VOC™ TERMINOLOGY ENGINE

A large, multilingual, integrated terminology built around SNOMED-CT

Yves Lévesque MD, MScA
Chief Medical Officer
Medforyou inc.
Oct 2013

medforyou™

Plan

- Why a medical terminology
- VOC Terminology engine
- Lexical tools
- Semantic tools
- Codes and mapping
- Demo

A strong clinical terminology

is the foundation

of a good clinical application

A strong clinical terminology

is essential

for good clinical data

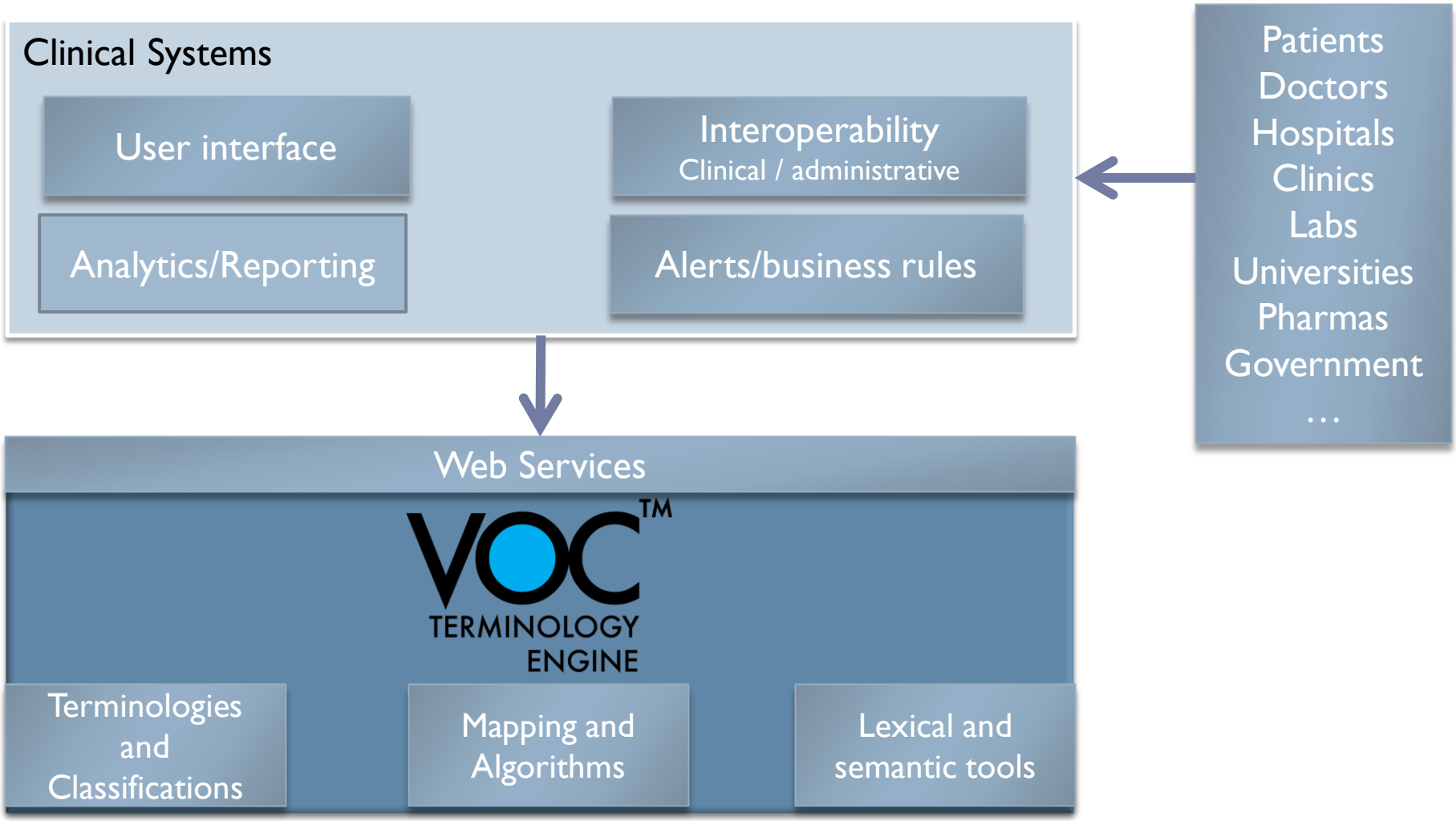
The problem

Many software developers don't have time, resources or expertise to implement and maintain a good terminological foundation for their clinical applications.

What is VOC?

- The integration of many terminologies around SNOMED CT providing a unified semantic ontology
- Synonyms, codes, mapping, semantic information, definitions, links to encyclopedic information
- A set of lexical and semantic tools
- A terminology server accessible via Web services
- **A solution to the terminology problem for any clinical application (EMR, PHR, HIE, etc.)**

VOC enables


Clinical Systems
User interface
Interoperability
Clinical / administrative
Analytics/Reporting
Alerts/business rules
Patients
Doctors
Hospitals
Clinics
Labs
Universities
Pharmas
Government
…
Web Services
VOC™
TERMINOLOGY ENGINE
Terminologies and Classifications
Mapping and Algorithms
Lexical and semantic tools

Characteristics

- Multilingual (English, French, Spanish)
- Synonyms
- Interoperable➔ Standards
- Complete, with specific access to frequent terms
- Powerful keyword searches
- Semantic content for "intelligent" behavior
- Many contexts and many countries
- Integrated
- Simple and pragmatic

Sources

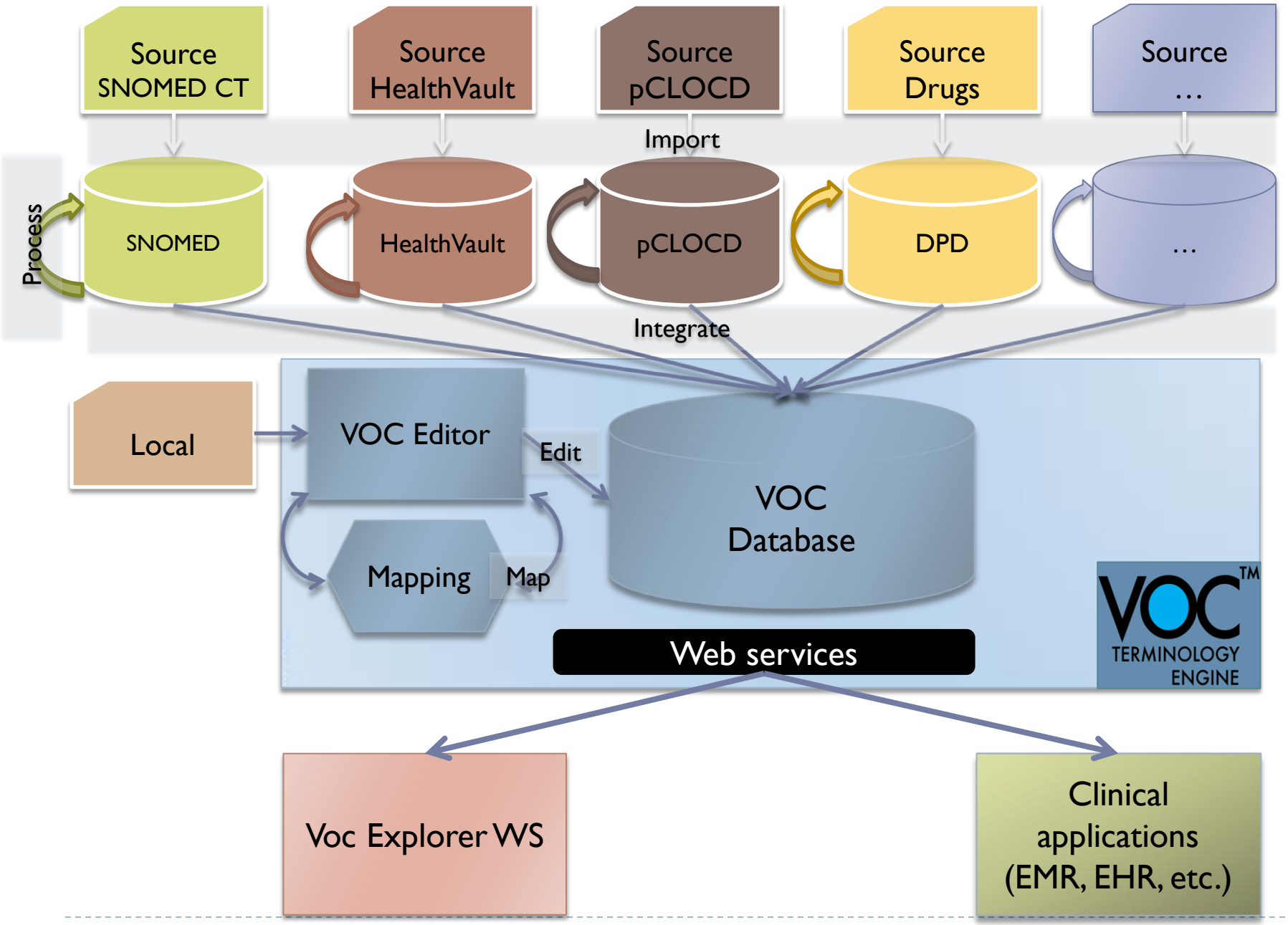
- All vocabularies for US Stage 2 Meaningful Use Certification, including:
  - Snomed CT (International +US extension + Spanish version)
  - RxNorm (US Medication)
  - LOINC (*for Lab*)
  - ICD-10, ICD-10CM, ICD-9CM
  - Current Procedural Terminology (CPT)
  - Healthcare Common Procedure Coding System, (HCPCS)
  - HL7 Standard Code Set CVX - Vaccines Administered
  - ISO639 Languages,
  - Consumer Health Vocabulary (CHV)
  - HealthVault / HealthSpace (partial)
  - Unified Medical Language System (UMLS)
  - OMB race and ethnicity, smoking status, etc.

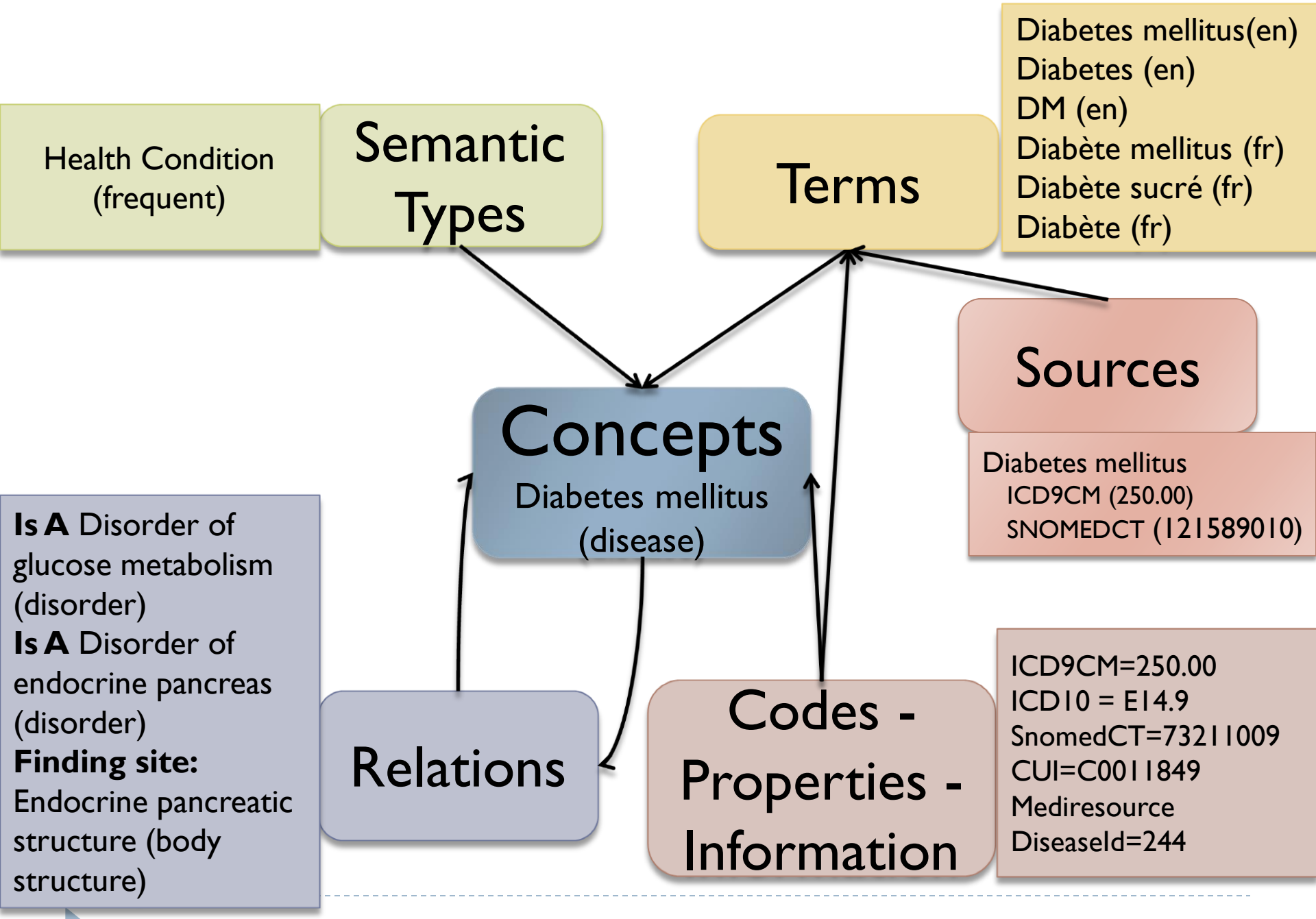
Some terminologies may need a specific license agreement

Sources

- Specific Canadian sources
  - Snomed CT Canadian extension (French translation and specific concepts)
  - Drug Product Database + Natural Products (Health Canada)
  - pCLOCD *(Canadian LOINC for Lab)*
  - French version of Snomed International 3.5
  - All Primary Health Care Reference sets (PHC RefSets) from Canada Health Infoway
  - ICD10CA and CCI
  - Mediresource

Some terminologies may need a specific license agreement


Source SNOMED CT
Source HealthVault
Source pCLOCD
Source Drugs
Source …
Import
Process
SNOMED
HealthVault
pCLOCD
DPD
…
Integrate
Local
VOC Editor
Edit
VOC Database
Mapping
Map
Web services
VOC™ TERMINOLOGY ENGINE
Voc Explorer WS
Clinical applications (EMR, EHR, etc.)


Health Condition (frequent)
Semantic Types
Terms
Diabetes mellitus(en)
Diabetes (en)
DM (en)
Diabète mellitus (fr)
Diabète sucré (fr)
Diabète (fr)
Sources
Concepts
Diabetes mellitus (disease)
Diabetes mellitus
ICD9CM (250.00)
SNOMEDCT (121589010)
Is A Disorder of glucose metabolism (disorder)
Is A Disorder of endocrine pancreas (disorder)
Finding site: Endocrine pancreatic structure (body structure)
Relations
Codes - Properties - Information
ICD9CM=250.00
ICD10 = E14.9
SnomedCT=73211009
CUI=C0011849
Mediresource
DiseaseId=244

Lexical tools

- Very fast keyword searches
- General or specific to some semantic types
- Lexical techniques
  - Fuzzy search
  - Spell checking
  - Lexical algorithms (Soundex)
  - Word stemming

Alsimer ➔ *Alzheimer*

Diabait ➔ *Diabète*

Lexical tools (2)

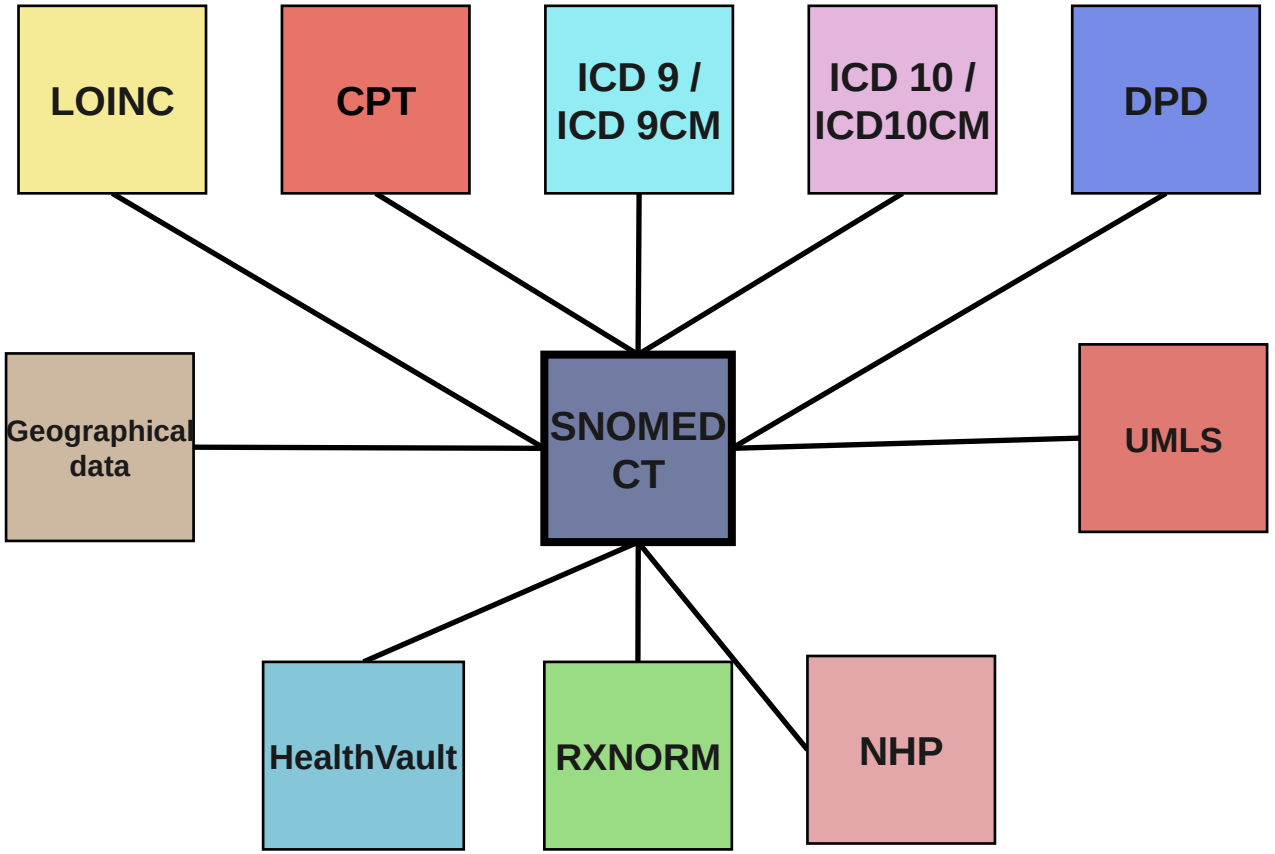
- Synonyms injection
  - *Broken thighbone* ➔ *Fracture of femur*
- Progressive algorithm
  - Start with specific searches
  - Then use more sensitive searches
  - Increase specificity and sensitivity
- Scoring algorithm
- Specific searches for frequent terms

Semantic information

- Multiple hierarchies
  - Ex. Is myocardial infarction a cardiac disease?
  - Support business rules, alerts, data analysis, etc
- Semantic Browsing
  - Browse hierarchies and other relations
- Semantic Search and Filtering
  - Find a concept using semantic rules
    - Ex. Find a disease caused by a virus and affecting the head
- Lexico-semantic searches
  - Find terms using semantic definitions
    - Ex. Liver infection -> hepatitis
  - Integrated with keyword searches

Integration and mapping

Each concept is positioned in the integrated semantic hierarchy



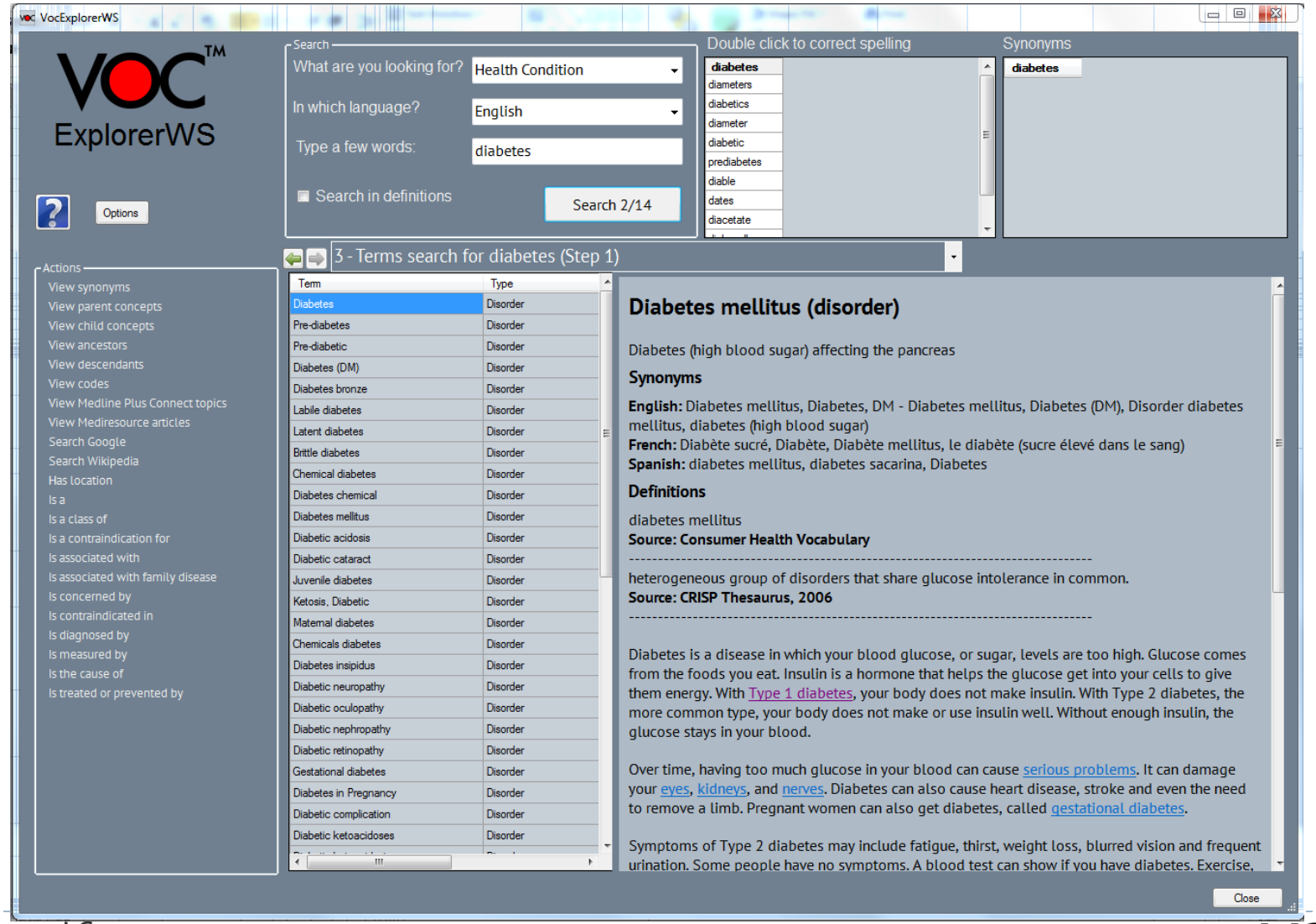
Mapping

- Exact mapping
  - The new source term is equivalent to an existing concept
  - New terms, relations, codes are added to the existing concept
- Inexact mapping
  - There is no existing concept equivalent to the new source term
  - A new concept is created with terms, relations and codes
  - New "is a" relations are created with one or more closest existing concepts (usually SNOMED)
- Difficulty: if a new SNOMED CT concept is added later, we try to merge the 2 concepts.

Codes

- Code equivalence is not an exact science
- Code qualifier
  - The code is specific for a Term that has a source from this code
  - The concept has a Term that has a source from this code
  - The concept has a good quality "map to" this code
  - The concept has a medium quality "map to" this code. There may be circumstances when this mapping is not adequate
  - The concept has a low quality "map to" this code. this mapping may not be adequate
  - The code has been inherited

Demo Voc Explorer WS



VOC can be used to:

- Create efficient user interfaces
  - Fast and powerful Keyword search
- Improve clinical data
  - Better reports and data analysis
- Improve Interoperability
  - The right standard code to exchange data
- Support intelligent behavior
  - Alerts, automations, etc.
- Provide contextual information to user
  - Definitions, reference information, consumer information, etc.

Conclusion

- VOC is a functional integrated multilingual terminology engine
- Based on standards terminologies
- Lexical tools for powerful keyword searches
- Semantic information for "intelligent" reasoning
- Usable via Web Services
- Strong foundation for any clinical applications (PHR, EMR, EHR, etc.)

Yves Lévesque
medforyou inc
vocterminology.com
yves.levesque@medforyou.com