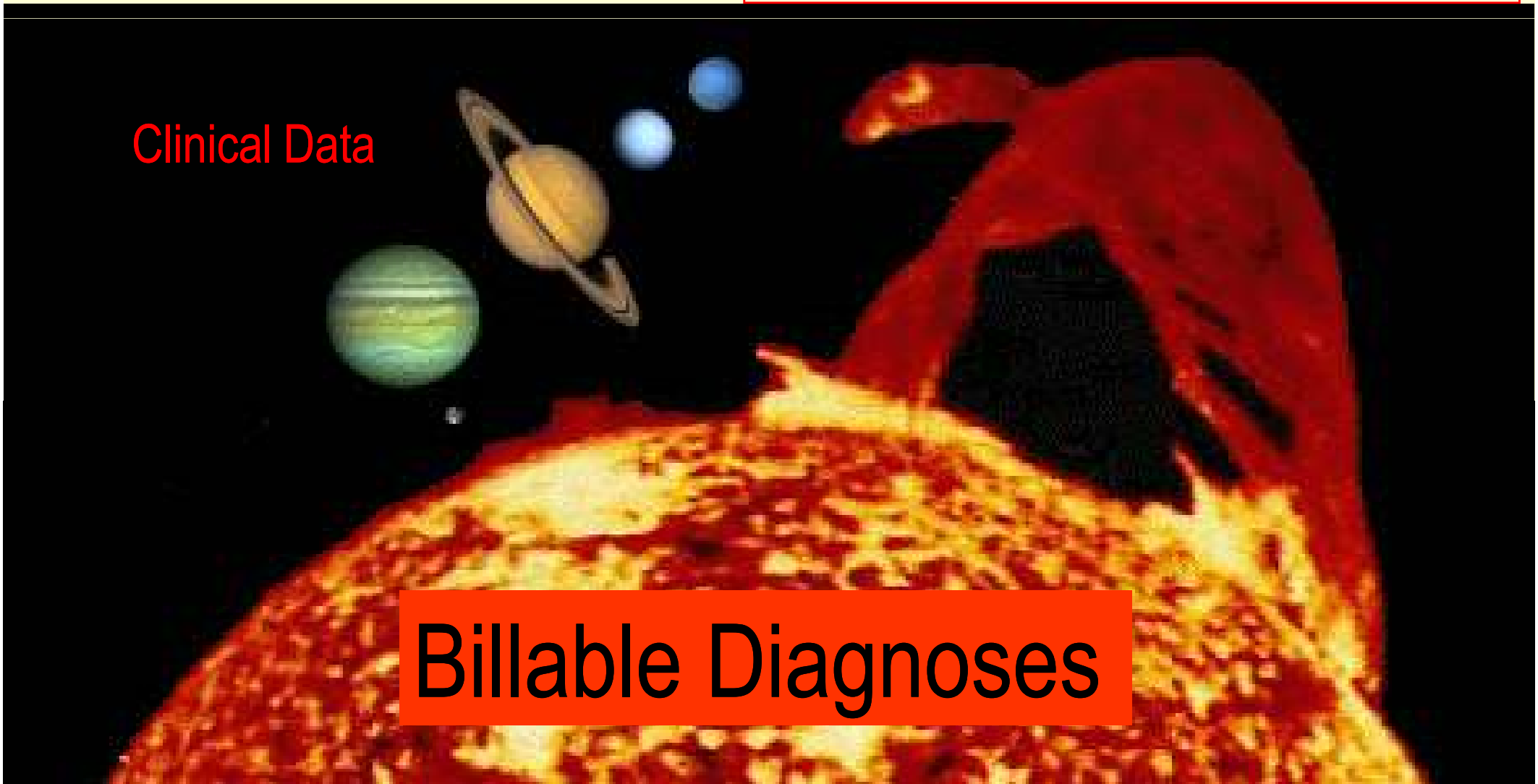
Whither Phenotype?
Spans spectrum from enzymes to disease

- Pharmacogenomics – enzyme functionality
- Physiologist – cellular function
- Systems biologist – pathway circuit flow
- Sub-specialist – organ functioning
- Patient/Clinician – disease manifestation
- Public Health – population characteristics

Highly specific to use-case context

The Historical Center of the Health Data Universe

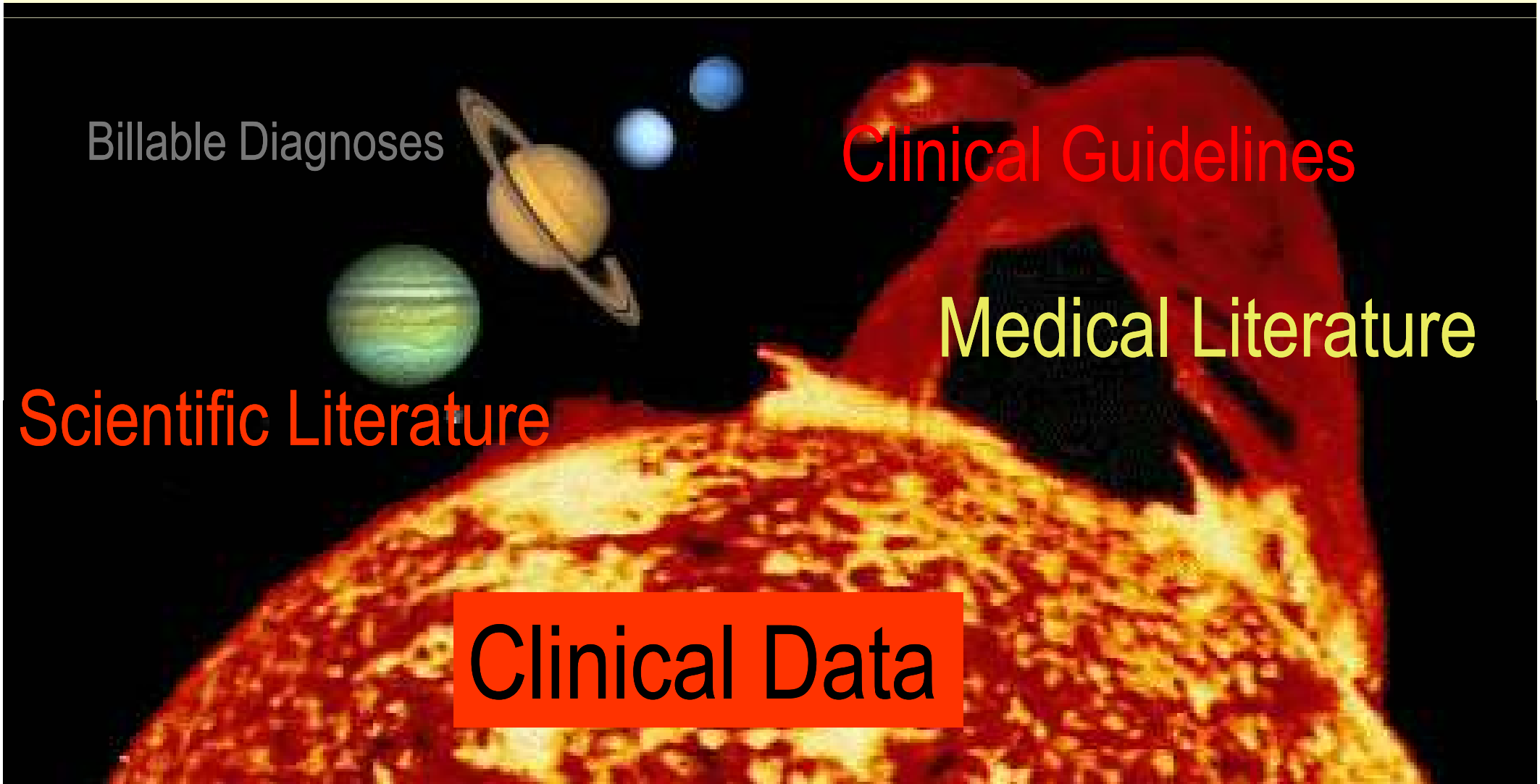
Billable Diagnoses



Copernican Healthcare

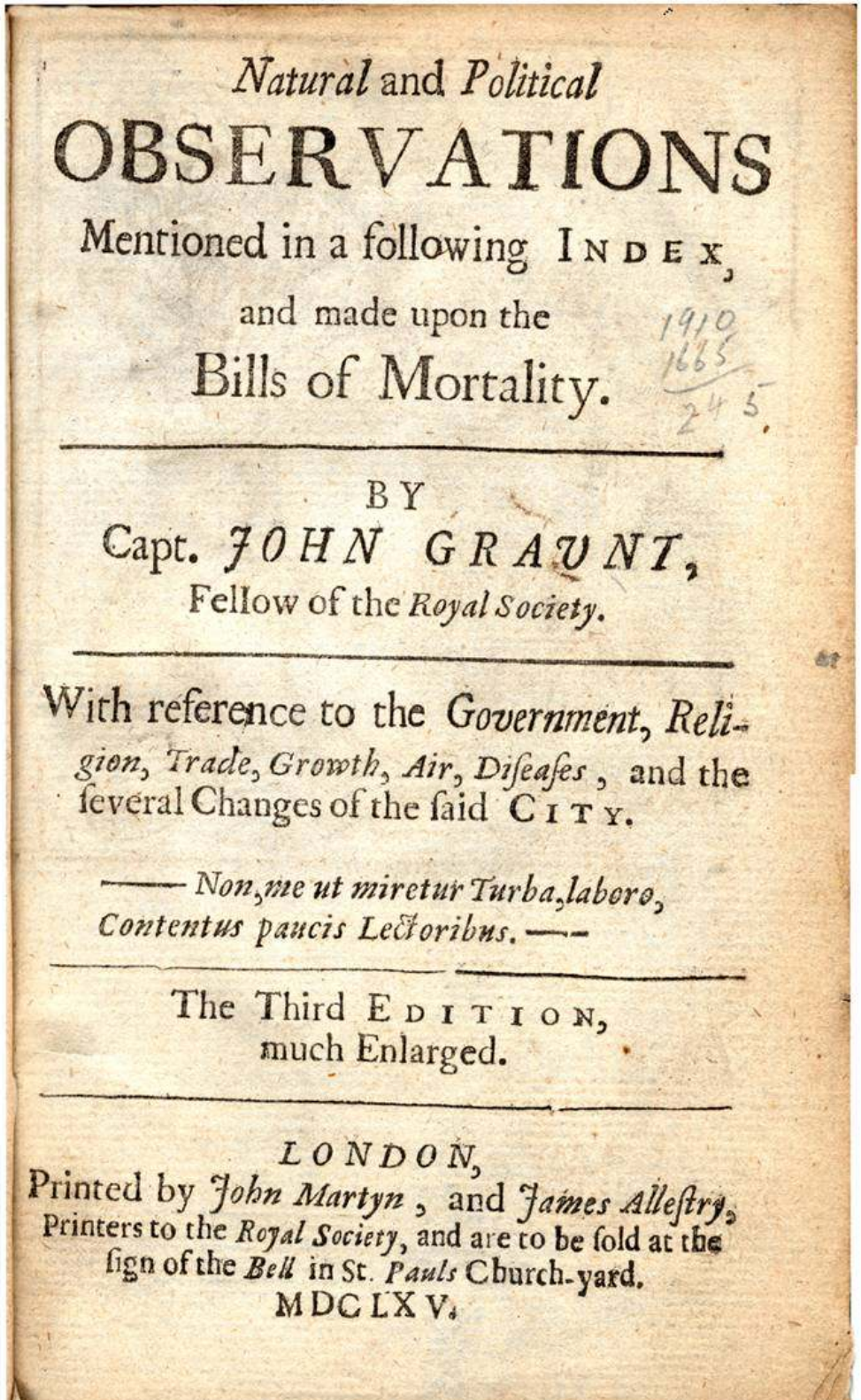
(Niklas Koppernigk)

Clinical Data



First Formal Health Data Model
London Bills of Mortality

- Commissioned 1542 (1598)
- Intended to Track Plague (Black Death)
  - ~60 disease categories
    - Variously Defined
  - Collected by Parish Clerks (Chanters)
  - Irregularly Printed in Folio
  - Data Table Layout
    - 16th Century Spreadsheet



Natural and *Political*

OBSERVATIONS

Mentioned in a following INDEX,

and made upon the

Bills of Mortality.

BY

Capt. *JOHN GRAUNT*,
Fellow of the *Royal Society*.

With reference to the *Government*, *Religion*, *Trade*, *Growth*, *Air*, *Diſeaſes*, and the ſeveral Changes of the ſaid CITY.

——*Non, me ut miretur Turba, laboro,*
Contentus paucis Lectoribus.——

The Third EDITION,
much Enlarged.

LONDON,
Printed by *John Martyn*, and *James Allestry*,
Printers to the *Royal Society*, and are to be ſold at the
ſign of the *Bell* in St. *Pauls* Church-yard.
MDCLXV.

The Table of CASUALTIES.

The Years of our Lord	1647	1648	1649	1650	1651	1652	1653	1654	1655	1656	1657	1658	1659	1660	1629	1630	1631	1632	1633	1634	1635	1636	1639 1630 1631	1633 1634 1635	1647 1648 1649	1651 1652 1653	1655 1656 1657	1629 1649 1659	In 20 Years
Abortive and Stil-born	335	329	327	351	389	381	384	433	483	419	463	467	421	544	499	439	410	445	500	478	507	523	1793	2005	1342	1587	1822	1247	8559
Aged	916	835	889	696	780	834	864	974	743	892	869	1176	909	1095	519	712	661	671	704	623	794	714	2475	2814	3336	3452	3680	2377	15752
Ague and Fever	1260	884	751	970	1038	1212	282	1371	689	875	999	1800	2303	2148	950	1091	1115	1108	953	1279	1622	2360	4418	6235	3865	4903	4363	4010	23764
Apoplex and Suddenly	68	74	64	74	106	111	115	86	92	102	113	138	91	67	22	36		17	24	35	26		73	85	280	421	445	177	1306
Bleach			1	3	7	2				1															4	9	1	1	15
Blasted					6	6			4		5	5	3	8	13	8	10	13	6	4		4	54	14	5	12	14	16	96
Bleeding	3	2	5	1	3	4	3	2	7	3	5	4	7	2	5	2	5	4	4	3			16	7	11	12	19	17	65
Bloody Flux, Scouring and Flux	155	176	802	289	833	762	200	386	168	368	362	233	346	251	449	438	352	348	278	512	346	330	1587	1466	1422	2181	1161	1597	7818
Burnt and Scalded	3	6	10	5	11	8	5	7	10	5	7	4	6	6	3	10	7	5	1	3	12	3	25	19	24	31	26	19	135
Calenture	1			1		2	1	1			3										1	3		4	2	4	3		13
Cancer, Gangrene and Fiſtula	26	29	31	19	31	53	36	37	73	31	24	35	63	52	20	14	23	28	27	30	24	30	85	112	105	157	150	114	609
Wolf				8																				8					8
Canker, Sore-mouth and Thruſh	66	28	54	42	68	51	53	72	44	81	19	27	73	68	6	4	4	1			5	74	15	79	190	244	161	133	686
Child-bed	161	106	114	117	206	213	158	192	177	201	236	225	226	194	150	157	113	171	132	143	163	230	590	668	498	769	830	490	3164
Chriſoms and Infants	1360	1254	1065	990	1237	1280	1030	1343	1089	1393	1162	1144	858	1123	2596	2378	2031	2268	2130	2315	2113	1895	9277	8453	4678	4910	4788	4519	32100
Colick and Wind	103	71	85	82	76	102	80	101	85	120	113	179	116	167	48	57					37	50	101	87	341	359	497	247	1580
Cold and Cough							41	36	21	58	30	31	33	24	10	58	51	55	45	54	50	57	174	207	00	77	140	43	598
Conſumption and Cough	2423	2200	2388	1988	2350	2410	2286	2868	2606	3184	2737	3610	2982	3414	1827	1910	1713	1797	1754	1955	2080	2477	5153	8266	8996	9014	12157	7197	44487
Convulſion	684	491	550	493	569	655	600	828	702	1027	807	841	742	1031	52	87	18	241	221	386	418	709	496	734	2198	2656	3377	1324	9077
Cramp			1														1	0	0	0	0	0	01	00	01	0	0	1	2
Cut of the Stone		2	1	3		1	2	4	1	3	5	6	4					5	1	5	2	2	5	10	6	4	13	5	58
Dropſie and Tympany	185	434	421	508	444	556	617	704	660	706	631	911	646	872	235	252	279	280	264	250	329	384	1048	1734	1538	2321	2982	1302	9623
Drowned	47	40	50	27	49	50	53	30	43	49	63	60	57	48	43	33	29	34	37	32	32	41	135	147	144	182	215	130	812
Exceſſive drinking			2																					2				2	2
Executed	8	17	29	43	24	12	19	21	19	22	20	18	7	18	19	13	12	18	13	13	13	13	62	52	97	76	78	55	384
Fainted in a Bath					1																				1				1
Falling-Sickneſs	3	2	2	3		3	4	1	4	3	1		4	5	3	10	7	7	2	5	6	8	27	21	10	8	8	9	74
Flox and ſmall Pox	139	400	1190	184	523	1279	139	812	1295	823	835	409	1523	354	72	40	58	531	72	1354	393	127	701	1846	1913	2755	3361	2785	16570
Found dead in the Streets	6	6	9	8	7	9	12	4	3	4	9	11	2	6	18	33	20	0	13	8	24	24	83	69	29	34	27	29	244
French-Pox	18	29	15	18	21	20	20	20	29	23	25	53	51	31	17	12	12	12	7	17	12	22	53	48	80	81	130	83	595
Frighted	4	4	1		3		2		1	1			9	1				1				3	2	3	9	5	2	2	23
Gout	9	5	12	9	7	7	5	6	8	7	8	13	14	2	2	5	3	4	4	5	7	8	14	24	35	25	36	28	135
Grief	12	13	16	7	17	14	11	17	10	13	10	12	13	4	18	20	22	11	14	17	5	20	71	56	48	55	45	47	272
Hanged and made away themſelves	11	10	13	14	9	14	15	9	14	16	24	18	11	36	8	8	6	15		3	8	7	35	11	48	47	74	52	222
Heach-Ach		1	11	2		2	6	6	5	3	4	5	35	26							4	2	6	14	14	17	46	05
Jaundice	57	35	39	49	41	43	57	71	61	41	46	77	102	76	47	59	35	42	35	45	54	63	184	197	180	212	225	188	994
Jaw-faln	1	1			3			2	2		3	1			10	16	13	8	10	10	4	11	47	33	02	5	6	10	96
Impoſtume	75	61	65	59	80	105	79	90	92	122	80	134	105	96	58	76	73	74	50	62	73	130	282	315	260	354	428	218	1637
Itch			1																10				00	10	01				11
Killed by ſeveral Accidents	27	57	39	94	47	45	57	58	52	43	52	47	55	47	54	55	47	46	49	41	51	60	202	201	217	261	194	148	1023
King's Evil	27	26	22	19	22	20	26	26	27	24	23	28	28	54	16	25	18	38	33	20	20	69	97	150	94	94	102	66	534
Lethargy	3	4	2	4	4	4	3	10	9	4	6	2	6	4	1		2	2	3		2	2	5	7	13	21	21	9	61
Leproſie			1									1		2	2						2		2	2	1		1	3	9
Liver-grown, Spleen and Rickets	53	46	56	59	65	72	67	65	52	50	38	51	8	15	94	12	99	87	82	77	58	99	392	356	213	265	191	158	1425
Lunatick	12	18	6	11	7	11	9	12	6	7	13	5	14	14	6	11	6	5	4	2	2	5	28	13	47	35	31	26	158
Meagrom	12	13		5	8	6	6	14	3	6	7	6	5	4			24					22	24	22	30	34	22	05	135
Meaſles	5	92	3	33	33	62	8	52	11	153	15	80	6	74	42	2	3	80	21	33	27	12	127	83	133	155	259	51	755
Mother	2					1	1	2	2	3		3	1	8	1							3	01	3	2	4	8	02	18
Murdered	3	2	7	5	4	3	3	3	9	6	5	7	70	20			3	7		6	5	8	10	19	17	13	27	77	80
Overlaid and ſtarved at Nurſe	25	22	36	28	28	29	30	56	58	53	44	50	46	43	4	10	13	7	8	14	10	14	34	46	111	123	215	86	570
Palſie	27	21	19	20	23	20	29	18	22	23	20	22	17	21	17	23	17	25	14	21	25	17	82	77	87	90	87	53	423
Plague	3597	611	67	15	23	16	6	16	9	6	4	14	36	14		1317	274	8		1		10400	1599	10401	4290	61	33	103	16138
Plague in the Guts				1		110	32		87	315	446		253	402									00	00	61	142	844	253	997
Pleuriſie	30	26	13	20	23	19	17	23	10	9	17	16	12	10	26	24	26	36	21		45	24	112	90	89	71	52	51	415
Poiſoned			3	7															1			2	00	4	10	00	00	00	16
Purples and Spotted Fever	145	47	43	65	54	60	75	89	56	52	56	126	368	146	32	58	58	38	24	125	245	397	186	791	300	278	290	241	1849
Quinſie and Sore-throat	14	11	12	17	24	20	18	9	15	13	7	20	21	14	01	8	6	7	24	04	5	22	22	55	54	71	45	34	247
Rickets	150	224	216	190	260	329	229	372	347	458	317	476	441	521						14	49	50	00	113	780	1190	1598	657	3688
Mother, riſing of the Lights	150	92	115	120	134	138	135	178	160	212	203	228	210	249	44	72	90	98	60	84	72	104	309	220	777	585	809	369	2700
Rupture	16	7	7	6	7	16	7	15	11	20	19	18	12	28	2	6	4	9	4	3	10	13	21	30	36	45	68	21	203
Scal'd-head	2				1				2																2	1	2		05
Scurvy	32	20	21	21	29	43	41	44	103	71	82	82	95	12	5	7	9		9		00	25	33	34	94	132	300	115	593
Smothered and ſtifled			2													24							24		2			2	26
Sores, Ulcers, broken and bruiſed	15	17	17	16	26	32	25	32	23	34	40	47	61	48	23		20	48	15	19	22	29	91	89	65	115	144	141	504
Shot (Limbs													7	20														07	27
Spleen	12	17					13	13		6	2	5	7	7										29	26	13	07	85
Shingles													1						1									1	2
Starved		4	8	7	1	2	1	1	3	1	3	6	7	1									14		19	5	13	29	91
Stitch				1																					1				1
Stone and Strangury	45	42	29	28	50	41	44	38	49	57	72	69	22	30	35	39	58	50	58	49	33	41	18	185	144	173	247	51	937
Sciatica														2					1	3		1	6	1	4				13
Stopping of the Stomach	29	29	30	33	55	67	66	107	94	145	129	277	186	214								6		6	121	295	247	216	669
Surfet	217	137	136	123	104	177	178	212	128	161	137	218	202	192	63	157	149	86	104	114	132	371	445	721	613	671	644	401	3094
Swine-Pox	4	4	3				1	4	2	1	1	1	2		5	8	4	6	3		10		23	13	11	5	5	10	57
Teeth and Worms	767	597	540	598	709	905	691	1131	803	1198	878	1036	839	1008	440	506	335	470	432	454	539	1207	1751	2632	2502	3436	3915	1819	24236
Tiffick	62	47													8	12	14	34	23	15	27		68	65	105			8	242
Thruſh											57	66			15	23	17	40	28	31	34		95	93		123	35	211
Vomiting	1	6	3	7	4	6	3	14	7	27	16	19	8	10	1	4	1	1	2	5	6	3	7	16	17	27	69	12	136
Worms	147	107	105	65	85	86	53								19	31	28	27	19	28	27		105	74	424	224		124	830
Wen	1		1		2	2			1		1	2	1	1	1		1		4				1	4	2	4	4	2	17
Suddenly															63	59	37	62	58	62	78	34	221	233				63	47
																												34190	229153

Place this Table at page 173.

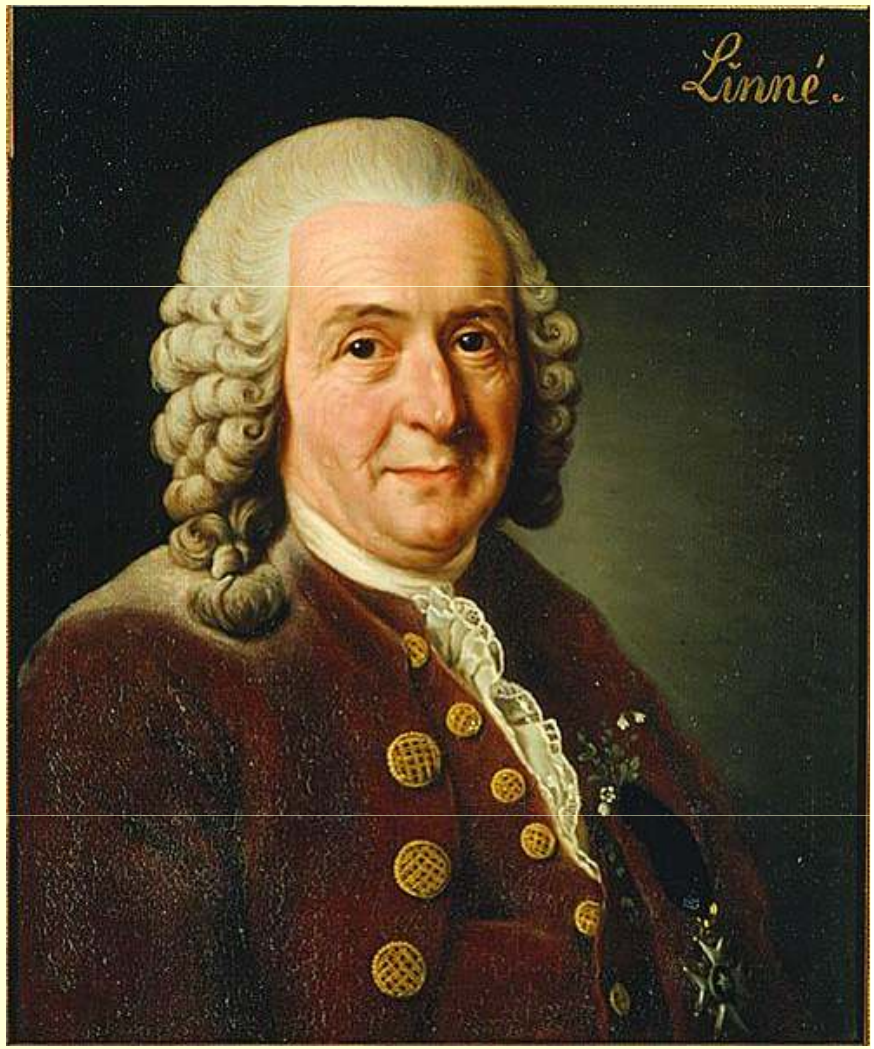
The Table of CASUALTIES.

The Years of our Lord	1647	1648	1649	1650	1651	1652	1653	1654	1655	1656	1657	1658	1659	1660	1629	1630	1631	1
Abortive and Stil-born	335	329	327	351	389	381	384	433	483	419	463	467	421	544	499	439	410	
Aged	916	835	889	696	780	834	864	974	743	892	869	1176	909	1095	579	712	661	
Ague and Fever	1260	884	751	970	1038	1212	282	1371	689	875	999	1800	2303	2148	956	1091	1115	1
Apoplex and Suddenly	68	74	64	74	106	111	118	86	92	102	113	138	91	67	22	36		
Bleach			1	3	7	2				1								
Blasted	4	1			6	6			4		5	5	3	8	13	8	10	
Bleeding	3	2	5	1	3	4	3	2	7	3	5	4	7	2	5	2	5	
Bloody Flux, Scouring and Flux	155	176	802	289	833	762	200	386	168	368	362	233	346	251	449	438	352	3
Burnt and Scalded	3	6	10	5	11	8	5	7	10	5	7	4	6	6	3	10	7	
Calenture	1			1		2	1	1			3							
Cancer, Gangrene and Fistula Wolf	26	29	31	19 8	31	53	36	37	73	31	24	35	63	52	20	14	23	
Canker, Sore-mouth and Thrush	66	28	54	42	68	51	53	72	44	81	19	27	73	68	6	4	4	
Child-bed	161	106	114	117	206	213	158	192	177	201	236	225	226	194	150	157	1 2	1
Chrisoms and Infants	1369	1254	1065	990	1237	1280	1050	1343	1089	1393	1162	1144	858	1123	2596	2378	203	22
Colick and Wind	103	71	85	82	76	102	80	101	85	120	113	179	116	167	48	57		
Cold and Cough							41	36	21	58	30	31	33	24	10	58	51	
Consumption and Cough	2423	2200	2388	1988	2350	2410	2286	2868	2606	3184	2757	3610	2982	3414	1827	1910	1713	17
Convulsion	684	491	530	493	569	653	606	828	702	1027	807	841	742	1031	52	87	18	2
Cramp			1														1	
Cut of the Stone		2	1	3		1	1	2	4	1	3	5	6	4				
Dropsie and Tympany	185	434	421	508	444	556	617	704	660	706	631	911	646	872	235	252	279	2
Drowned	47	40	30	27	49	50	53	30	43	49	63	60	57	48	43	33	29	
Excessive drinking			2															
Executed	8	17	29	43	24	12	19	21	19	22	20	18	7	18	19	13	12	
Fainted in a Bath					1													
Falling-Sickness	3	2	2	3		3	4	1	4	3	1		4	5	3	10	7	
Flox and small Pox	139	400	1190	184	525	1279	139	812	1294	823	835	409	1523	354	72	40	58	5
Found dead in the Streets	6	6	9	8	7	9	14	4	3	4	9	11	2	6	18	33	20	
French-Pox	18	29	15	18	21	20	20	20	29	23	25	53	51	31	17	12	12	
Frighted	4	4	1		3		2		1	1				9	1			

Inferences from 16th Century Data Models

- John Graunt, First Epidemiologist - 1662
  - Estimate of Population
  - Age-specific Mortality
  - Disease Specific Mortality
  - Foci of Mortality
  - Recognize *Epidemic and Endemic Disease*
  - Notions of *Etiology and Causation*
- Modern Epidemiology and Demographics
- Work ignored for 200 years (Farr)

Flawed Information Model



- Carolus Linnaeus
  Carl von Linné
  - *Genera Morborum* (1763)
- Underscored Content Difficulty
  - Pathophysiology vs Manifestation
    e.g. Rabies as psychiatric disease
- Lacked the Germ Theory of Disease
  - Was not incorporated into an information model

Weights and Measures

"The nomenclature is of as much importance in this department of inquiry, as weights and measures in the physical sciences, and should be settled without delay."

- William Farr, about Cullenian system
- First Annual Report of the Registrar-General of Births,Deaths, and Marriages in England. London: 1839 p. 99.

The Birth of a Formal Data Model for Cause of Death Classification

- First Statistical Congress,1853 (Brussels)
  - William Farr (London)
  - Marc d'Espine (Geneva)
  - Achille Guillard (Paris) - Sponsor
- First International List (139 rubrics)
  - *Il y a lieu de former une nomenclature uniforme des causes de déces applicable a tous les pays.*
    - Sixteenth Annual Report of Registrar-General of England, 1853, Appendix, p. 73.

Competing Concept Models about Cause of Death Classificaitons

- Farr – Anatomical Organization vs.
- d'Espine – Systemic Disease (Humors)
  - Necessary to Pick One
- Codes Linked to Disease Order
- Single Hierarchy Structure
- Vague Distinction between Term and Concept
  - Multi-Lingual (French Master)
- Revisions:
  - 1857, 1855, 1864 (model of Farr), 1874, 1880, 1886

Jacque Bertillon
ICD-1

- Introduced 1886 version in Chicago, 1893
  - International Statistical Institute (161 rubrics)
  - American Public Health Assoc. adopted 1898
  - Basis for decennial census
- Bertillon, Permanent Secretary General
  - International Commission (French Government)
  - Decennial revisions 1900, 1909, 1920 (Paris)

ICD *not* Catalog of Disease

"The International List of Causes of Death makes no pretension of being a proper nomenclature of diseases or of including a scientific classification of diseases."

Introduction ICD-2, 1909

Post-Bertillon ICD

- French Government continued sponsorship
  - (1929, 1938) 5th revision: 200 rubrics
- WHO assumed sponsorship, 1948. (6th rev)
- Greatly expanded to include morbidity
  - 612 diseases and morbid conditions
  - 153 external causes of injury
  - 189 categories of injuries, by lesion, nature
  - decimal sub-divisions
  - 1955, 7th revision (minor)
- Pressure to Index Hospital Patients

ICD-9-CM Resolution?

185 Malignant neoplasm of prostate

- 232,000 cases in the US each year
- Cannot distinguish stage or extend of disease

E845.9 Accident involving spacecraft injuring other person

- No person in history has ever died from this
- Not to be confused with death of astronaut or ground crew

Combination Platter Coding in Diabetes Mellitus

250.0 DM without mention complications
250.1 Diabetes with ketoacidosis
250.2 Diabetes with hyperosmilarity
250.3 Diabetes with other coma
250.4 Diabetes with renal manifestations
250.5 Diabetes with ophthalmic manifestations
250.5 Diabetes with neurological manifestations
250.7 Diabetes with peripheral circulatory disorders
250.8 Diabetes with other specified manifestation
250.9 Diabetes with unspecified complications

Severity?

ICD-10
Improved Resolution?

C61 Malignant neoplasm of prostate

- Alphanumeric format
- No substantial improvement in resolution
- Continues tabular (non-axial, unidimensional) format

The ICDs

1853	Farr/d'Espine	139	
1893	Bertillon	161	
1900	ICD 1	179	
1909	ICD 2	189	
1920	ICD 3	205	
1929	ICD 4	214	
1938	ICD 5	200	
1948	ICD 6	954*	*Decimal subdivisions
1955	ICD 7	965*	
1968	ICD 8	1,040*	
1968	H-ICDA2	905	4,334
1975	ICD 9	1,164*	8,173
1979	ICD-9-CM	1,179	14,473
1993	ICD 10	1,967*	10,468
2007	ICD-10-CM		68,000

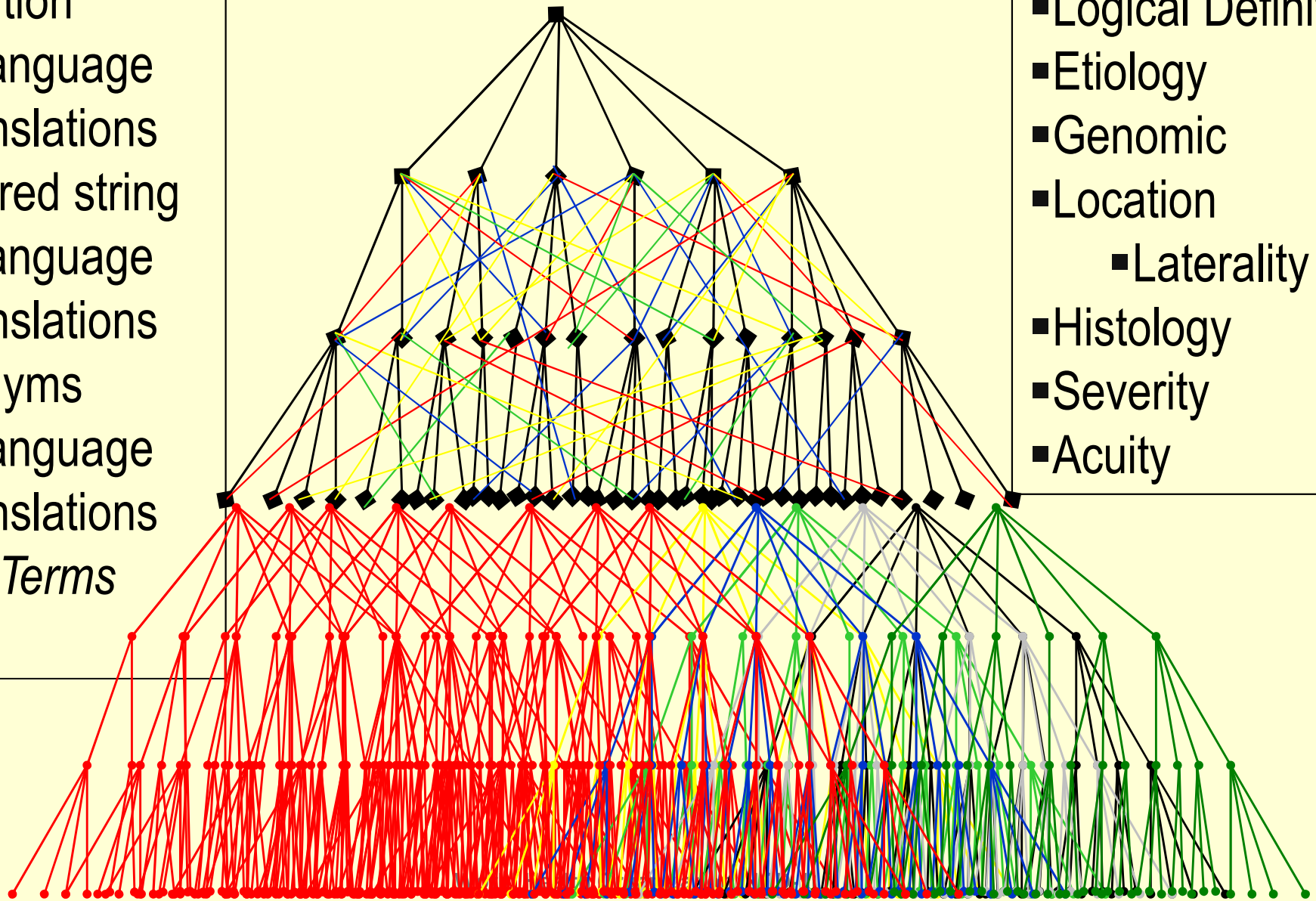
ICD11 Use-Cases

- Scientific Consensus on Clinical Phenotype
- Mortality
- Morbidity
- Case Mix
- Primary Care
- Quality and Safety

ICD11 - An Enriched Information Model

Concept name

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



Relationships

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

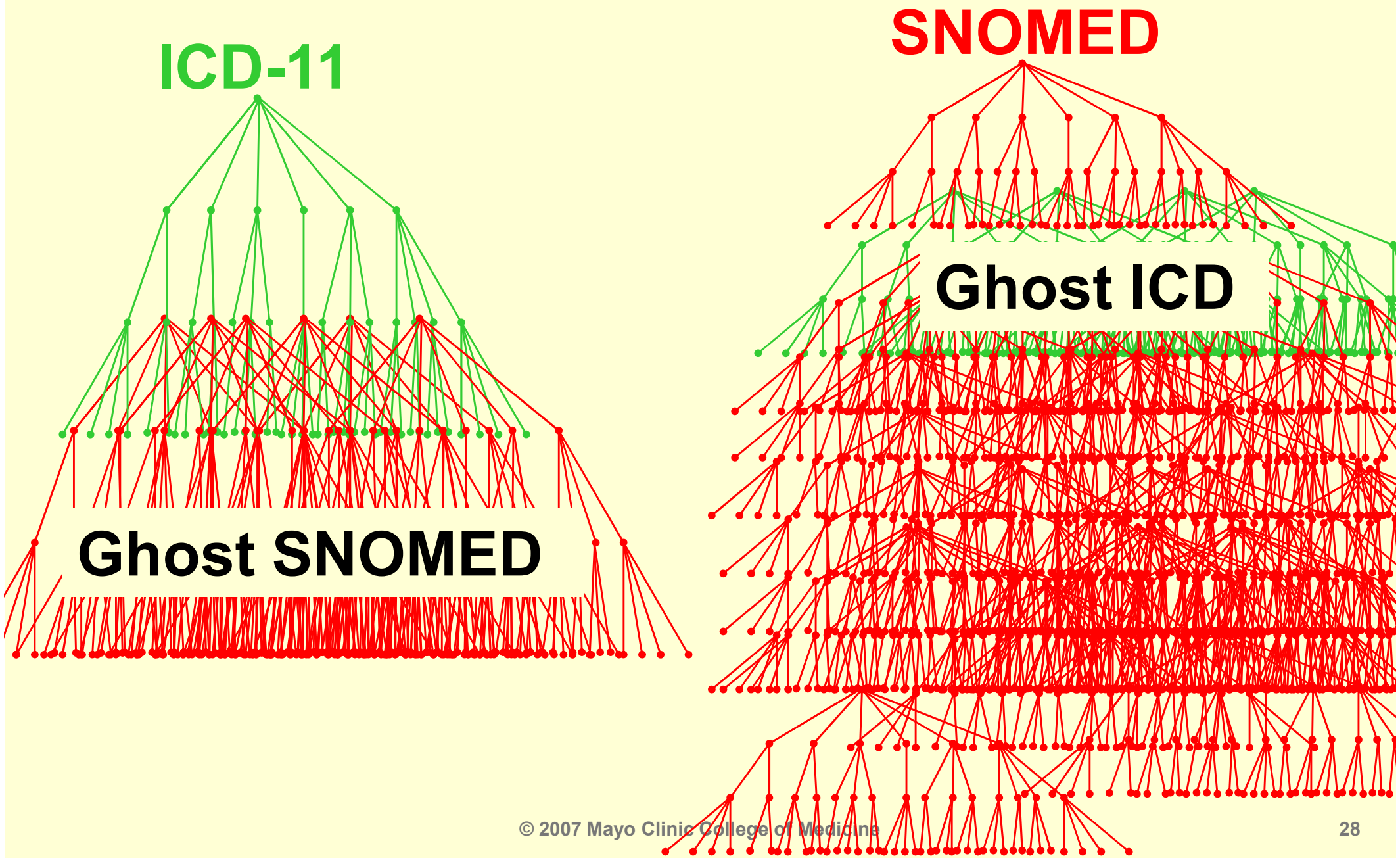
ICD11 Content Model

- Manifestation Attributes
  - Symptoms
  - Signs
  - Diagnostic results
  - Functional impact
- Etiology
  - causal agents
  - mechanism
  - Genomic characteristics
- Temporal Relations
  - chronicity (including acute)
  - episodicity
- Severity and/or Extent
- Hierarchical relationships (parents and children)

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

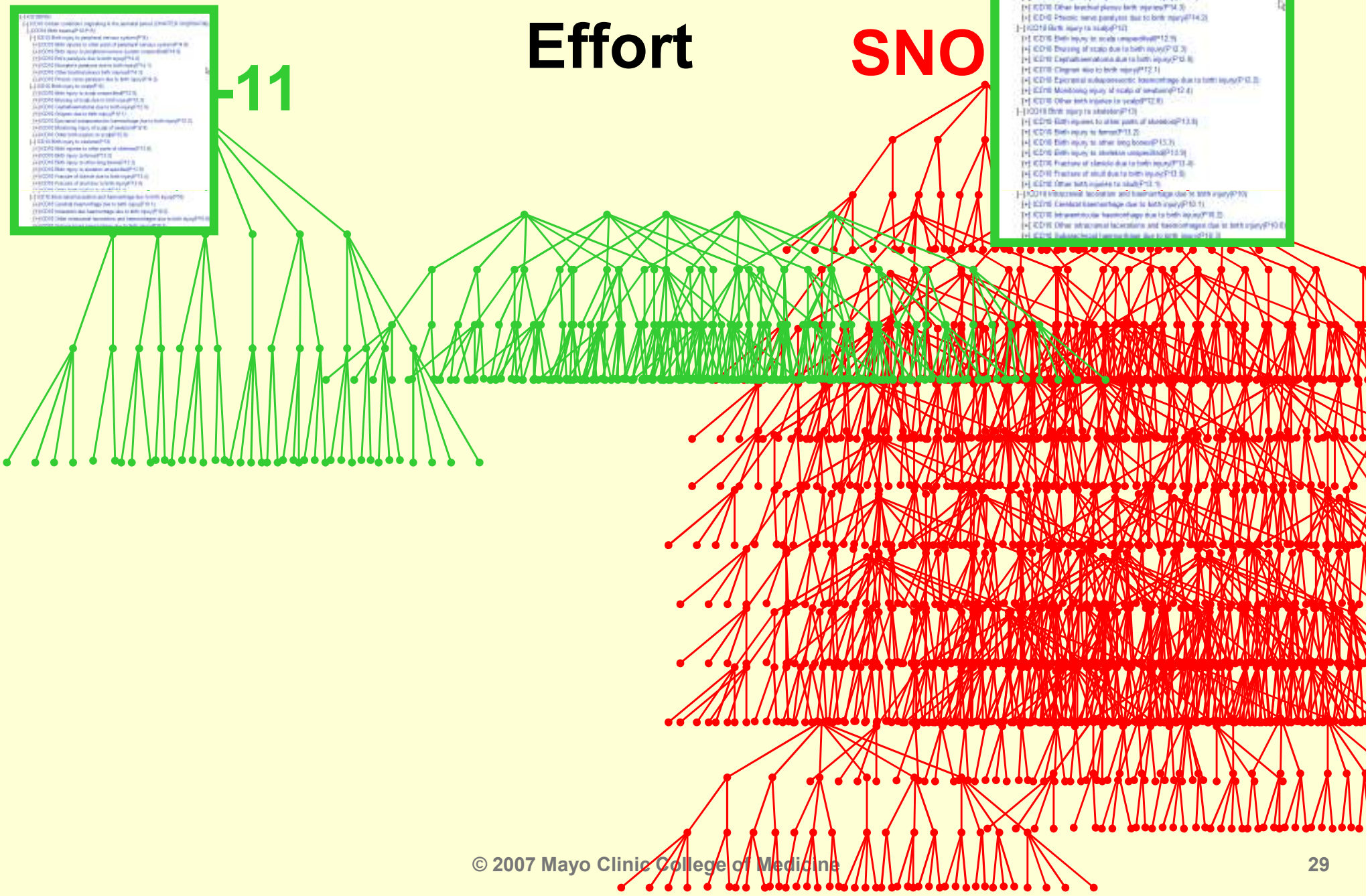


Joint Alternate Future Effort

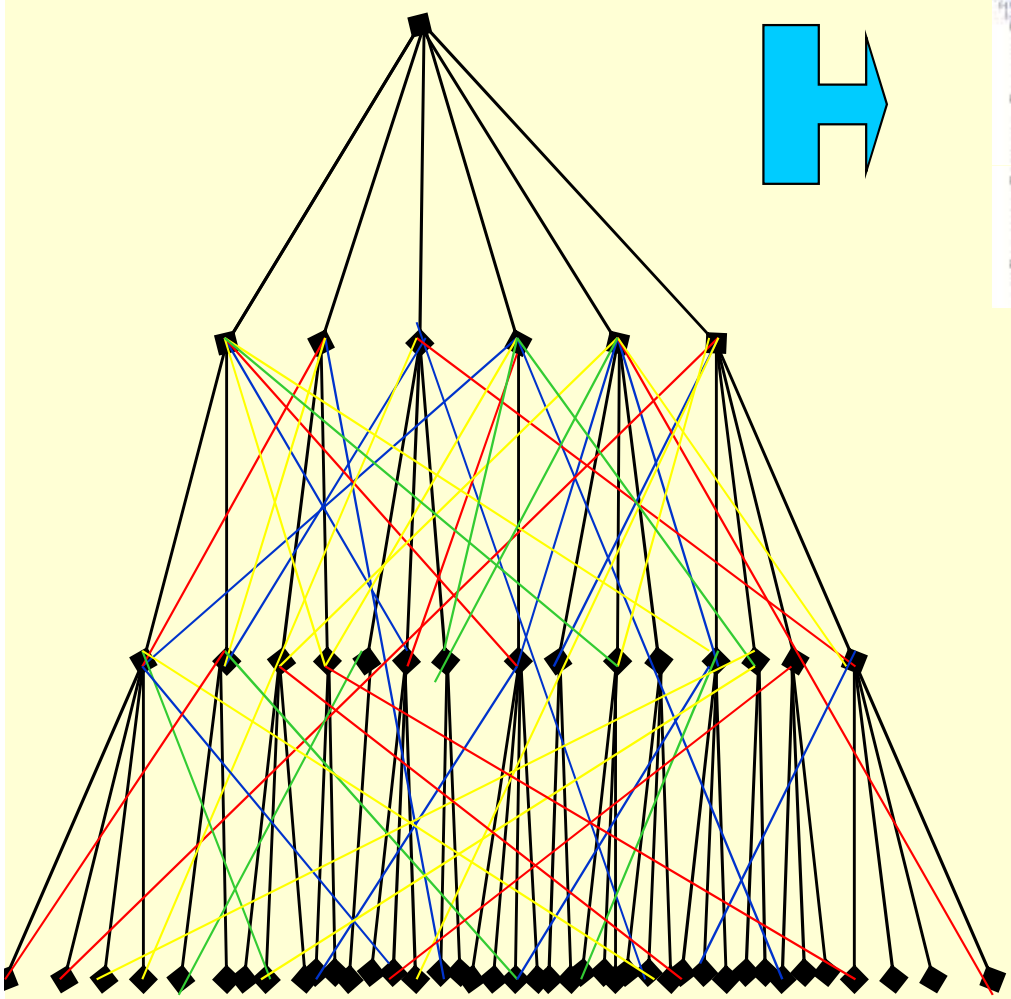
ICD-11

IHTSDO

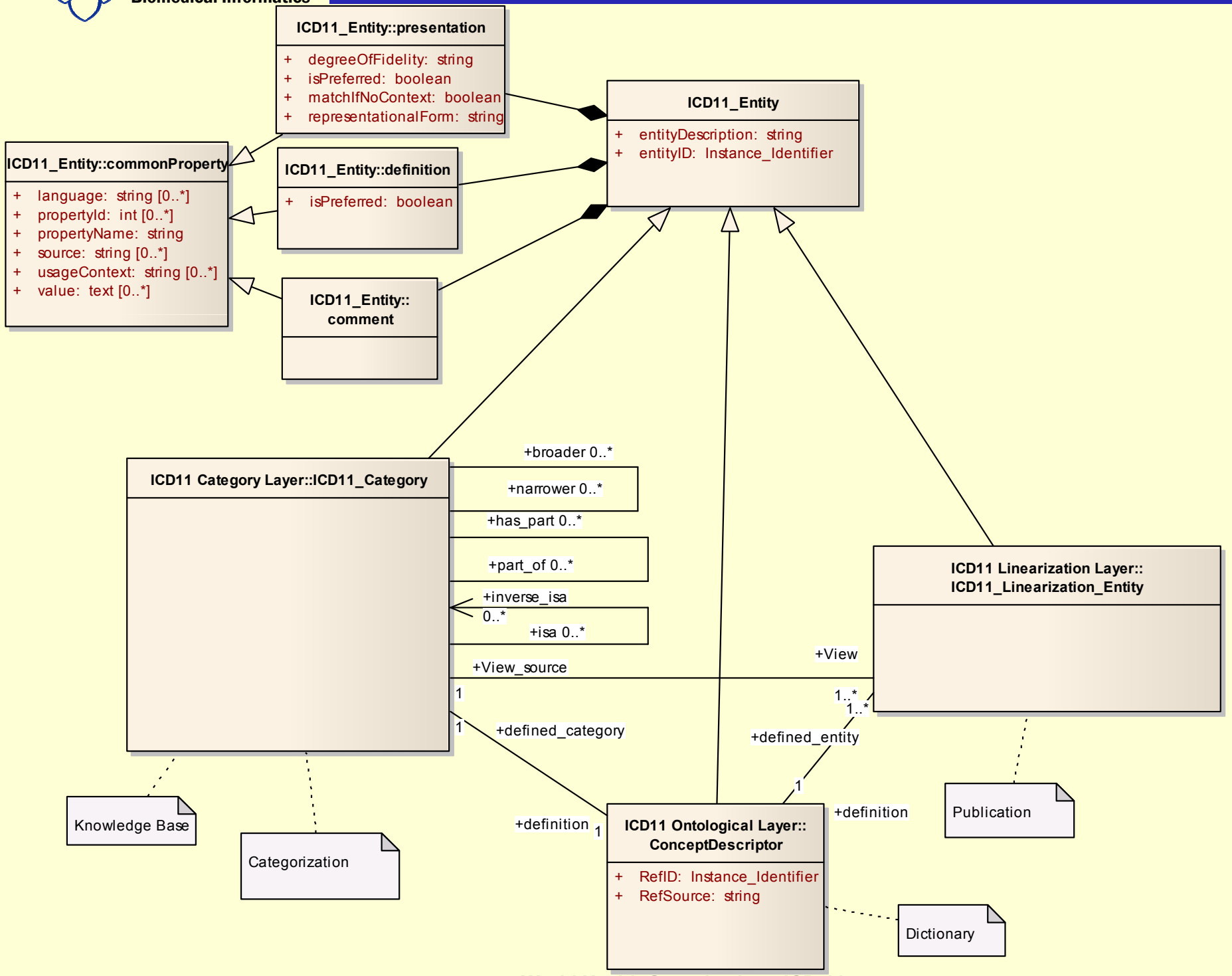
SNO



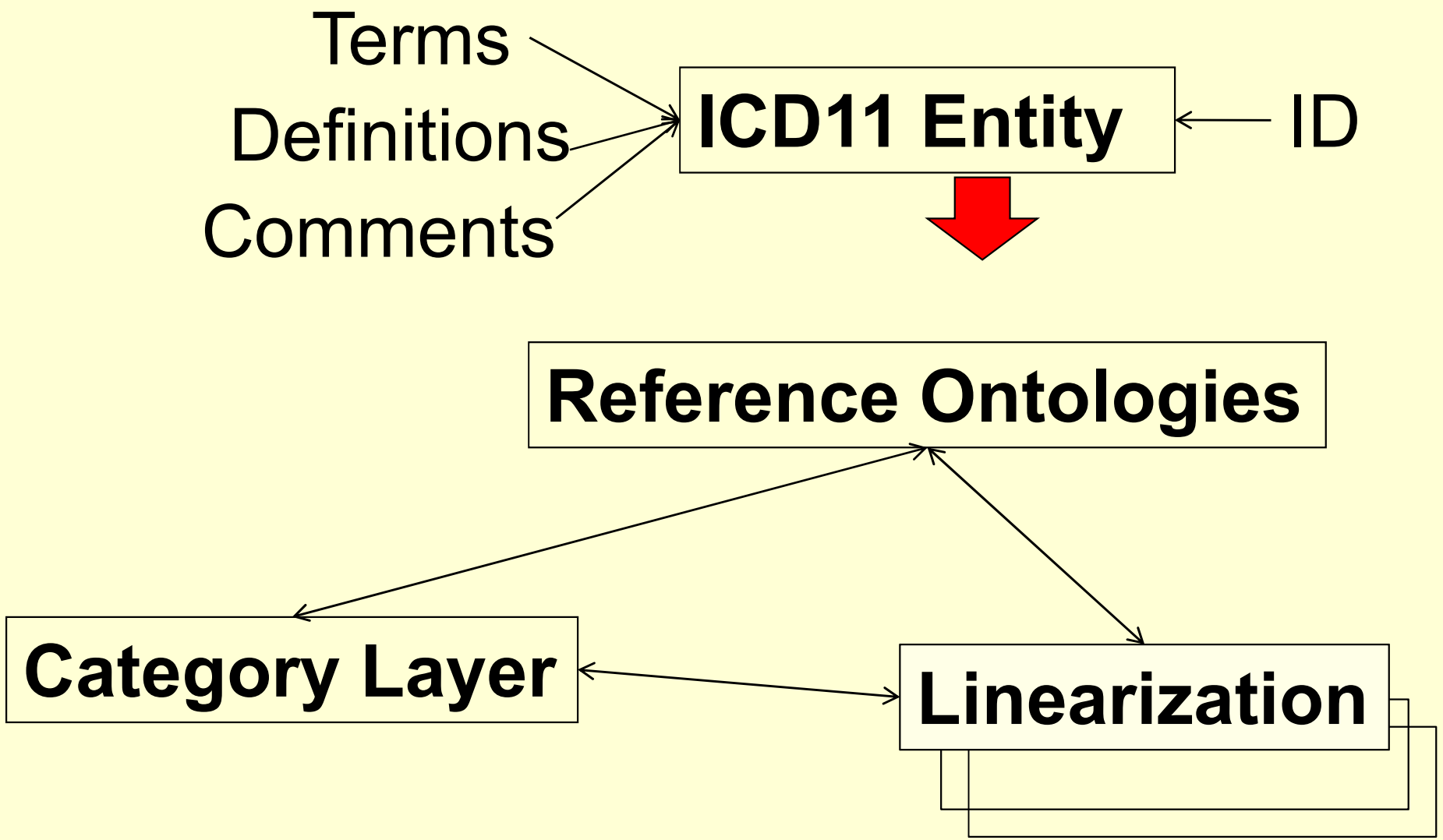
Linear views may serve multiple use-cases
Morbidity, Mortality, Quality, …



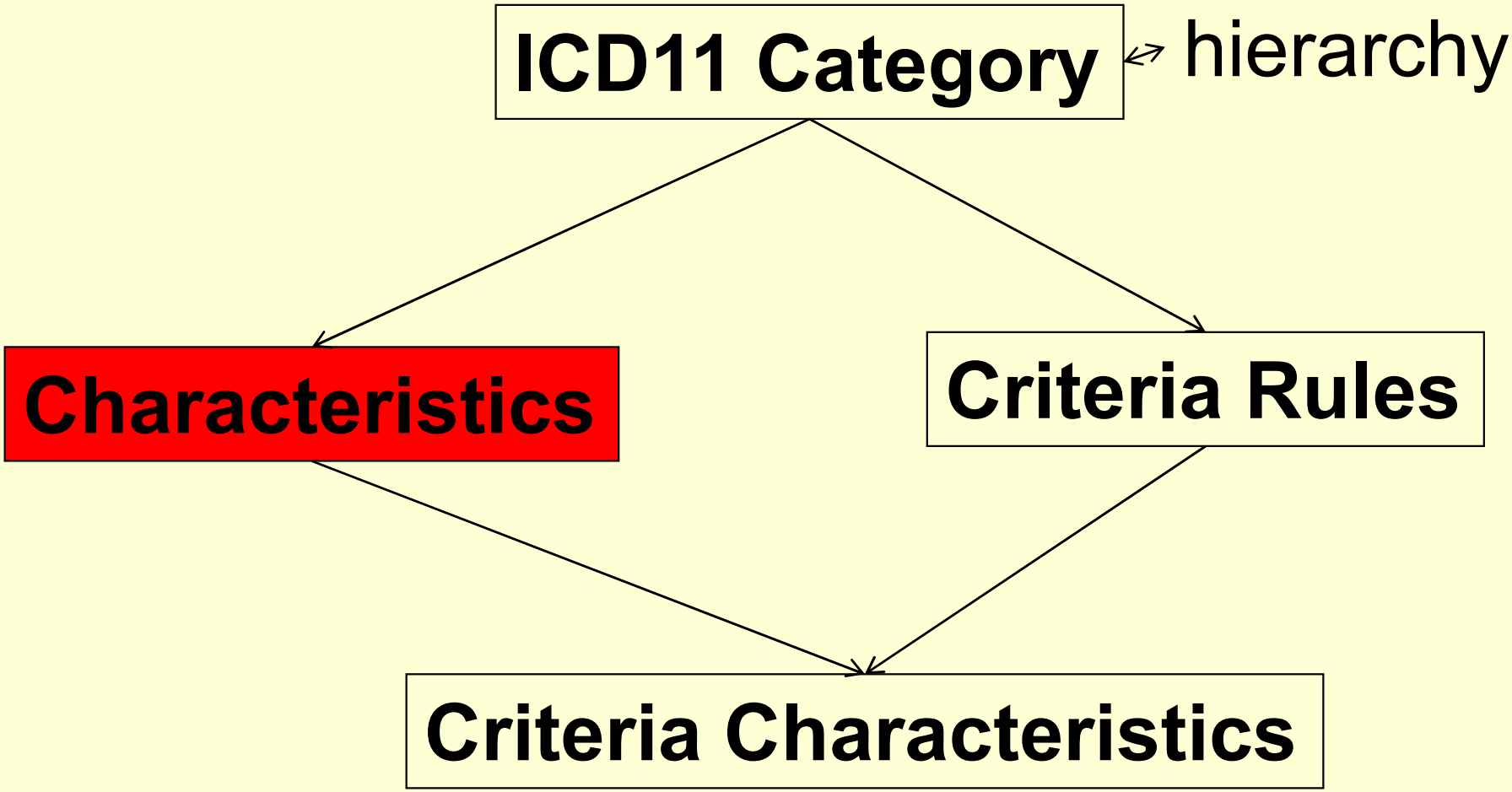
Core ICD11 Model



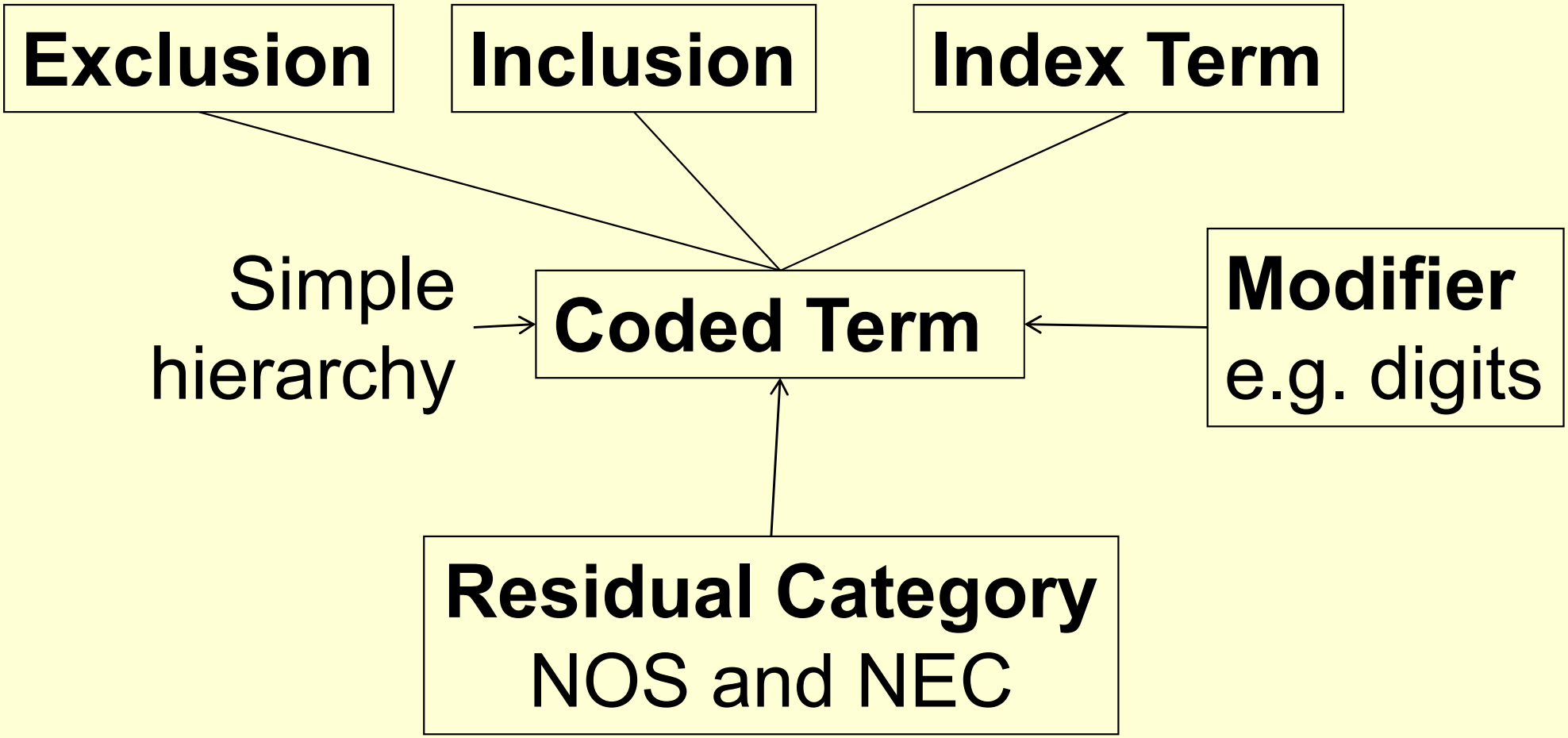
High Level Structure – Core Model



Category (Clinical) Layer



ICD Linearization



Wiki
Basis for *Light-weight editor*

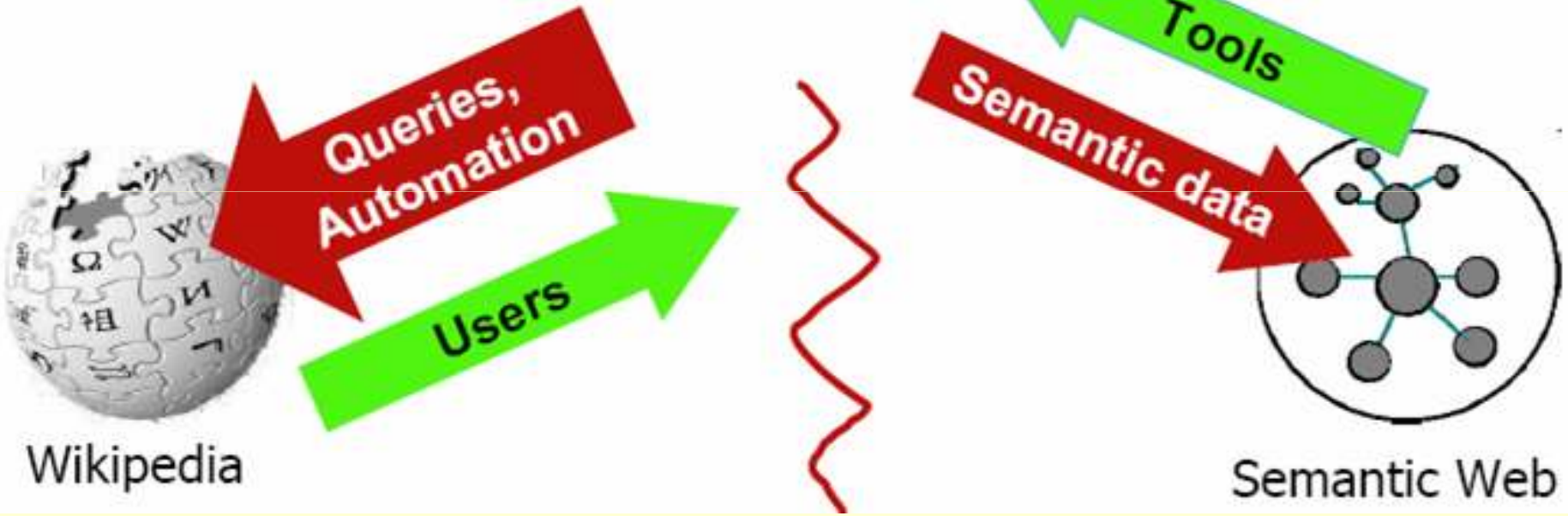
- The largest and most successful "social computing" project in history
- Tools and resources to permit huge communities to asynchronously author and edit complex resources
- Computer engineering of impressive capacity
  - Wikipedia manages >12,000 hits/second
  - Includes transactional edits

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 s and ,
  but: many manual pr text-based search
- Semantic W ation processing,
  sophisticated
  but: few data



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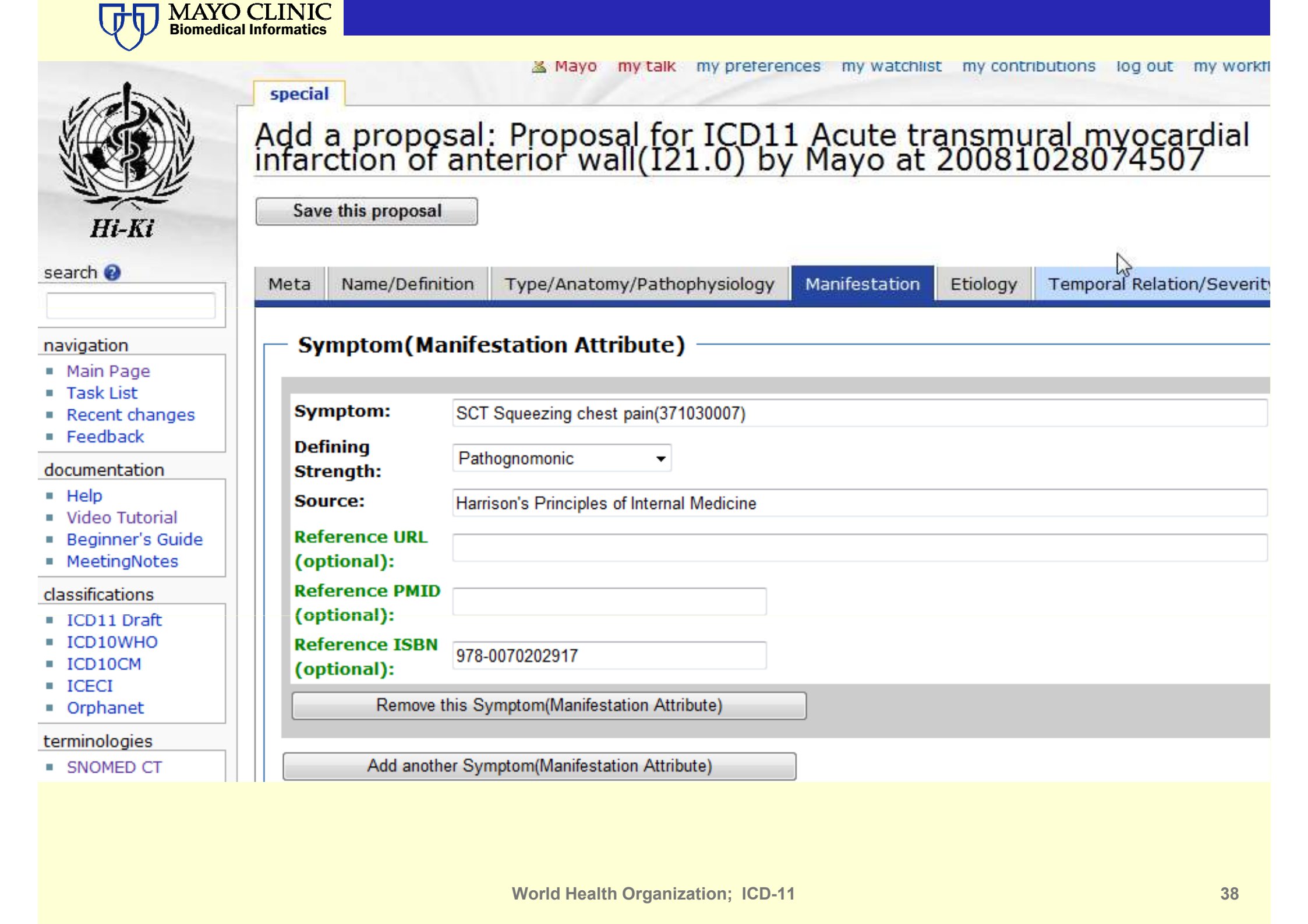
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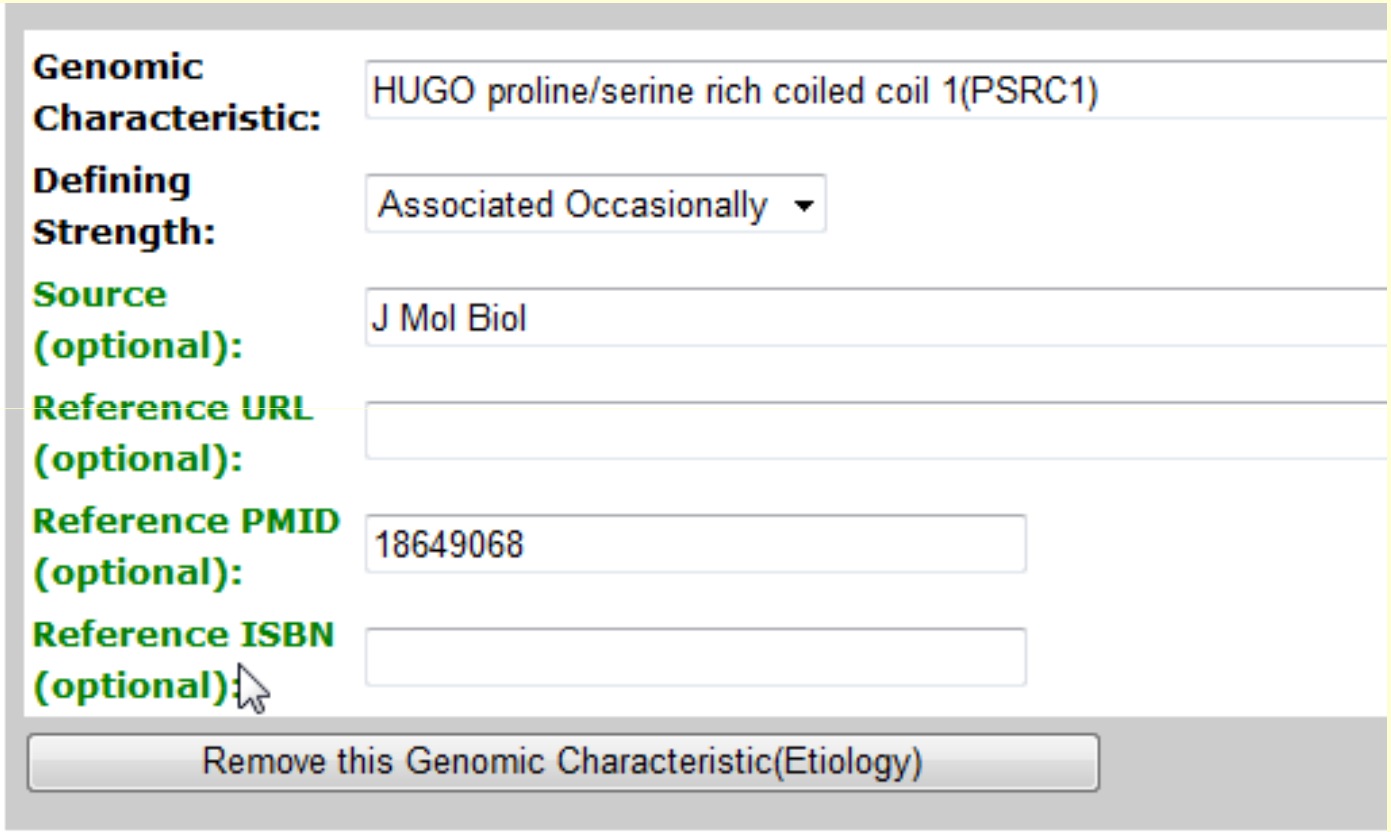
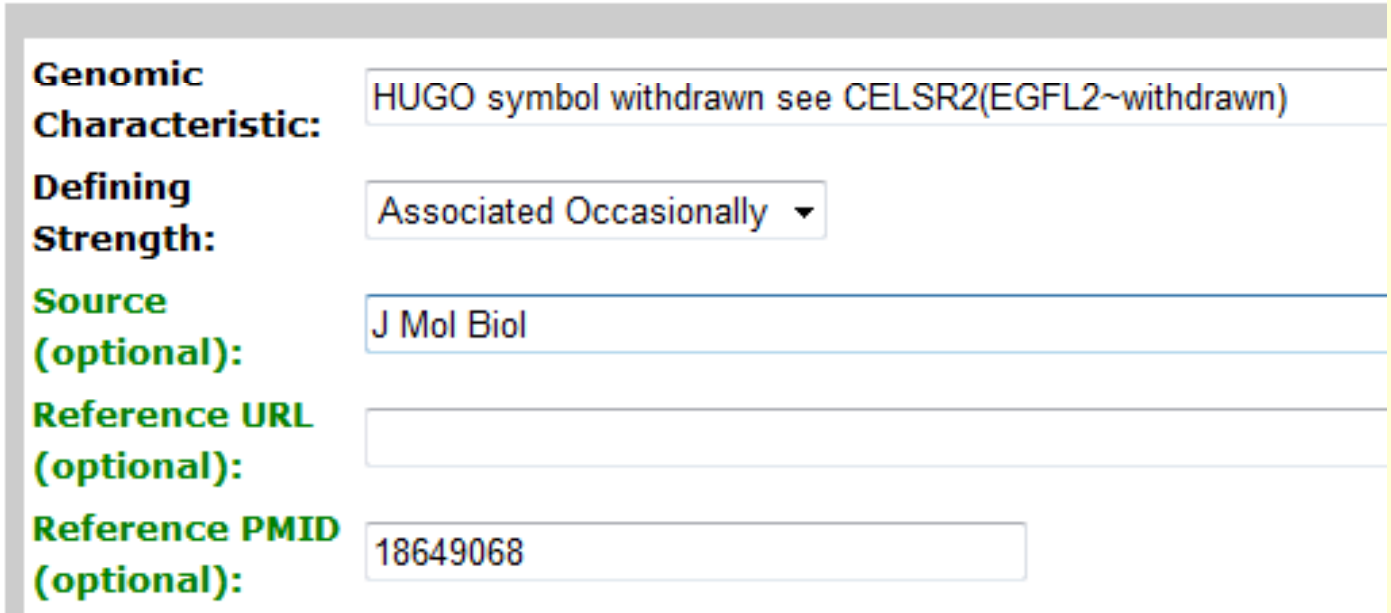
search
navigation
Main Page
Task List
Recent changes
Feedback
documentation
Help
Video Tutorial
Beginner's Guide
MeetingNotes
classifications
ICD11 Draft
ICD10WHO
ICD10CM
ICECI
Orphanet
terminologies
SNOMED CT
Add a proposal: Proposal for ICD11 Acute transmural myocardial infarction of anterior wall(I21.0) by Mayo at 20081028074507
Save this proposal
Meta
Name/Definition
Type/Anatomy/Pathophysiology
Manifestation
Etiology
Temporal Relation/Severity
Symptom(Manifestation Attribute)
Symptom:
SCT Squeezing chest pain(371030007)
Defining Strength:
Pathognomonic
Source:
Harrison's Principles of Internal Medicine
Reference URL (optional):
Reference PMID (optional):
Reference ISBN (optional):
978-0070202917
Remove this Symptom(Manifestation Attribute)
Add another Symptom(Manifestation Attribute)

Adding Genomic Characteristics





Partial I21.0 Anterior Transmural MI Defined

Symptom(Manifestation Attribute): Category:SCT Squeezing chest pain(371030007) (Pathognomonic) (Source:Harrison's Textbook of Medcine)

3. *Harrison's principles of internal medicine.* New York: McGraw-Hill, Health Professions Division, 1998. isbn:978-0070202917. [isbn978-0070202917]

Sign(Manifestation Attribute): Category:Not Specified(Source:not specified)
Diagnostic Finding(Manifestation Attribute): Category:Not Specified(Source:not specified)
Functional Impact(Manifestation Attribute): Category:Not Specified(Source:not specified)
Causal Agent(Etiology): Category:Not Specified(Source:not specified)
Mechanism(Etiology): Category:Not Specified(Source:not specified)

Genomic Characteristic(Etiology): Category:HUGO proline/serine rich coiled coil 1(PSRC1) (Associated Occasionally) (Source:J Mol Biol)

4. Samani NJ, Braund PS, Erdmann J, G□tz A, Tomaszewski M, Linsel-Nitschke P, Hajat C, Mangino M, Hengstenberg C, Stark K, Ziegler A, Caulfield M, Burton PR, Schunkert H, and Tobin MD. *The novel genetic variant predisposing to coronary artery disease in the region of the PSRC1 and CELSR2 genes on chromosome 1 associates with serum cholesterol.* J Mol Med 2008 Nov; 86(11) 1233-41. doi:10.1007/s00109-008-0387-2 pmid:18649068. PubMed [pmid18649068]

Genomic Characteristic(Etiology): Category:HUGO symbol withdrawn see CELSR2(EGFL2~withdrawn) (Associated Occasionally)(Source:J Mol Biol)

4. Samani NJ, Braund PS, Erdmann J, G□tz A, Tomaszewski M, Linsel-Nitschke P, Hajat C, Mangino M, Hengstenberg C, Stark K, Ziegler A, Caulfield M, Burton PR, Schunkert H, and Tobin MD. *The novel genetic variant predisposing to coronary artery disease in the region of the PSRC1 and CELSR2 genes on chromosome 1 associates with serum cholesterol.* J Mol Med 2008 Nov; 86(11) 1233-41. doi:10.1007/s00109-008-0387-2 pmid:18649068. PubMed [pmid18649068]

Conclusion

- Comparable and consistent health data has five centuries of history
- Modern ontology principles are being leveraged to create the next-generation ICD
- Social computing infrastructure (wiki) can greatly extend WHO's capacity in this effort