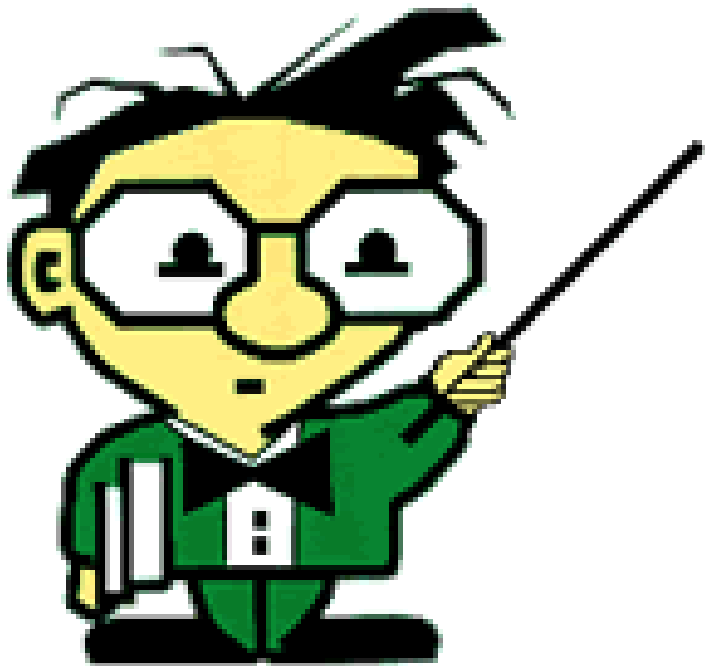


# Protégé-OWL: Has it Really Been Ten Years?



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# But it took a village to create Protégé

• • •

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# The Context of the Paper

- The “language wars” of the preceding decade had ended: OWL won
- Outstanding work on ontology editing at places such as Manchester and Maryland demonstrated new ways to manage the complexity of ontology engineering
- Although people were beginning to talk about linked data, the Semantic Web still was construed mainly as machine intelligence at Web scale
- The Semantic Web was at its trendiest—at least according to Google

# The original focus for Protégé was *not* ontology editing

- We wanted an IDE for building *intelligent systems*
- We wanted that IDE to support abstractions that were
  - More cognitively useful than those of expert-system “shells”
  - Translatable directly into software components for operational systems
- We saw ontologies as just part of the path to software engineering for more robust intelligent systems

# Ontology Inspector



Ontology name:

Inspect slots and facets

## Class Browser

Root	USER	domain-entity	personnel
USER ▶	domain-entity ▶	rule laboratory-test ▶ therapy-admjus ▶ protocol ▶ eligibility-criteri ▶ personnel ▶ event ▶ schema decide-node action-node temporal-predic	physician nurse clerk nurse-practione

With selection do:

- Add new subclass
- Change class name
- Delete class
- Add new is-a link
- Delete is-a link

## Slot Inspector

Class name:

Parent(s):

### Slot Browser

- Add new slot
- With selection do:
  - Change slot name
  - Delete slot

pager_number
specialty
name
title_of_position
institution
office_phone_number

## Facet Inspector

Slot name:

- Add new class facet ▼
- Add new slot facet ▼

- With selection do:
- Modify facet
  - Delete facet

### Facet Browser

(type string)
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Protege/Win OntologyEditor - [GuidelineStarter.pont]

File Class Slot View Window Help

- Starter\_Kit\_Component
  - Activity
    - Diagnostic\_procedure
      - Lab\_test
      - Other\_diagnostics
      - Radiologic\_test
    - Evaluation\_procedure
      - Eligibility\_determination
      - Staging
      - Stratification
      - Toxicity\_check
    - Therapeutic\_procedure
      - Chemotherapy
      - Drug\_admin
      - Immunotherapy
      - Radiotherapy
      - Surgery

Slot	Allowed Classes/Symbols/Values
name	
next_step	Conditional_Step Synchronization
dose_information	
toxicity_list	

For Help, press F1



**SUBCLASS RELATIONSHIP**

For Project: ● Thesaurus

**Asserted Hierarchy**

- owl:Thing
  - Abnormal\_Cell\_Kind
  - Anatomy\_Kind
  - Biological\_Process\_Kind
  - Chemicals\_and\_Drugs\_Kind
  - Chemotherapy\_Regimen\_Kind
  - Clinical\_or\_Research\_Activity\_Kind
  - Diagnostic\_and\_Prognostic\_Factors\_Kind
  - Drug\_Mechanism\_of\_Action\_Kind
  - Drug\_Physiologic\_Effect\_Kind
  - EO\_Anatomy\_Kind
  - EO\_Findings\_and\_Disorders\_Kind
    - Experimental\_Organism\_Diagnoses
      - Experimental\_Allergic\_Encephalomyelitis
      - Mouse\_Pathologic\_Diagnoses
        - Mouse\_Cancer-Related\_Conditions
          - Benign\_Plasma\_Cell\_Proliferations\_of
          - Hyperplasia\_of\_the\_Mouse\_Intestinal
          - Hyperplasia\_of\_the\_Mouse\_Pulmonar
          - Melanocytic\_Proliferative\_Disorders\_c
          - Mouse\_Noncancerous\_Conditions
            - Benign\_Conditions\_of\_the\_Mouse
            - Congestion\_of\_the\_Mouse\_In

**CLASS EDITOR**

For Class: ● Benign\_Conditions\_of\_the\_Mouse\_Intestinal\_Tract (instance of owl:Class)

Name: Benign\_Conditions\_of\_the\_Mouse\_Intestinal\_Tract

SameAs: DifferentFrom:

rdfs:comment:

Annotations:

Property	Value	Lang
code	C22102	
DesignNote	Autonomous new grov...	
Display_Name	Benign Conditions of th...	
FULL_SYN	<term-name>Benign Co...	
FULL_SYN	<term-name>Benign Co...	
hasType	primitive	
Preferred_Name	Benign Conditions of th...	

**Properties and Restrictions**

- rEO\_Disease\_Has\_Associated\_EO\_Anatomy (someValuesFrom Gastrointestinal\_Tract\_MMHCC, someValuesFrom
  - Gastrointestinal\_Tract\_MMHCC
  - Digestive\_System\_MMHCC [from Mouse\_Digestive\_System\_Disorder]
- rEO\_Disease\_Has\_Associated\_Cell\_Type
- rEO\_Disease\_Has\_Property\_or\_Attribute
- rEO\_Disease\_Maps\_to\_Human\_Disease

**Superclasses**

- Mouse\_Noncancerous\_Conditions
- Mouse\_Digestive\_System\_Disorder

**Disjoints**

Disjoints area (currently empty)



# ICAT ICD Collaborative Authoring Tool

- My ICD
- ICD Content**
- Category Notes and Discussions
- Reviews
- Change History
- Manage Hierarchy
- Export and Import

**ICD Categories**

Create Watch Branch Search:

- Diseases of the circulatory system 4 2635
- Diseases of the eye and adnexa 9 3330
- Diseases of the respiratory system 3 1487
  - Needing a decision to be made 1 1
  - To be retired - Diseases of the respiratory system 1 140
  - Upper respiratory tract disorders 1 44
  - Airway diseases 5 101
  - Lung infections 1 275
    - Influenza 3 39
    - Infectious Pneumonia 3 173
    - Acute bronchitis 4 10
    - Acute bronchiolitis 5 4
    - Unspecified acute lower respiratory infection 4
    - Abscess of lung and mediastinum 3
    - Pyothorax
    - Pulmonary mycobacterial infection 2 24
      - Respiratory tuberculosis, confirmed 10 2**
      - Pulmonary non-tuberculous mycobacterial infection 2
    - Chronic obstructive pulmonary disease with acute lower resp
    - Inhalational, occupational and environmental lung disease 1

**Parents of Respiratory tuberculosis, confirmed**

- Tabulated - Respiratory tuberculosis
- Pulmonary mycobacterial infection**
- Tuberculosis of the respiratory system

**Details for Respiratory tuberculosis, confirmed**

**Title & Definition** | Classification Properties | Terms | Clinical Description | Manifestation Properties

Causal Properties | Temporal Properties | Severity Properties | Functioning Properties

Specific Condition Properties | Treatment | Diagnostic Criteria | ICD-10 Notes and Hints

ICD-10 Linearizations | **Editorial Information**

**ICD-10 Code**

**ICD Title**

**Fully Specified Name**

**Short Definition**

Text

Respiratory tuberculosis is a bacterial infection by Mycobacterium tuberculosis complex that includes Mycobacterium tuberculosis, Mycobacterium bovis, Mycobacterium africanum, and Mycobacterium canettii, into pharynx, larynx, trachea, bronchus, lung, or the other respiratory tracts. It can be transmitted by airborne spread. Respiratory

**Detailed Definition**

Text

+ Add new value

**External Definitions**

+ Add new value

Definition	Source

# Protégé-OWL won us lots of friends

- OWL became a *de facto* standard, and Protégé could support it
- Protégé's open, plug-in architecture made it possible for the Semantic Web community to build lots of great extensions and enhancements
- The availability of Protégé-OWL made OWL much more accessible to the ontology-engineering community—and a virtuous cycle had commenced

# But Protégé-OWL caused us lots of headaches, too

- Many Protégé users just wanted a simple, frame-based ontology editor
- Layering OWL on top of a frame editor was an expedient choice, but it was architecturally clumsy—and it took us a lot of backtracking to fix that problem
- Academic groups really have no business building and maintaining complex software for use by thousands of people when funded only by “soft” money—unless they believe they have to

# What have we learned after 10 years?

- Infrastructure is an underrated component of scientific success
- Sometimes, only academic groups can develop infrastructure that addresses the requirements of complex systems such as OWL
- Funding agencies need to place much more value on computational infrastructure
- Scientific communities—such as this one—make all the hassles seem worth it!

The Protégé Team is hiring! & SemTechBiz discounted rates for the Protégé community!



PRODUCTS

SUPPORT

COMMUNITY

# A free, open-source ontology editor and framework for building intelligent systems

Protégé is supported by a strong community of academic, government, and corporate users, who use Protégé to build knowledge-based solutions in areas as diverse as biomedicine, e-commerce, and organizational modeling.

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