Ontology Model of CRF for Clinical Research in Traditional Korean Medicine

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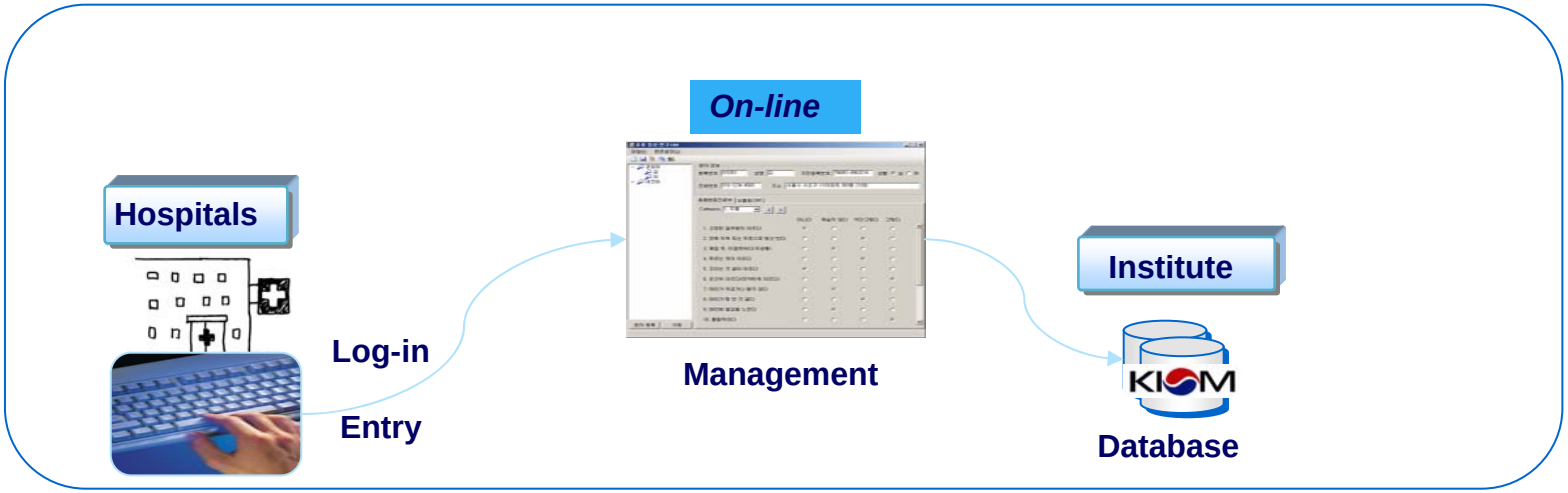
Background

- Multicenter trials progress in oriental and western medicine. A Case Report Form(CRF) is a questionnaire specifically used in clinical trial research. The CRF is the primary data collection tool from the investigator site. As a nowadays, as using electronic CRF, it decreases the errors that was generated for inputting data and be convenient to sending the clinical data.



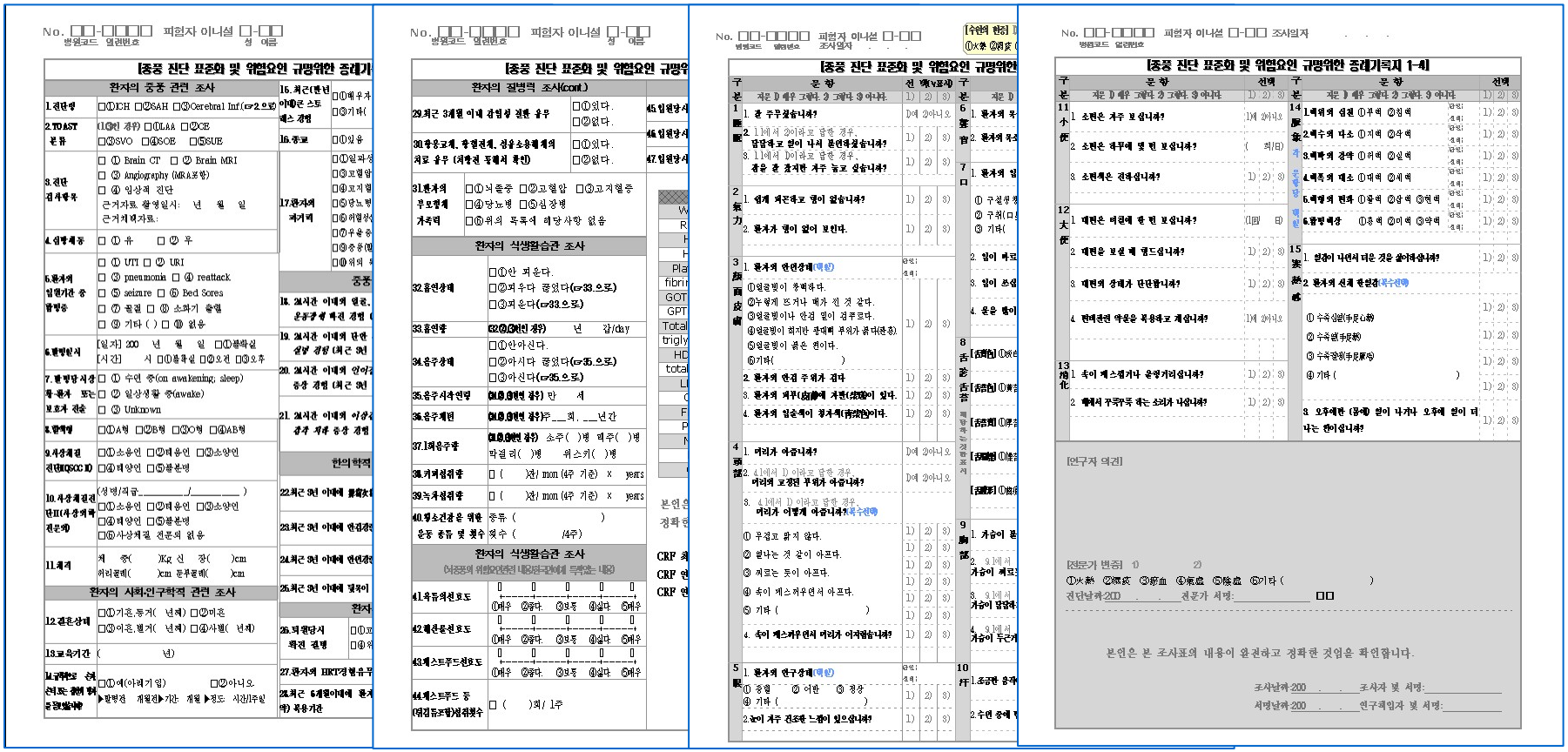
- We suggest that the electronic CRF based on the ontology. That could be systematically collect and analyze clinical data.

Methods

- The conceptual model is made up of syndrome differentiation(辨證), diagnosis, blood test, dietary life and history et al. This model was referenced ISO TC 215 22789 Patient Findings.

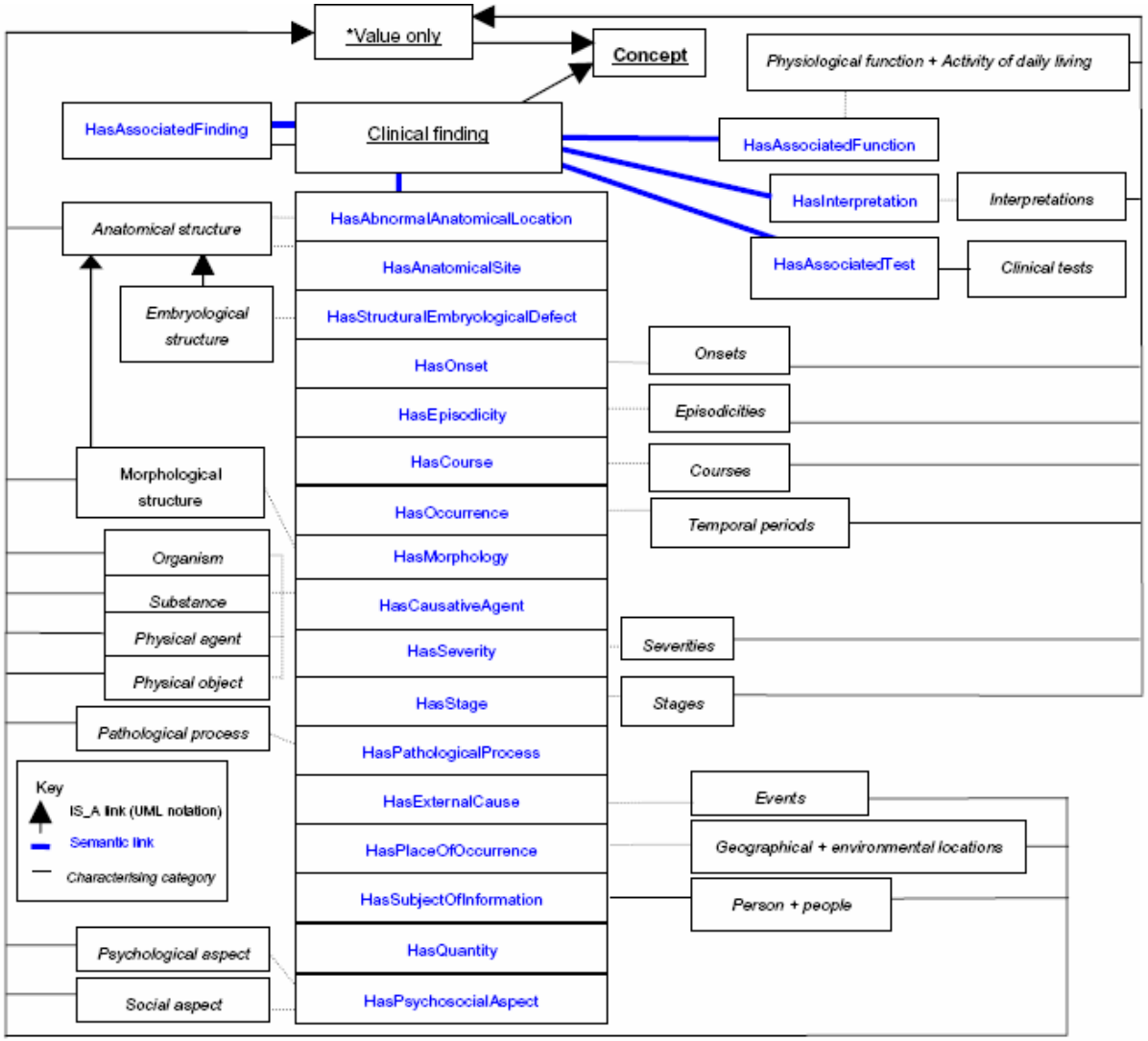
- The OntoCRF(CRF based Ontology) is based on the conceptual model using Protégé 3.1.

CRF for Stroke Clinical Trials made by KIOM

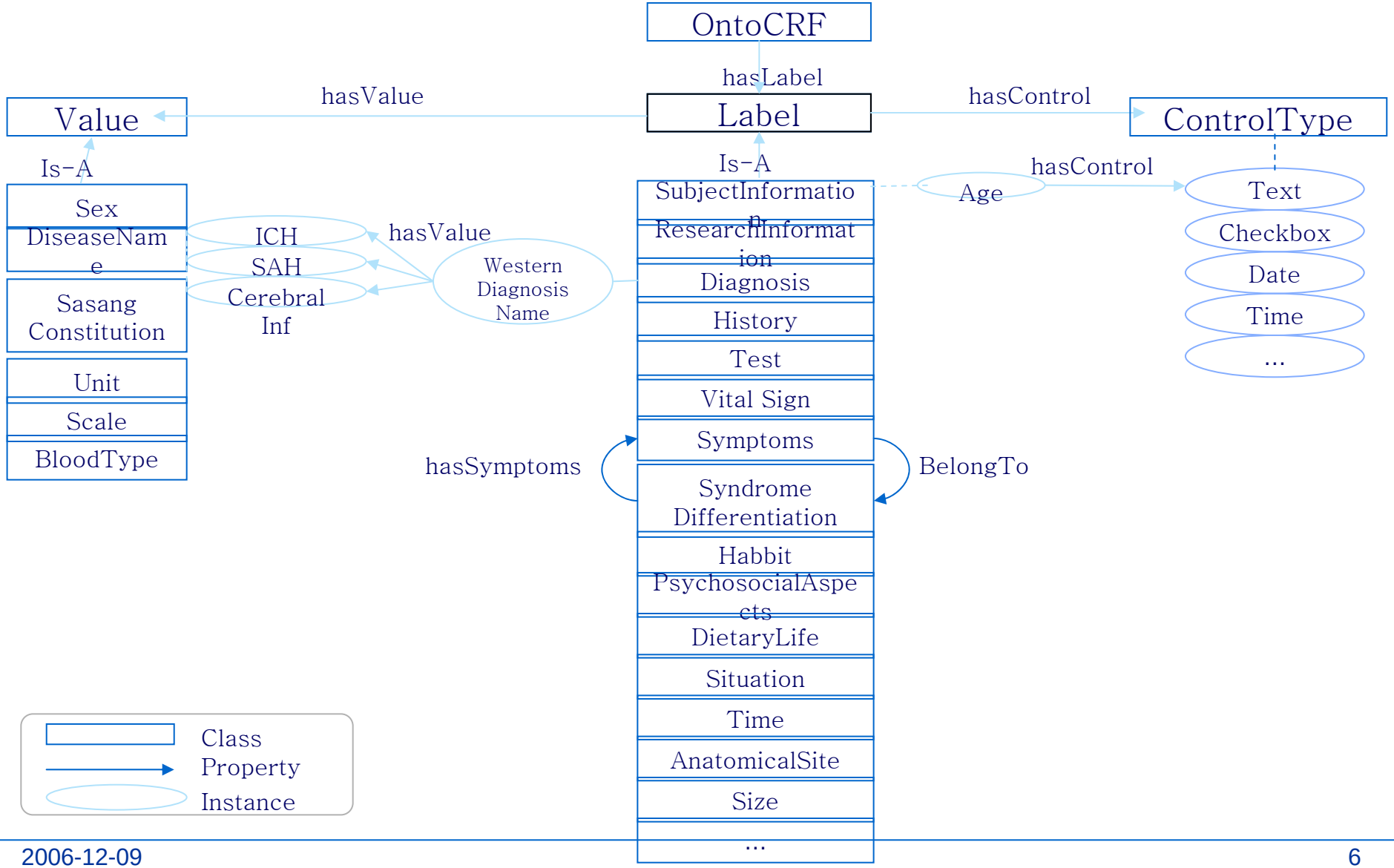


Reference Model

- ISO/TC 215 WG3 N231Draft ISO/DTS 22789 (ballot version.7) H ealth informatics
  - Conceptual framework for patient findings and problems in terminolog ies



Conceptual Model of CRF



OntoCRF – Classes and Properties

❖ Classes

OWLClasses | Properties | Forms

SUBCLASS RELATIONSHIP

For Project: OntoCRF

Asserted Hierarchy

- owl:Thing
  - crf:OntoCRF
    - crf:ControlType
    - crf:Domain
    - crf:Label
    - crf:Value

OWLClasses | Properties | Forms

SUBCLASS RELATIONSHIP

For Project: OntoCRF

Asserted Hierarchy

- owl:Thing
  - crf:OntoCRF
    - crf:ControlType
    - crf:Domain
    - crf:Label
    - crf:Value
      - crf:Value_BloodType
      - crf:Value_Cause
      - crf:Value_DiseaseName
      - crf:Value_etc
      - crf:Value_Gender
      - crf:Value_Habit
      - crf:Value_Preferences

OWLClasses | Properties | Forms

SUBCLASS RELATIONSHIP

For Project: OntoCRF

Asserted Hierarchy

- owl:Thing
  - crf:OntoCRF
    - crf:ControlType
    - crf:Domain
    - crf:Label
      - crf:Label_4Jin
        - crf:Label_AuscultationAndOlfaction
        - crf:Label_Inquiring
        - crf:Label_Inspection
        - crf:Label_Palpation
      - crf:Label_AnatomicalSite
      - crf:Label_BloodTest
      - crf:Label_Diagnosis
      - crf:Label_DietaryLife
      - crf:Label_Disease
      - crf:Label_etc
      - crf:Label_History
      - crf:Label_PsychoSocialAspect
      - crf:Label_ResearcherInformation
      - crf:Label_Situation
      - crf:Label_Size
      - crf:Label_SubjectInformation
      - crf:Label_SyndromeDifferentiation
      - crf:Label_Test

❖ Properties

OntoCRF Protégé 3.1 (file:₩E:₩대학원₩OWL_test₩OntoCRF.pprj, OWL Fil

File Edit Project OWL Code Window TGVizTab Tools Help

OWLClasses | Properties | Forms | Individuals | Metadata | TGVizTab | Queri

PROPERTY BROWSER

For Project: OntoCRF

Properties

- crf:belongto ↔ crf:hasSymptoms
- crf:hasControl
- crf:hasLabel
- crf:hasSymptoms ↔ crf:belongto
- crf:hasUnit
- crf:hasValue
- protege:abstract
- protege:allowedParent
- protege:defaultLanguage
- protege:excludedTest
- protege:probeClass
- protege:readOnly
- protege:subclassesDisjoint
- protege:todoPrefix
- protege:todoProperty
- protege:usedLanguage

PROPERTY EDITOR

For Property crf:belongto (instance of owl:Objec

Name | Equivalents | SameAs | DifferentFrom

crf:belongto

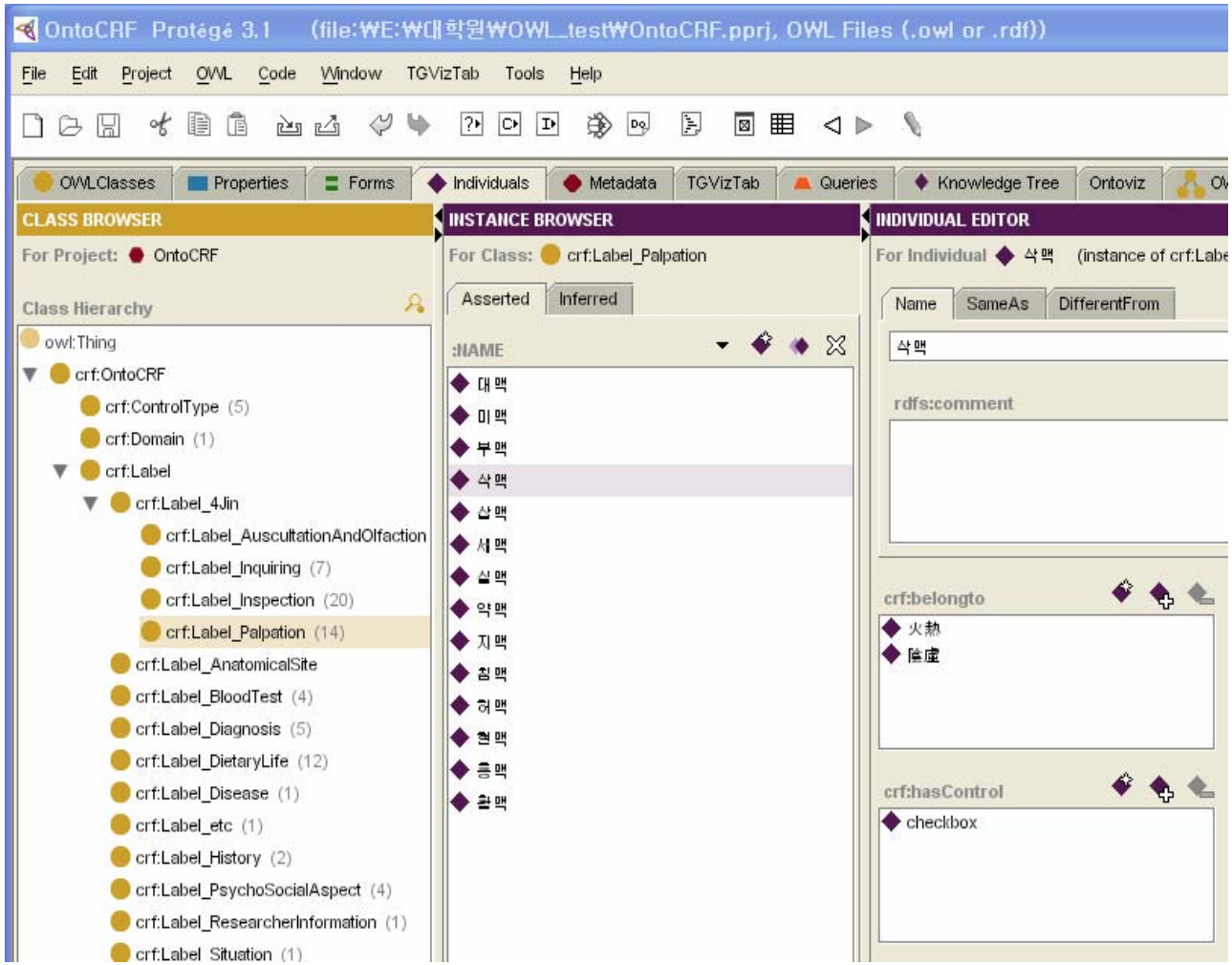
rdfs:comment

Domain

- crf:Label_Inspection
- crf:Label_AuscultationAndOlfaction
- crf:Label_Palpation
- crf:Label_Inquiring

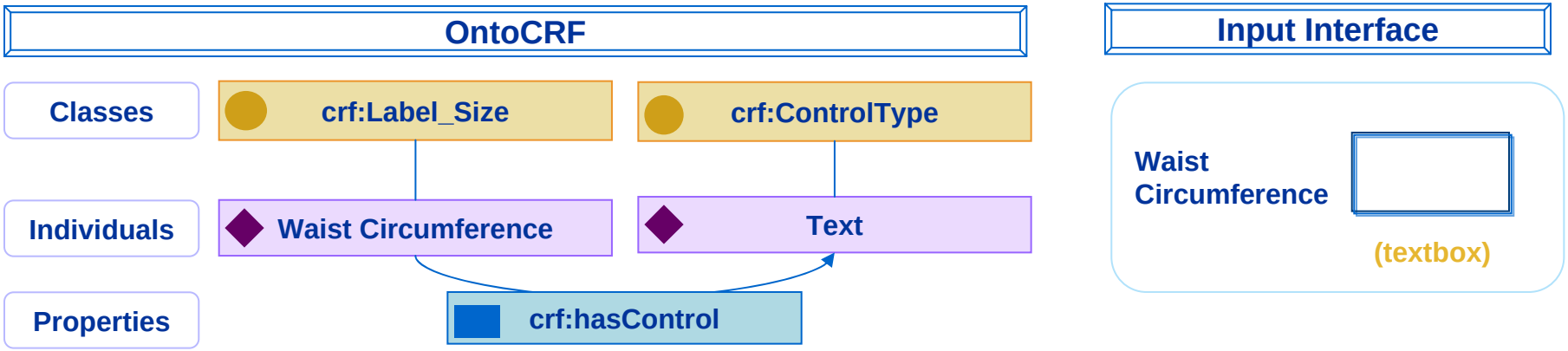
OntoCRF – Label

- Label Instance-hasControl, belongto

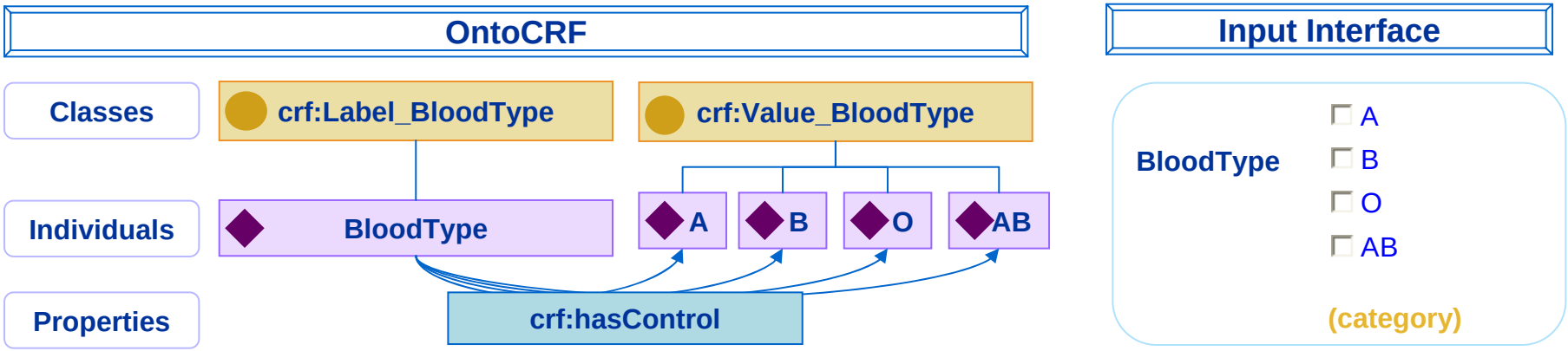


hasControl property generate interface

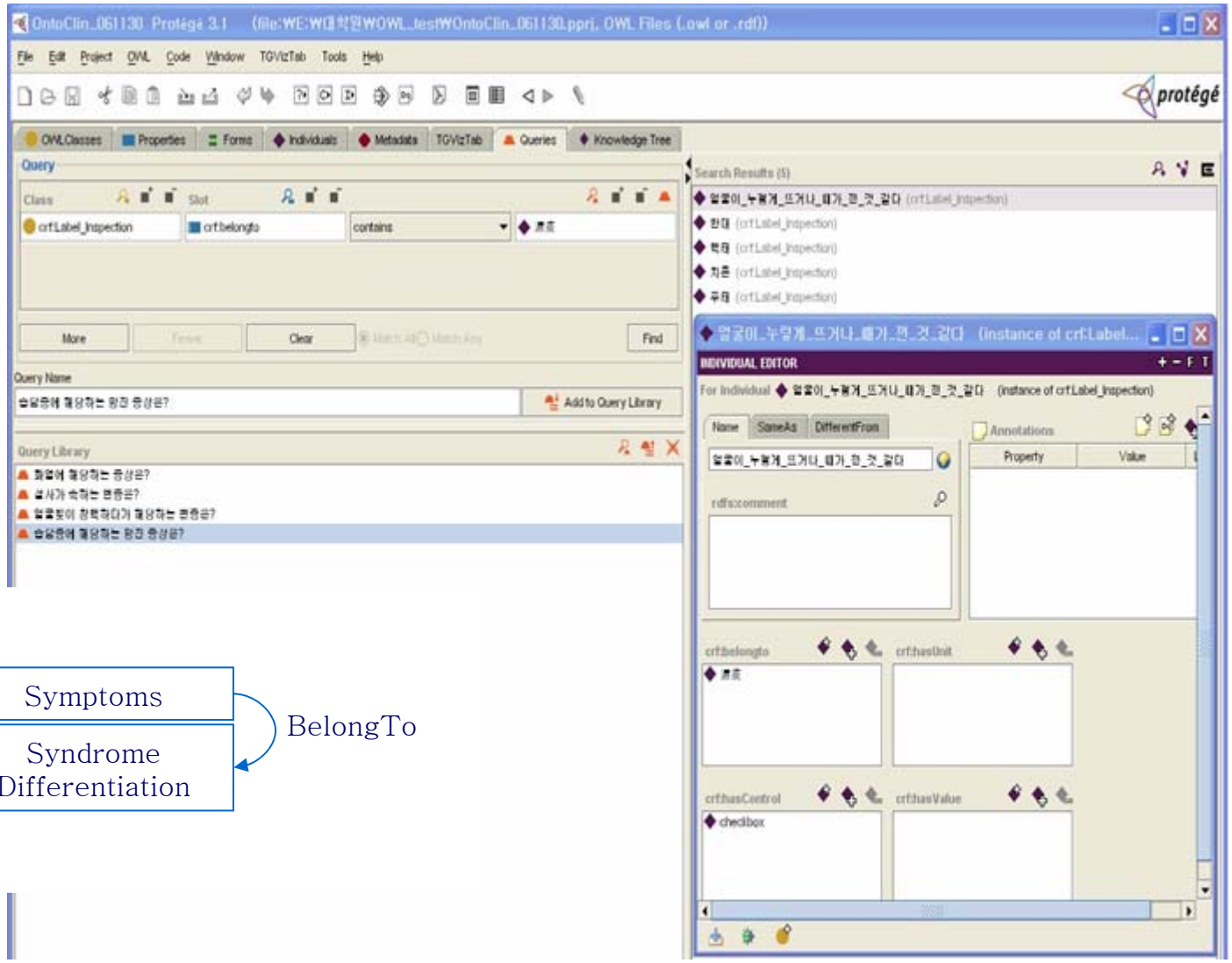
hasControl Text



hasControl Value



Queries Tab


File Edit Project OWL Code Window TGVizTab Tools Help
protégé
OWLClasses Properties Forms Individuals Metadata TGVizTab Queries Knowledge Tree
Query
Class
Slot
crf:Label_Inspection
crf:belongto
contains
More
Clear
Find
Query Name
Add to Query Library
Query Library
Search Results (5)
INDIVIDUAL EDITOR
Name
SameAs
DifferentFrom
Annotations
Property
Value
rdfs:comment
crf:belongto
crf:hasUnit
crf:hasControl
crf:hasValue
checkbox

hasSymptoms
Symptoms
Syndrome Differentiation
BelongTo

Discussion and Conclusion

- The OntoCRF builds on the standard CRF by domain experts, oriental medicine doctors. It organizes classes and properties and their relationships. Therefore preparation based ontology is more systematically than that based RDBMS at representing the knowledge.

- This ontology model is developed in stroke domain. Furthermore it could use to construct the other disease diagnosis and clinical decision support or reasoning by ontology.

- The traditional medicine ontology would link with existing western medicine ontology such as UMLS and SNOMED CT.

- Ontology of metadata in traditional medicine should consent among domain experts.

References

1. ClinTrialTM. PHASE•FORWARD. Available at http://www.phaseforward.com

2. Xuezhong Zhou, Zhaohui Wu, Aining Yin, Lancheng Wu, Weiyu Fan, Ruen Zhang. Ontology Development for Unified Traditional Chinese Medical Language System. 中國科技論文在线

3. ISO/TC 215 WG3 N231 - Draft ISO/DTS 22789 (ballot version.7) Health informatics - Conceptual framework for patient findings and problems in terminologies

4. 이현실. 합성 온톨로지 기반의 한의학 처방 지식 관리 시스템. 한국학술정보(주). 2006

5. 의약품임상시험관리기준개정안 (식품의약품안전청고시 제1999-67호)

6. http://www.w3.org/2004/OWL/004/OWL/

Acknowledgements

This study was supported by the Clinical Database Construction of Oriental Medicine for Evidence Based Medicine Project (K07010) of Korea Institute of Oriental Medicine in 2007.

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