In developing ~~the~~our semantic web system for the child immunization system, in addition to consulting the literature, we also interviewed four mothers with young children in order to uncover areas for improvement in the childhood immunization process. After reviewing the system ~~need~~needs and design analysis, we decided on the outcome structure ~~is~~ as demonstrated in ~~figure~~Figure 1. ~~Main~~Its main users are parents with young children, and they can access this system from any ~~web-based point, in~~area with internet access. In addition to user account information management, vaccination reminders, date suggestions, and date changes, the system can also provide vaccination and disease information through semantic and keyword ~~search~~searches. In an attempt to provide comprehensive information on vaccination, the team developed the system by linking basic information on childhood vaccination and related ~~disease basic information linked~~diseases to ~~the system~~it. The development of this knowledge base derives from ~~paediatric~~the pediatric literature, 56 documents ~~or~~from web-based resources, and 13 documents from the government-~~-~~based Taiwan ~~Centre~~Center for Disease Control Office.

The system ~~is~~was developed with Eclipse ~~program~~software, and Java, ~~Java Script~~JavaScript, and ~~Java Server Page~~JavaServer Pages (JSP) ~~are~~were used in the website development. The website is served by Apache Tomcat, and all individual user information, child immunization ~~record~~records, and vaccination and related-~~-~~disease resources are stored on a MS SQL server database. For language research functionality, Protégé 3.3 beta ~~is~~was used to develop ~~a~~an ontology for immunization, and Jena Java and the Protégé OWL operating system interface ~~are~~were used to store the synonyms and related terms in this ontological structure.

~~Immunization~~An immunization information search involves four interfaces. The first and second involve the user directly selecting the vaccination name, or choosing from among pre-set frequently encountered vaccination ~~name~~ and disease ~~name which appears~~names that appear on the immunization table. The third option involves the user ~~type~~typing in a search phrase ~~and~~that then undergoes a semantic search, and the fourth option utilizes a keyword search from within the search phrases typed.

Once a user has entered a search phrase, the system will convert all capitalized ~~letter~~letters into ~~lower case~~lowercase in the English alphabet, and conduct either ~~key word~~a keyword search or search using the entire phrase. If the search is conducted through the semantic web, the system will first check for synonyms in the immunization ontology~~;~~: if a synonym is identified, then variants of the synonyms are defined as ~~key words~~keywords in the search. Apart from searching for synonyms in the search phrase, the system will also conduct categorical analysis (see ~~figure~~Figure

註解 **[Editor1]:**
Golden English Editing
Humanities and Social Sciences
Information Management
Sample of work

註解 **[Editor2]:**

CHECK: Please verify that this edit retains your intended meaning.

3). For example if the term belongs to the category ~~of~~named “vaccine”, then the disease prevented by this ~~immunization~~vaccine can be obtained by the relationship of “Prevents”. Conversely, if the term belongs to category ~~of~~named “disease”, then the vaccines that can prevent this disease are linked by the relationship “Prevented-By”. The obtained vaccination or disease names are designated as final search terms.

Moreover, for interface ~~option~~Options 1 and 2, once the user ~~have~~has selected the vaccine or disease name, the system will ~~similarly~~ use semantic search in a similar way, to compare ~~for~~against synonyms and categories from within the immunization ontology and to conduct subsequent information ~~search~~searches. The benefit of these two interface options is that it ~~is~~saves the time ~~saving from~~of having to type out the search phrase, and the user can target specific questions for further ~~search~~searching, therefore increasing their knowledge of immunization.

System Evaluation

~~System~~The system evaluation involves three key components. ~~First~~The first component is the evaluation of the immunization ontology designed for this research. The team consulted specialists in clinical pharmacy and immunization to comment on and suggest ~~improvement on~~improvements for the comprehensiveness of the ontology. ~~Second~~The second component involves testing and troubleshooting the basic system performance. In addition, semantic search speed, accuracy, comprehensiveness of results, and ~~search of synonyms~~synonym searches are also ~~analysed~~analyzed. Lastly, the ~~4~~four mothers involved in the initial focus group interview, ~~8~~eight medical practitioners and ~~19~~nineteen computer science students ~~are~~were invited to test the system, providing feedback on their experiences with the system and suggesting areas for improvement.

Results

The results broadly ~~include~~cover two ~~components~~areas. The first ~~is~~consists of findings concerning the immunization ontological design, and the second ~~component~~ outlines the functional design of a semantic search for childhood immunization management system. Assessments and ~~explanation~~explanations are provided for results from both areas.

Child Immunization Ontological Design

Protégé 3.3 beta’s OWL DL was used for the final design of the ontological structure, as shown in ~~figure~~Figure 3. Considering the majority of searches on childhood immunization ~~is~~are on topics related to vaccine information, the disease prevented by

註解 **[Editor3]:**

CHECK: Please note, the word “Prevents” is misspelled in this Figure (as “Prevente**s**”). Please revise this figure before publication.

a vaccine, symptoms of diseases, and optimal time or period for vaccination, after consulting the UMLS ~~is consulted and 4~~, the four categories of vaccine, disease, symptoms, and age ~~are~~were established. ~~Vaccine~~The vaccine category ~~is~~was further divided into live-attenuated vaccine and non-live vaccine, and age ~~is~~was separated into ~~time or period~~the two categories of time or period, depending on the vaccination requirement; moreover ~~considering~~, since vaccine and disease ~~are~~constitute two other important ~~terminologies~~ terms in this field, synonyms of these two terms were established as well. In addition, to improve the reliability of semantic ~~search~~searches, symptoms characterizing different diseases ~~are~~were established as additional ~~relations.~~relationships. Each category is ~~related~~interrelated via its Object Property ~~setting~~settings, including the terms "Occurs_In", "Prevents", "Prevented_By", and "Related_To". Synonymous terms are stringed together by ~~Data type Property.~~the DatatypeProperty. Once the ontological structure is completed, additional instances are added to respective categories, and new ~~relations~~relationships and synonymous terms are ~~also~~ added as well.

Support for semantic search ~~for Childhood~~in the children's immunization management system

In order to store resources on vaccine and relevant diseases, two data sheets ~~are~~were established. ~~Vaccine~~The vaccine data sheet ~~contain~~contains the serial code, ~~vaccine~~ Chinese ~~name,~~and English vaccine ~~English name~~names, vaccine properties, ~~vaccine~~an introduction~~, appropriate age of~~ to the vaccine, the suitable ages for recipients, dosage, mode of delivery, injection sites, adverse reactions and contra-indications, rate of immunity, and duration of immunity. ~~Data sheet on~~The disease ~~contain~~data sheet contains fields for the serial code, ~~name of~~ disease name, disease ~~serial number,~~