



# Implementing a Government-wide Semantic Solution to Thesauri

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# Agenda

- Problem
- Goals and Requirements
- Basic Thesaurus Terminology and IC Examples
- SKOS (Simple Knowledge Organisation System)
- Our SKOS Element Subset and Extensions
- SKOSaurus Pilot
- DTIC Thesaurus Examples
- Potential Next Steps



## Problem Statement

- Government agencies need common vocabulary of (technical) terminology.
- Communication and data sharing is greatly enhanced when the semantics are clear.
- Various government groups approach this in different ways -- Microsoft Word, Excel, HTML, databases, and wiki pages: bulleted lists, tables, spreadsheets, acronym lists, etc.
- Need to focus on a common formats and standards that enable reuse and harmonization across Communities of Interest (COIs).



## Goals and Requirements

- Allow constraining terms to one COI or sharing across COIs.
- Should benefit from ISO standards for thesauri.
- Enable term authors to use familiar tools (e.g., Excel).
- Leverage existing Microsoft formats to access expressive backend data stores.
- XML-based (RDF) solution with few required elements but many optional and/or repeatable elements.
- Multiple definitions of the same term must be permitted, with either same or different subject/context.
- Should support semantic relationships between terms: “search thesaurus”.



## % Thesauri Standards and Specifications

- **ISO 2788:1986** - Documentation - Guidelines for the establishment and development of monolingual thesauri
  - Developing a Thesaurus (mono-lingual)
  - ISO 5964:1986 - multi-lingual version
- ISO 1087:2000 - Vocabulary of Terminology
- ISO 704:2000 - Principles and Methods
- **ANSI/NISO Z39.19-2003** - Construction, Format, and Management
- ISO 15836:2003 - The Dublin Core metadata element set
- [Many more listed in paper.]



## % Basic Thesaurus Terminology (1) [ISO 2788:1986]

- *Thesaurus* - list of concepts in a particular domain of knowledge together with explicit relationships
- *Concept* - unit of thought that exists in the mind as an abstract entity, independent of the term(s) that identify it (i.e., human language independent)
- *Concept Scheme* - set of concepts, optionally including statements about semantic relationships between those concepts.
  - Thesauri, classification schemes, subject heading lists, taxonomies, terminologies, glossaries and other types of controlled vocabularies

# Basic Thesaurus Terminology (2) [ISO 2788:1986]

- ISO 2788 defines abbreviations for each thesaurus construct. These “generally recognized conventions” are useful for compactness and in automated processing.
- USE (or SEE) - *preferred* label for this concept follows
- UF = USE FOR - *alternate* label follows, may be a synonym but less preferred
  - e.g., ELECTRONIC INTELLIGENCE **UF** ELINT

↑  
Preferred label

↑  
Alternate label



## Basic Thesaurus Terminology (3) [ISO 2788:1986]

- SN = Scope Note - to clarify or constrain the meaning
  - sometimes contains the concept's definition
- BT = Broader Than - another concept more *general* than this concept
- NT = Narrower Than - more *specialized* than this concept
- RT = Related To - concept that is *similar* in some way



## Thesaurus Concept Example

### **MT Adult education**

BT Education

BT Employee training

NT Continuing education

RT Community colleges

RT Compensatory education

RT Higher education

SN Educational programs/services, usually at the postsecondary level, for adults seeking personal, academic or occupational enhancement.

### **MT Adults**

NT Elderly persons

RT Parents

RT Youth

Source: GAO Thesaurus, Feb. 2005



## Example: DTIC Thesaurus (1)

*INTELLIGENCE*

NT ACOUSTIC INTELLIGENCE

NT COUNTERINTELLIGENCE

NT \*ELECTRONIC INTELLIGENCE

NT INTELLIGENCE(HUMANS)

NT \*MILITARY INTELLIGENCE

NT PHOTOGRAPHIC INTELLIGENCE

DTIC  
Thesaurus

Italics added

*INTELLIGENCE(MILITARY)*

use MILITARY INTELLIGENCE

Source:  
Defense Technical  
Information Center



## DTIC Thesaurus (2)

### *MILITARY INTELLIGENCE*

EVALUATED INFORMATION CONCERNING AN ACTUAL OR POSSIBLE ENEMY THEATER OF OPERATIONS.

UF INTELLIGENCE(MILITARY)

BT INTELLIGENCE

NT AIR INTELLIGENCE

NT ARMY INTELLIGENCE

NT COMMUNICATIONS INTELLIGENCE

NT ESPIONAGE

NT NAVAL INTELLIGENCE

NT STRATEGIC INTELLIGENCE

NT \*TACTICAL INTELLIGENCE



## DTIC Thesaurus (3)

### *ARMY INTELLIGENCE*

INCLUDES EVERY PHASE AND HANDLING OF INFORMATION FROM ITS EVALUATION COLLATION, SYNTHESIS, INTERPRETATION AND PRESENTATION, TO ITS DISSEMINATION BY THE ARMY.

BT \*MILITARY INTELLIGENCE

### *COMINT*

use COMMUNICATIONS INTELLIGENCE

### *COMMUNICATIONS INTELLIGENCE*

TECHNICAL AND INTELLIGENCE INFORMATION DERIVED FROM FOREIGN COMMUNICATIONS BY OTHER THAN THE INTENDED RECIPIENTS.

UF COMINT

BT \*MILITARY INTELLIGENCE



## DTIC Thesaurus (4)

*COUNTERINTELLIGENCE*  
BT INTELLIGENCE

*ELECTRONIC INTELLIGENCE*

THE TECHNICAL AND INTELLIGENCE INFORMATION DERIVED FROM FOREIGN NONCOMMUNICATIONS ELECTROMAGNETIC RADIATIONS EMANATING FROM OTHER THAN NUCLEAR DETONATIONS OR RADIOACTIVE SOURCES.

UF ELINT  
BT INTELLIGENCE  
NT RADAR INTELLIGENCE

*ELINT*

use ELECTRONIC INTELLIGENCE



## DTIC Thesaurus (5)

*NAVAL INTELLIGENCE*  
BT \*MILITARY INTELLIGENCE

*RADAR INTELLIGENCE*  
INTELLIGENCE CONCERNING RADAR OR INTELLIGENCE DERIVED FROM THE USE OF RADAR EQUIPMENT.  
BT \*ELECTRONIC INTELLIGENCE

*STRATEGIC INTELLIGENCE*  
BT \*MILITARY INTELLIGENCE

*TACTICAL INTELLIGENCE*  
BT \*MILITARY INTELLIGENCE  
NT TERRAIN INTELLIGENCE

Note: We will see the data from these DTIC slides later in SKOSaurus.

# DTIC Thesaurus (6) - Navigation Interface



Public STINET  
[Home](#) | [Collections](#)

[New Descriptor Search](#) | [Insert this Descriptor into a TR Guided Search](#)

**DTIC Thesaurus Entry**

**Descriptor:**  
MILITARY INTELLIGENCE

EVALUATED INFORMATION CONCERNING AN ACTUAL OR POSSIBLE ENEMY THEATER OF OPERATIONS.

**Broader Terms:**  
[INTELLIGENCE](#)

**Narrower Terms:**  
[AIR INTELLIGENCE](#)  
[ARMY INTELLIGENCE](#)  
[COMMUNICATIONS INTELLIGENCE](#)  
[ESPIONAGE](#)  
[NAVAL INTELLIGENCE](#)  
[STRATEGIC INTELLIGENCE](#)  
[TACTICAL INTELLIGENCE](#)

**Used Alone For:**  
[INTELLIGENCE\(MILITARY\)](#)

**Use:**

**Used in Combination For:**

**Use in Combination:**

---



[Privacy & Security Notice](#) | [Web Accessibility](#)

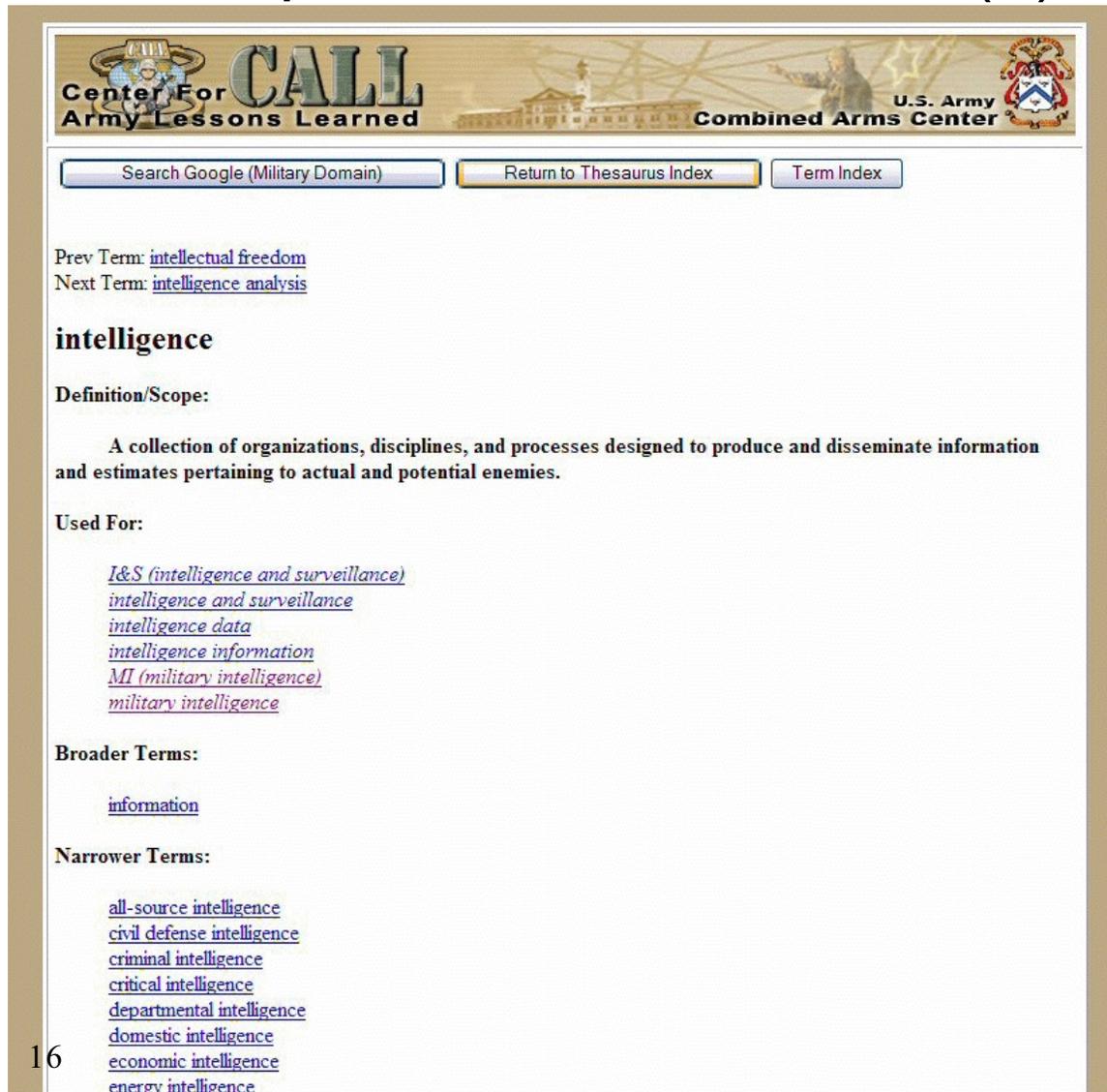
[stinet@dtic.mil](mailto:stinet@dtic.mil)



DTIC  
Thesaurus

# Example: CALL Thesaurus (1)

## CALL Thesaurus



The screenshot shows the CALL Thesaurus interface. At the top, there is a banner with the text "Center For CALL Army Lessons Learned" and "U.S. Army Combined Arms Center". Below the banner are three buttons: "Search Google (Military Domain)", "Return to Thesaurus Index", and "Term Index". The main content area is titled "intelligence". Under "Definition/Scope:", it states: "A collection of organizations, disciplines, and processes designed to produce and disseminate information and estimates pertaining to actual and potential enemies." Under "Used For:", it lists several terms: *I&S (intelligence and surveillance)*, *intelligence and surveillance*, *intelligence data*, *intelligence information*, *MI (military intelligence)*, and *military intelligence*. Under "Broader Terms:", it lists *information*. Under "Narrower Terms:", it lists: *all-source intelligence*, *civil defense intelligence*, *criminal intelligence*, *critical intelligence*, *departmental intelligence*, *domestic intelligence*, *economic intelligence*, and *energy intelligence*.

- [energy intelligence](#)
- [evasion and escape intelligence](#)
- [finished intelligence](#)
- [foreign intelligence](#)
- [geographic intelligence](#)
- [intelligence cycles](#)
- [intelligence disciplines](#)
- [intelligence estimates](#)
- [interdepartmental intelligence](#)
- [joint intelligence](#)
- [medical intelligence](#)
- [national intelligence](#)
- [national intelligence estimates](#)
- [naval intelligence](#)
- [political intelligence](#)
- [raw intelligence](#)
- [scientific and technical intelligence](#)
- [technical intelligence](#)
- [terrain intelligence](#)

### Related Terms:

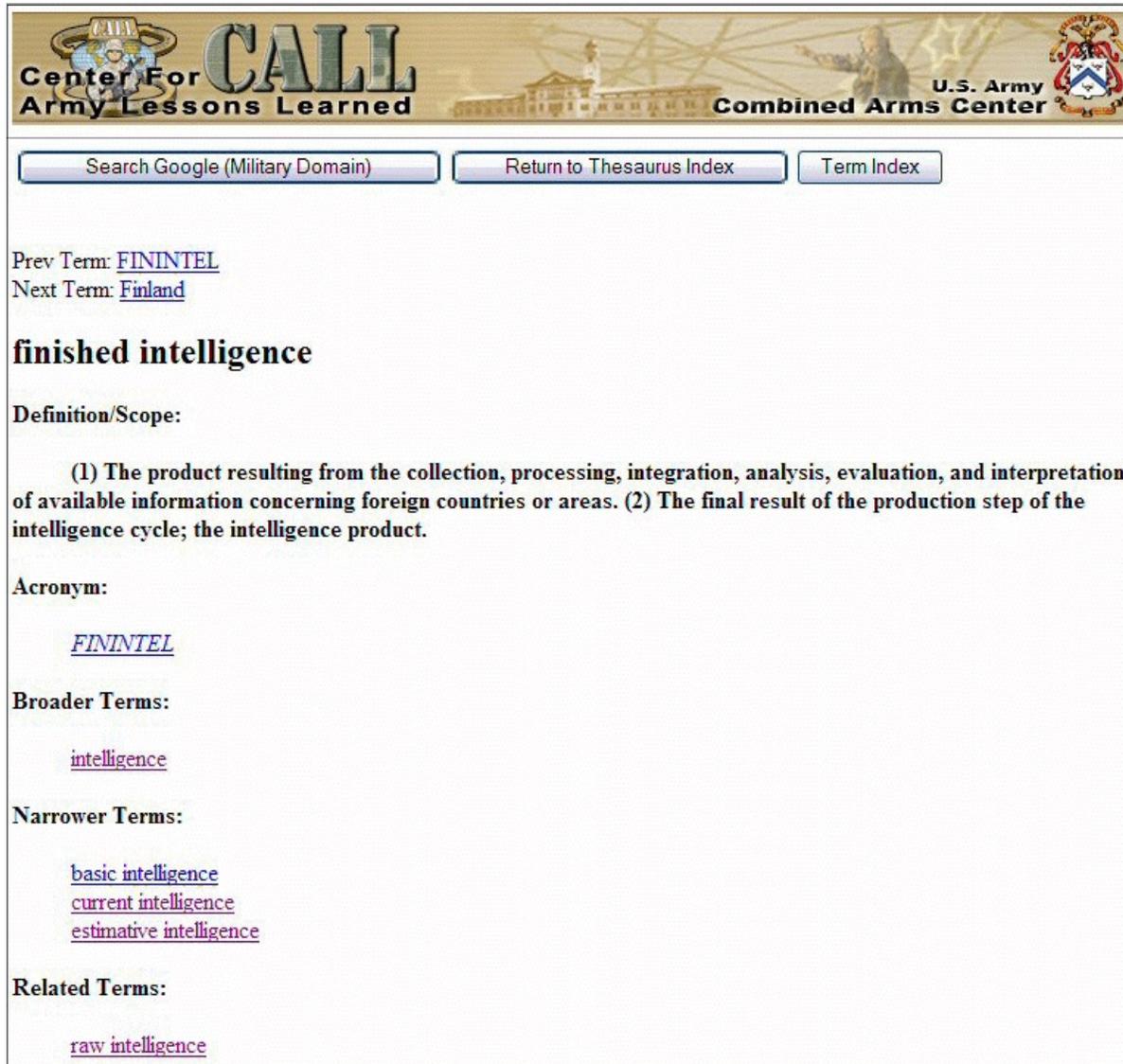
- [intelligence and electronic warfare](#)
- [intelligence publications](#)
- [military capabilities studies](#)

Send your comments to: [CALL Thesaurus](#)

Last updated: Aug 25, 2005 (cer)

Concept: intelligence

# CALL Thesaurus (2)



**Center For CALL**  
Army Lessons Learned

U.S. Army  
Combined Arms Center

Search Google (Military Domain)    Return to Thesaurus Index    Term Index

Prev Term: [FININTEL](#)  
Next Term: [Finland](#)

**finished intelligence**

**Definition/Scope:**

(1) The product resulting from the collection, processing, integration, analysis, evaluation, and interpretation of available information concerning foreign countries or areas. (2) The final result of the production step of the intelligence cycle; the intelligence product.

**Acronym:**

[FININTEL](#)

**Broader Terms:**

[intelligence](#)

**Narrower Terms:**

[basic intelligence](#)  
[current intelligence](#)  
[estimative intelligence](#)

**Related Terms:**

[raw intelligence](#)

CALL Thesaurus

Concept: finished intelligence

# FEA Business Reference Model (BRM)

## BUSINESS REFERENCE MODEL (BRM) Services for Citizens: Intelligence Operations

Intelligence Operations involves collecting and analyzing information to meet the national security challenges of the US by processing reliable, accurate foreign intelligence, and disseminating intelligence products to policymakers, military commanders, and other consumers.

- **Dissemination**  
Consists of delivering the intelligence products to consumers.
- **Intelligence Analysis & Production**  
Converts large amounts of data to a form suitable for the production of finished intelligence to include translation, decryption, and interpretation of information stored on film and magnetic media through the use of highly refined photographic and electronic processes.
- **Intelligence Collection**  
Involves the gathering of raw data from multiple sources from which finished intelligence is produced.
- **Intelligence Planning and Direction/Needs**  
Establishes the intelligence requirements of the policymakers, the President, the NSC, military commanders, and other officials in major departments and governmental agencies.

Intelligence  
Operations  
in the BRM



# SKOS (Simple Knowledge Organisation System)

- Leverages ISO 2788 (and ISO 5964) by defining an RDF vocabulary based on the ISO standards [implied].
- Defines an XML element (SKOS property) for each thesaurus construct (USE, UF, BT, NT, SN, etc.) and many more.
- Semantic Web Best Practices and Deployment Working Group - W3C
- SKOS Working Drafts (W3C) and Related Efforts
  - SKOS Core Guide
  - SKOS Core Vocabulary Specification
  - Quick Guide to Publishing a Thesaurus on the Semantic Web
  - Also: SKOS Mapping, Extensions, API, Development Wiki



## SKOS Core

- SKOS Core - model for expressing structure and content of *concept schemes*:
  - Thesauri
  - Classification schemes
  - Subject heading lists
  - Taxonomies
  - “Folksonomies”
  - Other types of controlled vocabulary
  - Concept schemes are also embedded in glossaries and terminologies.

Source: SKOS Core Guide, November 2005



# SKOS Core Vocabulary

- SKOS Core Vocabulary
  - Application of Resource Description Framework (RDF)
  - Can be used to express a concept scheme as an RDF graph
  - Can be linked to and/or merged with other RDF data by semantic web applications
  - Uses RDFS Classes and RDF Properties to describe Concepts and Concept Schemes
  - 26 Properties and 5 Classes

Source: SKOS Core Guide, November 2005



## % SKOS Vocabulary: 5 Classes

CollectablePropertyCollectionConcept  
\*ConceptScheme (\*)OrderedCollection

\* = the classes implemented in SKOSaurus pilot  
Source: SKOS Core Vocabulary, November 2005



## % SKOS Vocabulary: 26 Properties

altLabel \*altSymbolbroader  
\*changeNotedefinition  
\*editorialNoteexample  
\*hasTopConcepthiddenLabelh  
istoryNoteinSchemeisPrimaryS  
ubjectOf  
isSubjectOf

membermemberListnarrower  
\*noteprefLabel  
\*prefSymbolprimarySubjectrel  
ated \*scopeNote  
\*semanticRelationsubject  
\*subjectIndicatorsymbol

\* = 9 properties implemented in SKOSaurus pilot

Source: SKOS Core Vocabulary, November 2005



## Our SKOS Element Subset and Extensions (1)

- **skos:Concept** - contains all statements about properties for a given concept
- **skos:prefLabel** - USE; preferred handle for this concept; designator. [In SKOS, no two concepts in the same *concept scheme* may have same prefLabel.]
- **skos:altLabel** - UF; alternate handle; spelling variants; *can* be used for abbreviations or acronyms (but we don't)
- **skos:related**, **skos:narrower**, **skos:broader** - associated with, more specific, or more general than this concept



## Our SKOS Element Subset and Extensions (2)

- **skos:scopeNote** - constrains meaning; ISO 2788 allows definitions to appear here (but we don't)
- **skos:definition** - statement or formal explanation of the meaning of a concept
- **skos:example** - used in a sentence
- **skos:subject** - topic; can be a `skos:broader`



## Our SKOS Element Subset and Extensions (3)

- Pilot Extensions (non-SKOS)

- **ABBREVIATION\_OR\_ACRONYM** - very common government need (could define as `rdfs:subPropertyOf skos:altLabel`)
- **SOURCE** - official document names and URLs are preferred, but specific names of people or agencies are acceptable; (probably could define as `rdfs:subPropertyOf skos:note`)
- **COI** - essentially a `skos:Collection` (with a potential `skos:ConceptScheme`)



## SKOS Fragment: Military Intelligence

```
<skos:Concept rdf:about="http://ex.com/MILITARY_INTELLIGENCE#concept">
  <skos:prefLabel xml:lang="en">MILITARY INTELLIGENCE</skos:prefLabel>
  <skos:altLabel xml:lang="en">INTELLIGENCE(MILITARY)</skos:altLabel>
  <skos:definition xml:lang="en">EVALUATED INFORMATION CONCERNING AN
ACTUAL OR POSSIBLE ENEMY THEATER OF OPERATIONS</skos:definition>
  <skos:scopenote xml:lang="en">IC</skos:scopenote>
  <skos:source xml:lang="en">DTIC Thesaurus</skos:source>
  <skos:subject rdf:resource="http://ex.com/intelligence#concept"/>
  <skos:narrower rdf:resource="http://ex.com/AIR_INTELLIGENCE#concept"/>
  <skos:narrower rdf:resource="http://ex.com/ARMY_INTELLIGENCE#concept"/>
  <skos:narrower rdf:resource="http://ex.com/ESPIONAGE#concept"/>
  <skos:narrower rdf:resource="http://ex.com/NAVAL_INTELLIGENCE#concept"/>
  <!-- etc (several NTs omitted for space reasons) -->
</skos:Concept>
```



# SKOSaurus Pilot

- Proof of concept
- Many simplifying assumptions
- Fabricated data (except for DTIC)
- About 100 man hours
- Ron Reck and Ken Sall
- Presented at XML 2005 Conference (Nov. 2005)



## % SKOSaurus Pilot: Environment

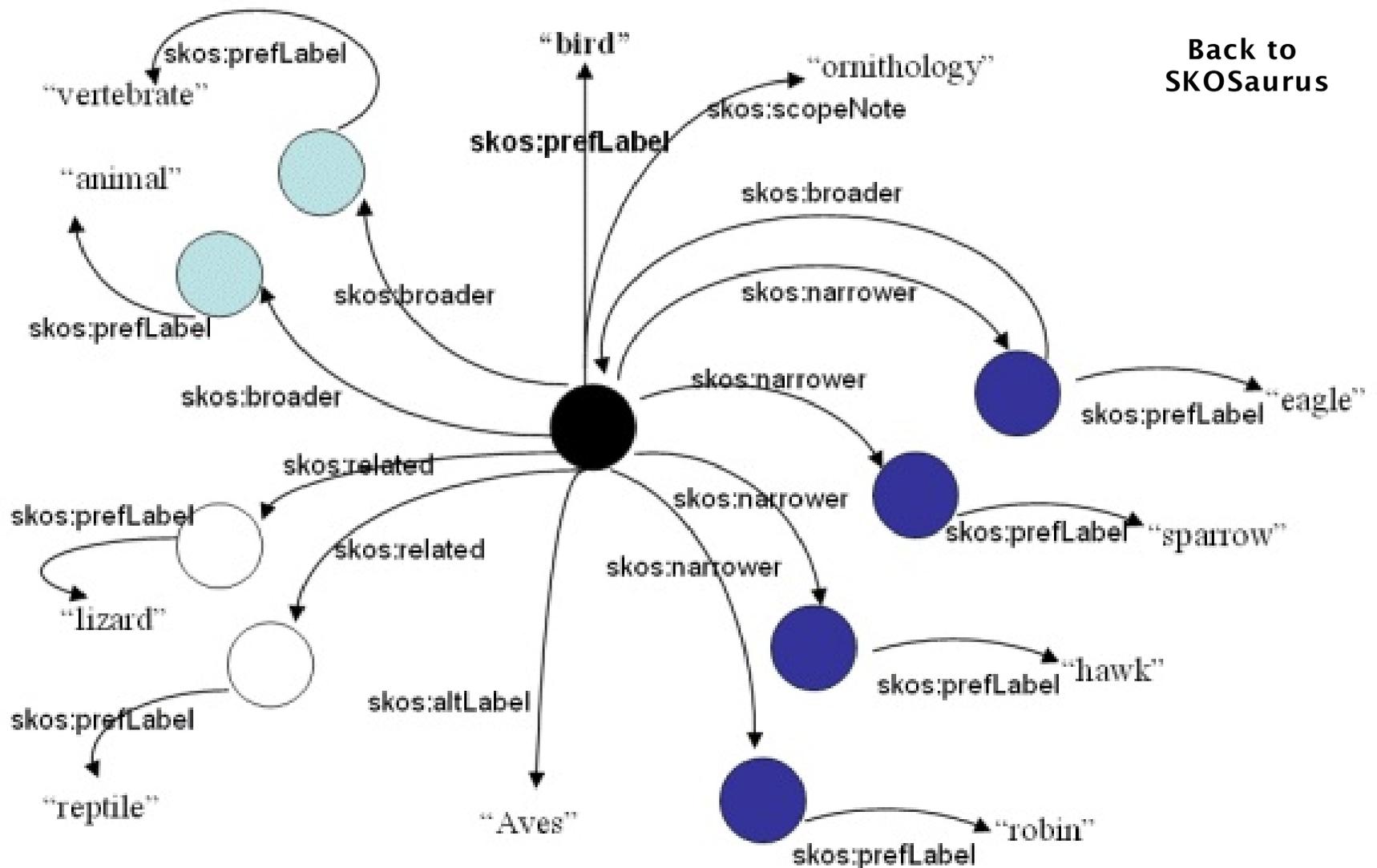
- CGI script issues SOAP requests and uses RMI.
- The host operating system is Microsoft Windows XP with Service Pack 2.
- Dell Latitude D800 (1.69GHz) with 1G of RAM.
- The Windows XP host runs VMware 5.0 build 13124 to emulate a machine onto which the Solaris X86 operating system version 10 is installed.
- This is referred to as the guest operating system which runs the SKOSaurus system, consisting of:
  - Perl version 5.8.7 and various Perl modules
  - Java version 1.4.2.08
  - Kowari server 1.1.0 Pre2
  - XSLT stylesheets



## Main Use Cases (for Pilot)

- Concept Entry via Web Form
- File Upload of Excel Spreadsheet (as CSV)
- File Upload of SKOS (or RDF)
- Query of Concept Data Store

# RDF Graph: Bird Example



Back to  
SKOSaurus



## % Illustrative Statements from RDF Graph

- An alternate label (`skos:altLabel`) for "bird" is "Aves".
- The concepts with the preferred label "vertebrate" and "animal" are broader than the concept with the preferred label "bird".
- There are four specializations of birds listed ("robin", "hawk", "sparrow" and "eagle"), each indicated as `skos:narrower` than "bird".
- The concepts "lizard" and "reptile" are `skos:related` to the "bird" concept in some way.
- Among various concepts which might have the `skos:prefLabel` of "bird", the one illustrated is constrained to ornithology, according to `skos:scopeNote`. This distinguishes the concept from "bird", such as in the informal term for a (young) woman.



## % OWL Statements About SKOS

- `skos:broader owl:inverseOf skos:narrower`
- `skos:narrower owl:inverseOf skos:broader`
- and
- `skos:broader` is an `owl:TransitiveProperty`
- `skos:narrower` is an `owl:TransitiveProperty`
- RDF/OWL version of SKOS Core

# Example Spreadsheet: birds

prefLabel	altLabel	ABBRE definition	subject	scopeNote
bird	Aves	warm-blooded egg-laying vertebrates characterized by feathers and forelimbs modified as wings	ornithology	ornithology
bird	chick	informal term for a (young) woman	slang	slang; more likely to be used in the UK
shuttlecock	birdie; cock; shuttle; bird	A shuttlecock is a high-drag projectile used in the sport of badminton. It has an open conical shape with a rounded head at the apex of the cone traditionally made of cork and a skirt traditionally of sixteen overlapping goose feathers.	sports	This term is applies only to the sport of badminton.
birdie	birdy	A score on an individual hole that is one stroke below par.	golf	This term applies only to golf.
eagle		any of various large keen-sighted diurnal birds of prey noted for their broad wings and strong soaring flight	ornithology	This terms refers to ornithology.
eagle		a score of two strokes under par on a hole	golf	This term applies only to golf.
Eagles		The Eagles are an American rock music group that originally came together in Los Angeles  California in the early 1970s.	music	This applies only to the rock music group.
Eagles	Philadelphia Eagles	Philadelphia football team	sports	This is a football team.
robin	American Robin	The American Robin (Turdus migratorius) is a	ornithology	This terms refers to

prefLabel	SOURCE	example	narrower	broader	related
bird	WordNet [http://wordnet.princeton.edu/] and http://en.wikipedia.org/wiki/Bird	A bird is an animal with feathers. All birds have wings but not all birds can fly. Ostriches  emus and penguins are birds that can't fly. Parrots  pelicans and wedge-tailed eagles are birds that can fly. All birds hatch from eggs. All birds are warm blooded.	eagle; sparrow; hawk; robin; kiwi	vertebrate; chordate; animal	birding; birdwatching; reptile; lizard
bird	http://wordnet.princeton.edu/	The young man whistled as the blonde bird walked by.		female	dame; doll; wench; skirt
shuttlecock	http://en.wikipedia.org/wiki/Birdie			badminton	
birdie	http://golf.about.com/cs/golferms/g/bldef_birdie.htm				par; bogey; even; eagle
eagle	WordNet [http://wordnet.princeton.edu/] and http://en.wikipedia.org/wiki/Eagle		bald eagle	bird	raptor
eagle	WordNet [http://wordnet.princeton.edu/]				
Eagles	http://en.wikipedia.org/wiki/Eagles	The Eagles compilation  Their Greatest Hits (1971-1975)  with US sales of 28 000 000 is the best selling album of all time.	Glenn Frey; Don Henley; Joe Walsh; Timothy Schmit	California Rock	Linda Ronstadt; Poco; James Gang
Eagles	http://www.philadelphiaeagles.com/default.jsp	The Philadelphia Eagles are part of the NFL.	Donovan McNabb	NFL	Washington Redskins
robin	http://en.wikipedia.org/wiki/American_Robin	The American Robin has gray upperparts and head  and orange underparts  usually		thrush; bird	blackbird; European Robin

# Single Row of Spreadsheet

prefLabel	altLabel	ABBRE definition	subject	scopeNote	
bird	Aves		warm-blooded egg-laying vertebrates characterized by feathers and forelimbs modified as wings	ornithology	ornithology

prefLabel	SOURCE	example	narrower	broader	related
bird	WordNet [ <a href="http://wordnet.princeton.edu/">http://wordnet.princeton.edu/</a> ] and <a href="http://en.wikipedia.org/wiki/Bird">http://en.wikipedia.org/wiki/Bird</a>	A bird is an animal with feathers. All birds have wings but not all birds can fly. Ostriches  emus and penguins are birds that can't fly. Parrots  pelicans and wedge-tailed eagles are birds that can fly. All birds hatch from eggs. All birds are warm blooded.	eagle; sparrow; hawk; robin; kiwi	vertebrate; chordate; animal	birding; birdwatching; reptile; lizard



## % Spreadsheet Conventions (Pilot)

- One row per concept, sparse or densely populated.
- New row for different definition or homonym (e.g., bird). [SKOS conflict: no duplicate prefLabels.]
- The heading row should not be removed or modified.
- Column order is invariant.
- Since several elements are repeatable, use semi-colon to indicate iteration. [Configurable.]
- A limitation in our pilot parser requires the author to use the pipe symbol ("|") instead of a comma within a cell. [Config.]
- Any number of rows can be included, but there must be no blank rows or separator rows.
- File > Save As Comma Separated Values (\*.csv).

# SKOSaurus: Home Page

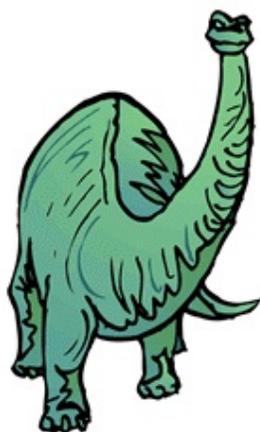
SKOSaurus Home - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://skosaurus.rrecktek.com/

XML FAMILY W3C TR GOV donations WashPost Maryland's Upscale Si... Comix Release Security Fix Cassandra Lynn Tiffany Merak DHCP Comcast

## SKOSAURUS



- [Manage](#) COI's
- [Upload](#) CSV or RDF
- [Enter](#) Values
- [Kowari](#) Search
- [Intuitive](#) Search

SKOSaurus is a system designed by [Ken Sall](#) and [Ronald P. Reck](#).  
[This paper](#) describes the intention and functionality of the system.

If you are interested in getting a login to the system send a [request](#).

Version 1.0

Version described in the paper

Version 1.1

System with working [DTIC data](#) presented at [ICMWG](#).  
[The slides](#) for that presentation. (password required)

Version 1.2

Visualization web service and migration to [64bit Debian](#)  
under [VMware 5.5.1](#)

# SKOSaurus: Manage COIs

**SKOSAURUS**

DELETE

icmwg  
 icea  
 caf  
 drm  
 dtic

CREATE

icmwg  
 icea  
 caf  
 drm  
 dtic

view\_log  
 do\_nothing

Lines

# SKOSaurus: Upload CSV or SKOS

## SKOSAURUS

### CSV or SKOS File Upload

Select the *browse* button to choose a file to upload.

Enter the file to upload:

Select the COI to upload to:  icmwg  icea  caf  drm  dtic

Select the delimiter used in the file:  comma  tab  pipe

Select the URI type to use:  text  numeric

# SKOSaurus: Upload Feedback

**Birds.csv**

**/usr/tmp/CGItemp61741**

**MIME Type:** *application/vnd.ms-excel*

**Upload received. See the [upload](#) or the [resulting SKOS](#) or additional [bootstrapped URIs](#)**

Successfully loaded 128 statements from file:/var/apache2/htdocs/incoming/csv-1130627035.txt into rmi://skosaurus.rrecktek.com/server1#drm

Successfully loaded 138 statements from file:/var/apache2/htdocs/incoming/csv-1130627035.txt.bootstrap into rmi://skosaurus.rrecktek.com/server1#drm

Generated SKOS files

Datastore for COI



# SKOSaurus: Generated SKOS Excerpt (1)

```
- <rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
  xmlns:skos="http://www.w3.org/2004/02/skos/core#">
- <skos:Concept rdf:about="http://skos.rrecktek.com/drm/bird#concept">
  <skos:prefLabel xml:lang="en">bird</skos:prefLabel>
  <skos:altLabel xml:lang="en">Aves</skos:altLabel>
  <skos:definition xml:lang="en">warm-blooded egg-laying vertebrates characterized by feathers and forelimbs modified as
    wings</skos:definition>
  <skos:scopenote xml:lang="en">ornithology</skos:scopenote>
  <skos:source xml:lang="en">WordNet [http://wordnet.princeton.edu/] and http://en.wikipedia.org/wiki/Bird</skos:source>
  <skos:subject rdf:resource="http://skosaurus.rrecktek.com/bootstrap/drm/ornithology#concept" />
  <skos:example xml:lang="en">A bird is an animal with feathers. All birds have wings but not all birds can fly. Ostriches, emus a
    birds that can't fly. Parrots, pelicans and wedge-tailed eagles are birds that can fly. All birds hatch from eggs. All birds are
    blooded.</skos:example>
  <skos:broader rdf:resource="http://skosaurus.rrecktek.com/bootstrap/drm/vertebrate#concept" />
  <skos:broader rdf:resource="http://skosaurus.rrecktek.com/bootstrap/drm/chordate#concept" />
  <skos:broader rdf:resource="http://skosaurus.rrecktek.com/bootstrap/drm/animal#concept" />
  <skos:narrower rdf:resource="http://skosaurus.rrecktek.com/bootstrap/drm/eagle#concept" />
  <skos:narrower rdf:resource="http://skosaurus.rrecktek.com/bootstrap/drm/sparrow#concept" />
  <skos:narrower rdf:resource="http://skosaurus.rrecktek.com/bootstrap/drm/hawk#concept" />
  <skos:narrower rdf:resource="http://skosaurus.rrecktek.com/bootstrap/drm/robin#concept" />
  <skos:narrower rdf:resource="http://skosaurus.rrecktek.com/bootstrap/drm/kiwi#concept" />
  <skos:related rdf:resource="http://skosaurus.rrecktek.com/bootstrap/drm/birding#concept" />
  <skos:related rdf:resource="http://skosaurus.rrecktek.com/bootstrap/drm/birdwatching#concept" />
  <skos:related rdf:resource="http://skosaurus.rrecktek.com/bootstrap/drm/reptile#concept" />
  <skos:related rdf:resource="http://skosaurus.rrecktek.com/bootstrap/drm/lizard#concept" />
</skos:Concept>
```



## SKOSaurus: Generated SKOS Excerpt (2)

- `<skos:Concept rdf:about="http://skos.rrecktek.com/drm/bird#concept">`
  - `<skos:prefLabel xml:lang="en">bird</skos:prefLabel>`
  - `<skos:altLabel xml:lang="en">chick</skos:altLabel>`
  - `<skos:definition xml:lang="en">informal term for a (young) woman</skos:definition>`
  - `<skos:scopenote xml:lang="en">slang; more likely to be used in the UK</skos:scopenote>`
  - `<skos:scopenote xml:lang="en">slang; more likely to be used in the UK</skos:scopenote>`
  - `<skos:source xml:lang="en">http://wordnet.princeton.edu/</skos:source>`
  - `<skos:subject rdf:resource="http://skosaurus.rrecktek.com/bootstrap/drm/slang#concept" />`
  - `<skos:example xml:lang="en">The young man whistled as the blonde bird walked by.</skos:example>`
  - `<skos:broader rdf:resource="http://skosaurus.rrecktek.com/bootstrap/drm/female#concept" />`
  - `<skos:related rdf:resource="http://skosaurus.rrecktek.com/bootstrap/drm/dame#concept" />`
  - `<skos:related rdf:resource="http://skosaurus.rrecktek.com/bootstrap/drm/doll#concept" />`
  - `<skos:related rdf:resource="http://skosaurus.rrecktek.com/bootstrap/drm/wench#concept" />`
  - `<skos:related rdf:resource="http://skosaurus.rrecktek.com/bootstrap/drm/skirt#concept" />``</skos:Concept>`
- `<skos:Concept rdf:about="http://skos.rrecktek.com/drm/shuttlecock#concept">`
  - `<skos:prefLabel xml:lang="en">shuttlecock</skos:prefLabel>`
  - `<skos:altLabel xml:lang="en">birdie</skos:altLabel>`
  - `<skos:altLabel xml:lang="en">cock</skos:altLabel>`
  - `<skos:altLabel xml:lang="en">shuttle</skos:altLabel>`

# SKOSaurus: Web Form

**SKOSAURUS**

concept	<input type="text" value="http://skos.rrecktek.com/1130628422-188162#concept"/>
COI	<input checked="" type="radio"/> IC MWG <input type="radio"/> IC EA <input type="radio"/> CAF <input type="radio"/> DRM <input type="radio"/> DTIC
prefLabel	<input type="text" value="car"/>
altLabel	<input type="text" value="Hot rod"/>
abbreviation or acronym	<input type="text" value="c"/>
definition	<input type="text" value="A means of transportation with 4 tires and an engine."/>
subject	<input type="text" value="http://skos.rrecktek.com/icmwg/1126190567-992144"/>
scopenote	<input type="text" value="Production automobile"/>
source	<input type="text" value="Ronald P. Reck"/>
example	<input type="text" value="chevette"/>
narrower	<input type="text" value="http://www.ukat.org.uk/thesaurus/concept/4380"/>
broader	<input type="text" value="http://www.ukat.org.uk/thesaurus/concept/4382"/>
related	<input type="text" value="transportation"/>
	<input type="button" value="Submit"/>

# SKOSaurus: Kowari Model Dump: Query

**kowari|metastore**

Model URI:

Example Queries:  ▼

Query Text:

```
select $subject $predicate $object from  
<rmi://skosaurus.rrecktek.com/server1#drm> where $subject $predicate $object;
```

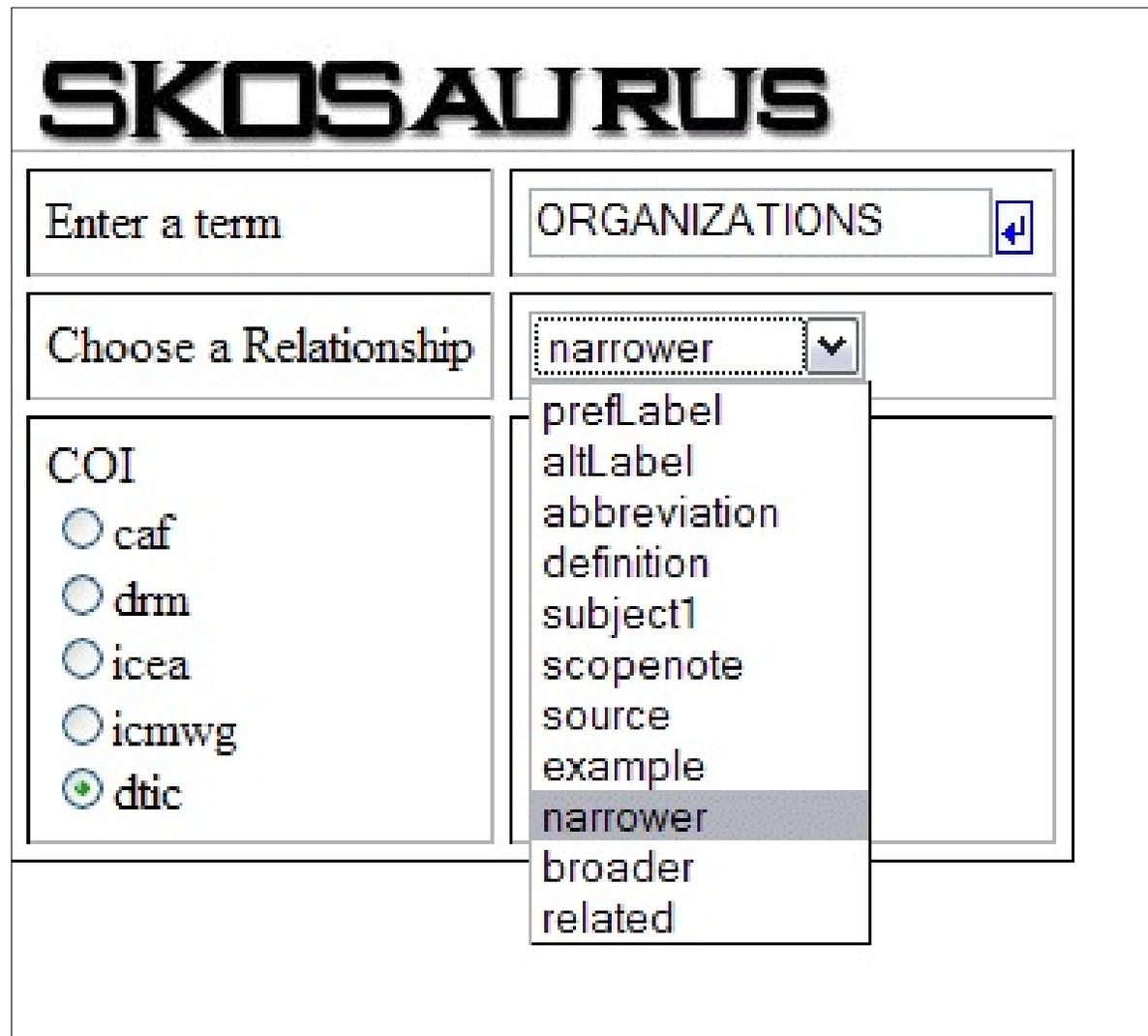
Results: (1 query, 0.304 seconds)

Query Executed: select \$subject \$predicate \$object from <rmi://skosaurus.rrecktek.com/server1#drm> where \$subject \$predicate \$object;

# SKOSaurus: Kowari Model Dump: Result

bject \$predicate \$object from <rmi://skosaurus.rrecktek.com/server1#drm> where \$subject \$predicate \$object;		
	predicate	object
drm/bird#concept	<a href="http://www.w3.org/1999/02/22-rdf-syntax-ns#type">http://www.w3.org/1999/02/22-rdf-syntax-ns#type</a>	<a href="http://www.w3.org/2004/02/skos/core#Concept">http://www.w3.org/2004/02/skos/core#Concept</a>
drm/bird#concept	<a href="http://www.w3.org/2004/02/skos/core#prefLabel">http://www.w3.org/2004/02/skos/core#prefLabel</a>	"bird"
drm/bird#concept	<a href="http://www.w3.org/2004/02/skos/core#altLabel">http://www.w3.org/2004/02/skos/core#altLabel</a>	"Aves"
drm/bird#concept	<a href="http://www.w3.org/2004/02/skos/core#altLabel">http://www.w3.org/2004/02/skos/core#altLabel</a>	"chick"
drm/bird#concept	<a href="http://www.w3.org/2004/02/skos/core#definition">http://www.w3.org/2004/02/skos/core#definition</a>	"warm-blooded egg-laying vertebrates characterized by feathers ar
drm/bird#concept	<a href="http://www.w3.org/2004/02/skos/core#definition">http://www.w3.org/2004/02/skos/core#definition</a>	"informal term for a (young) woman"
drm/bird#concept	<a href="http://www.w3.org/2004/02/skos/core#subject">http://www.w3.org/2004/02/skos/core#subject</a>	<a href="http://skosaurus.rrecktek.com/bootstrap/drm/ornithology#concept">http://skosaurus.rrecktek.com/bootstrap/drm/ornithology#concept</a>
drm/bird#concept	<a href="http://www.w3.org/2004/02/skos/core#subject">http://www.w3.org/2004/02/skos/core#subject</a>	<a href="http://skosaurus.rrecktek.com/bootstrap/drm/slang#concept">http://skosaurus.rrecktek.com/bootstrap/drm/slang#concept</a>
drm/bird#concept	<a href="http://www.w3.org/2004/02/skos/core#example">http://www.w3.org/2004/02/skos/core#example</a>	"A bird is an animal with feathers. All birds have wings but not all b
drm/bird#concept	<a href="http://www.w3.org/2004/02/skos/core#example">http://www.w3.org/2004/02/skos/core#example</a>	"The young man whistled as the blonde bird walked by."
drm/bird#concept	<a href="http://www.w3.org/2004/02/skos/core#related">http://www.w3.org/2004/02/skos/core#related</a>	<a href="http://skosaurus.rrecktek.com/bootstrap/drm/birding#concept">http://skosaurus.rrecktek.com/bootstrap/drm/birding#concept</a>
drm/bird#concept	<a href="http://www.w3.org/2004/02/skos/core#related">http://www.w3.org/2004/02/skos/core#related</a>	<a href="http://skosaurus.rrecktek.com/bootstrap/drm/birdwatching#conce">http://skosaurus.rrecktek.com/bootstrap/drm/birdwatching#conce</a>
drm/bird#concept	<a href="http://www.w3.org/2004/02/skos/core#related">http://www.w3.org/2004/02/skos/core#related</a>	<a href="http://skosaurus.rrecktek.com/bootstrap/drm/reptile#concept">http://skosaurus.rrecktek.com/bootstrap/drm/reptile#concept</a>
drm/bird#concept	<a href="http://www.w3.org/2004/02/skos/core#related">http://www.w3.org/2004/02/skos/core#related</a>	<a href="http://skosaurus.rrecktek.com/bootstrap/drm/lizard#concept">http://skosaurus.rrecktek.com/bootstrap/drm/lizard#concept</a>
drm/bird#concept	<a href="http://www.w3.org/2004/02/skos/core#related">http://www.w3.org/2004/02/skos/core#related</a>	<a href="http://skosaurus.rrecktek.com/bootstrap/drm/dame#concept">http://skosaurus.rrecktek.com/bootstrap/drm/dame#concept</a>
drm/bird#concept	<a href="http://www.w3.org/2004/02/skos/core#related">http://www.w3.org/2004/02/skos/core#related</a>	<a href="http://skosaurus.rrecktek.com/bootstrap/drm/doll#concept">http://skosaurus.rrecktek.com/bootstrap/drm/doll#concept</a>
drm/bird#concept	<a href="http://www.w3.org/2004/02/skos/core#related">http://www.w3.org/2004/02/skos/core#related</a>	<a href="http://skosaurus.rrecktek.com/bootstrap/drm/wench#concept">http://skosaurus.rrecktek.com/bootstrap/drm/wench#concept</a>
drm/bird#concept	<a href="http://www.w3.org/2004/02/skos/core#related">http://www.w3.org/2004/02/skos/core#related</a>	<a href="http://skosaurus.rrecktek.com/bootstrap/drm/skirt#concept">http://skosaurus.rrecktek.com/bootstrap/drm/skirt#concept</a>
drm/bird#concept	<a href="http://www.w3.org/2004/02/skos/core#broader">http://www.w3.org/2004/02/skos/core#broader</a>	<a href="http://skosaurus.rrecktek.com/bootstrap/drm/vertebrate#concept">http://skosaurus.rrecktek.com/bootstrap/drm/vertebrate#concept</a>
drm/bird#concept	<a href="http://www.w3.org/2004/02/skos/core#broader">http://www.w3.org/2004/02/skos/core#broader</a>	<a href="http://skosaurus.rrecktek.com/bootstrap/drm/chordate#concept">http://skosaurus.rrecktek.com/bootstrap/drm/chordate#concept</a>

# SKOSaurus: Intuitive Search



**SKOSAURUS**

Enter a term

ORGANIZATIONS

Choose a Relationship

COI

- caf
- drm
- icea
- icmwg
- dtic

narrower

- prefLabel
- altLabel
- abbreviation
- definition
- subject1
- scopenote
- source
- example
- narrower
- broader
- related

# SKOSaurus: DTIC Data: 17K concepts (in 73K lines) 70K SKOS statements

ABLATIVE MATERIALS

BT \*ABLATION

BT MATERIALS

ABNORMAL PSYCHOLOGY

INCLUDES GENERAL INVESTIGATIONS OF IRREGULAR MENTAL PHENOMENA, INCLUDING BEHAVIOR OR MENTAL DISORDERS, DREAMS, HALLUCINATIONS, AND MENTAL RETARDATION. FOR PREVENTION, DIAGNOSIS, AND THERAPY OF MENTAL DISTURBANCES, SEE PSYCHIATRY.

UF PSYCHOPATHOLOGY

BT \*PSYCHOLOGY

NT \*MENTAL DISORDERS

ABNORMALITIES

NT CONGENITAL ABNORMALITIES

ABO INCOMPATIBILITY

BT \*BLOOD GROUP DISORDERS

ABORT

ABORTION

ABRASION

BT WEAR

ABRASION RESISTANCE

use WEAR RESISTANCE

ABRASIVE BLASTING

UFC SANDBLASTING

BT \*SURFACE FINISHING

ANATOMICAL MODELS

BT MODELS

ANATOMY

BT \*BIOLOGY

NT ABDOMEN

NT \*BODY FLUIDS

NT \*CARDIOVASCULAR SYSTEM

NT CEREBROVASCULAR SYSTEM

NT \*DIGESTIVE SYSTEM

NT \*EXTREMITIES

NT FISTULAS

NT \*HEAD(ANATOMY)

NT \*HIP

NT HUMAN BODY

NT \*INTEGUMENTARY SYSTEM

NT \*MUSCULOSKELETAL SYSTEM

NT NECK(ANATOMY)

NT \*NERVOUS SYSTEM

NT \*ORGANS(ANATOMY)

NT \*REPRODUCTIVE SYSTEM

NT \*RESPIRATORY SYSTEM

NT SHEATHS(ANATOMY)

NT SHOULDERS(ANATOMY)

NT THORAX

NT \*URINARY SYSTEM

ANCHOR CHAINS

BT CHAINS

ANCHORS

NT ANCHORS(MARINE)

NT ANCHORS(STRUCTURAL)

NT GRAPNELS

ANCHORS(MARINE)

UF SHIP ANCHORS

DTIC  
Thesaurus

## Intuitive Search 1: Organizations (prefLabel)

# SKOSAU RUS

Results for Term :ORGANIZATIONS:	
type	Concept
prefLabel	ORGANIZATIONS
prefLabel	
altLabel	<u>ASSOCIATIONS</u>
narrower	<u>MILITARY ORGANIZATIONS</u>
narrower	<u>CORPORATIONS</u>
narrower	<u>LABOR UNIONS</u>
narrower	<u>SCIENTIFIC ORGANIZATIONS</u>
narrower	<u>SOCIETIES</u>
narrower	<u>TASK FORCES</u>



# Organizations: Military Organizations (NT)

## SKOSAU RUS

Results for Term 'MILITARY_ORGANIZATIONS':	
type	Concept
prefLabel	MILITARY_ORGANIZATIONS
prefLabel	
altLabel	<a href="#">ORGANIZATIONS(MILITARY)</a>
broader	<a href="#">ORGANIZATIONS</a>
narrower	<a href="#">MILITARY FORCES(UNITED STATES)</a>
narrower	<a href="#">ARTILLERY UNITS</a>
narrower	<a href="#">BATTLE GROUP LEVEL ORGANIZATIONS</a>
narrower	<a href="#">CORPS LEVEL ORGANIZATIONS</a>
narrower	<a href="#">MILITARY FORCES(FOREIGN)</a>
narrower	<a href="#">MILITARY RESERVES</a>
narrower	<a href="#">NATO</a>
narrower	<a href="#">SQUADRONS</a>
narrower	<a href="#">WING LEVEL ORGANIZATIONS</a>



## Organizations: Mil Orgs: Military Reserves (NT)

# SKOSAURUS

Results for Term 'MILITARY_RESERVES':	
type	Concept
prefLabel	MILITARY_RESERVES
prefLabel	
broader	<a href="#">MILITARY ORGANIZATIONS</a>
narrower	<a href="#">NATIONAL GUARD</a>
narrower	<a href="#">RESERVE OFFICER TRAINING CORPS</a>



# SKOS “definition” Property

## SKOSAU RUS

Results for Term 'ELECTRONIC_INTELLIGENCE':	
type	Concept
prefLabel	ELECTRONIC_INTELLIGENCE
altLabel	<a href="#">ELINT</a>
definition	THE TECHNICAL AND INTELLIGENCE INFORMATION DERIVED FROM FOREIGN NONCOMMUNICATIONS ELECTROMAGNETIC RADIATIONS EMANATING FROM OTHER THAN NUCLEAR DETONATIONS OR RADIOACTIVE SOURCES.
broader	<a href="#">INTELLIGENCE</a>
narrower	<a href="#">RADAR INTELLIGENCE</a>

## SKOSAU RUS

Results for Term 'MILITARY_INTELLIGENCE':	
type	Concept
prefLabel	MILITARY_INTELLIGENCE
altLabel	<a href="#">INTELLIGENCE(MILITARY)</a>
definition	EVALUATED INFORMATION CONCERNING AN ACTUAL OR POSSIBLE ENEMY THEATER OF OPERATIONS.
broader	<a href="#">INTELLIGENCE</a>
narrower	<a href="#">AIR INTELLIGENCE</a>
narrower	<a href="#">ARMY INTELLIGENCE</a>
narrower	<a href="#">COMMUNICATIONS INTELLIGENCE</a>
narrower	<a href="#">ESPIONAGE</a>
narrower	<a href="#">NAVAL INTELLIGENCE</a>
narrower	<a href="#">STRATEGIC INTELLIGENCE</a>
narrower	<a href="#">TACTICAL INTELLIGENCE</a>

## SKOSAU RUS

Results for Term 'COMMUNICATIONS_INTELLIGENCE':	
type	Concept
prefLabel	COMMUNICATIONS_INTELLIGENCE
altLabel	<a href="#">COMINT</a>
definition	TECHNICAL AND INTELLIGENCE INFORMATION DERIVED FROM FOREIGN COMMUNICATIONS BY OTHER THAN THE INTENDED RECIPIENTS.
broader	<a href="#">MILITARY INTELLIGENCE</a>

Note: Definitions not shown in other screenshots.

## Intuitive Search 2: Intelligence (prefLabel)

### SKOSAURUS

Enter a term	INTELLIGENCE
Choose a Relationship	prefLabel
COI <input type="radio"/> caf <input type="radio"/> drm <input type="radio"/> icea <input type="radio"/> icmwg <input checked="" type="radio"/> dtic	Submit

### SKOSAURUS

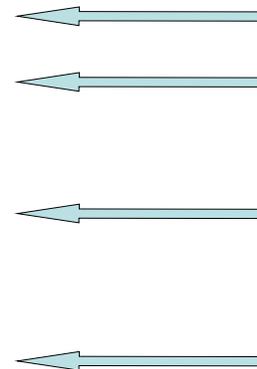
Results for Term INTELLIGENCE:	
type	Concept
prefLabel	INTELLIGENCE
prefLabel	
narrower	<a href="#">ACOUSTIC INTELLIGENCE</a>
narrower	<a href="#">MILITARY INTELLIGENCE</a>
narrower	<a href="#">COUNTERINTELLIGENCE</a>
narrower	<a href="#">ELECTRONIC INTELLIGENCE</a>
narrower	<a href="#">INTELLIGENCE(HUMANS)</a>
narrower	<a href="#">PHOTOGRAPHIC INTELLIGENCE</a>



# Intelligence: Military Intelligence

## SKOSAURUS

Results for Term 'MILITARY_INTELLIGENCE':	
type	Concept
prefLabel	MILITARY_INTELLIGENCE
prefLabel	
altLabel	<a href="#">INTELLIGENCE(MILITARY)</a>
broader	<a href="#">INTELLIGENCE</a>
narrower	<a href="#">AIR INTELLIGENCE</a>
narrower	<a href="#">ARMY INTELLIGENCE</a>
narrower	<a href="#">COMMUNICATIONS INTELLIGENCE</a>
narrower	<a href="#">ESPIONAGE</a>
narrower	<a href="#">NAVAL INTELLIGENCE</a>
narrower	<a href="#">STRATEGIC INTELLIGENCE</a>
narrower	<a href="#">TACTICAL INTELLIGENCE</a>



# Intelligence: Military Intelligence: narrower

## SKOSAURUS

Results for Term 'NAVAL_INTELLIGENCE':	
type	Concept
prefLabel	NAVAL_INTELLIGENCE
prefLabel	
broader	<a href="#">MILITARY INTELLIGENCE</a>

## SKOSAURUS

Results for Term 'ARMY_INTELLIGENCE':	
type	Concept
prefLabel	ARMY_INTELLIGENCE
prefLabel	
broader	<a href="#">MILITARY INTELLIGENCE</a>

## SKOSAURUS

Results for Term 'COMMUNICATIONS_INTELLIGENCE':	
type	Concept
prefLabel	COMMUNICATIONS_INTELLIGENCE
prefLabel	
altLabel	<a href="#">COMINT</a>
broader	<a href="#">MILITARY INTELLIGENCE</a>

## SKOSAURUS

Results for Term 'TACTICAL_INTELLIGENCE':	
type	Concept
prefLabel	TACTICAL_INTELLIGENCE
prefLabel	
broader	<a href="#">MILITARY INTELLIGENCE</a>
narrower	<a href="#">TERRAIN INTELLIGENCE</a>

(Intelligence: MILINTEL) or (Unconventional Warfare) :  
Subversion: Espionage

## SKOSAURUS

Results for Term 'ESPIONAGE':	
type	Concept
prefLabel	ESPIONAGE
prefLabel	
broader	<a href="#">MILITARY INTELLIGENCE</a>
broader	<a href="#">SUBVERSION</a>

## SKOSAURUS

Results for Term 'SUBVERSION':	
type	Concept
prefLabel	SUBVERSION
prefLabel	
broader	<a href="#">UNCONVENTIONAL WARFARE</a>
narrower	<a href="#">ESPIONAGE</a>

## SKOSAURUS

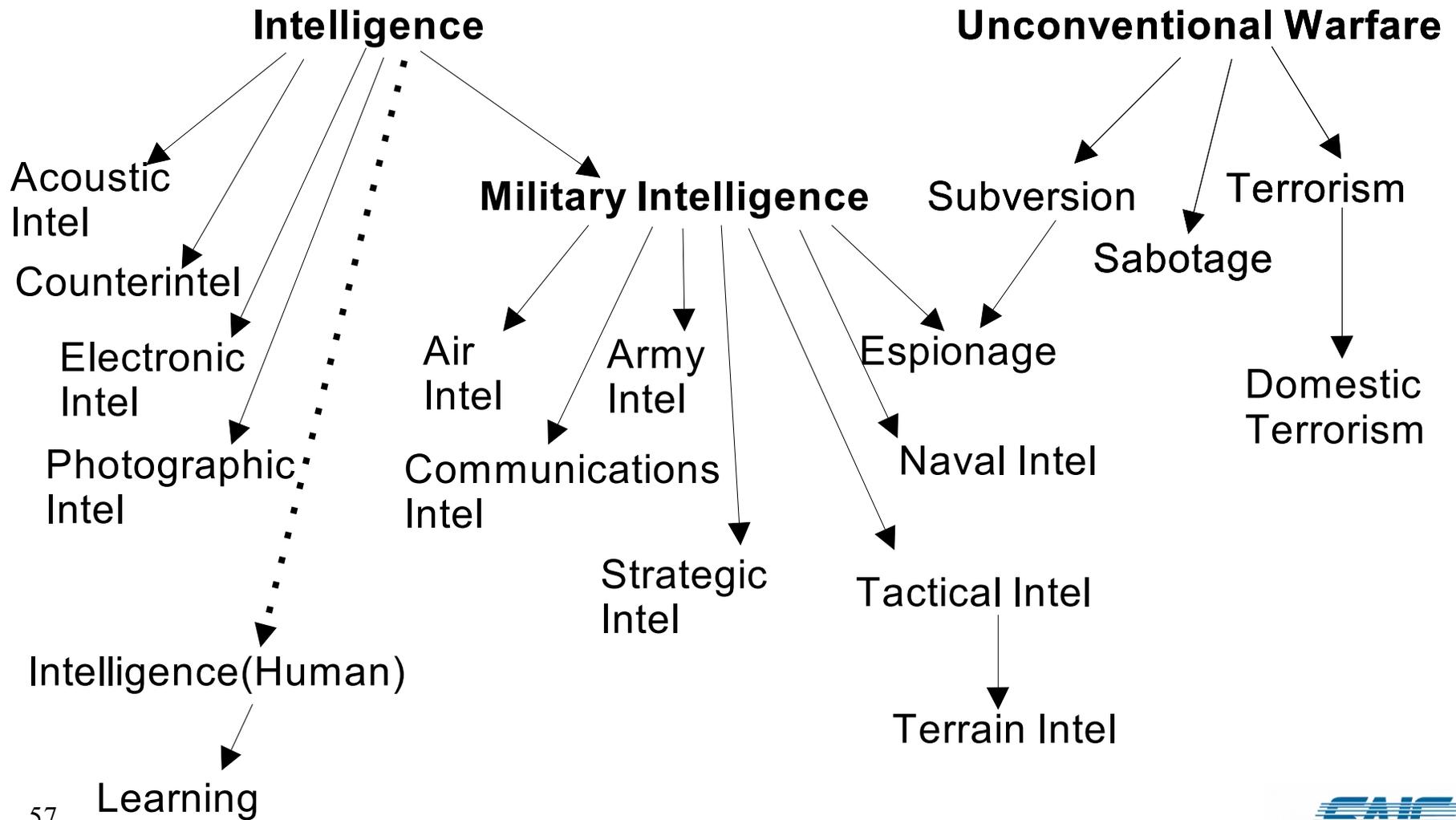
Results for Term 'UNCONVENTIONAL_WARFARE':	
type	Concept
prefLabel	UNCONVENTIONAL_WARFARE
prefLabel	
broader	<a href="#">WARFARE</a>
narrower	<a href="#">GUERRILLA WARFARE</a>
narrower	<a href="#">TERRORISM</a>
narrower	<a href="#">COUNTERINSURGENCY</a>
narrower	<a href="#">COUNTERTERRORISM</a>
narrower	<a href="#">SUBVERSION</a>
narrower	<a href="#">EVASION</a>
narrower	<a href="#">SABOTAGE</a>
narrower	<a href="#">SECTARIAN VIOLENCE</a>

# Unconventional Warfare: Subversion: Terrorism

## SKOSAURUS

Results for Term 'TERRORISM':	
type	Concept
prefLabel	TERRORISM
prefLabel	
broader	<a href="#">UNCONVENTIONAL WARFARE</a>
narrower	<a href="#">ASSASSINATION</a>
narrower	<a href="#">DOMESTIC TERRORISM</a>

# Now, Connect the Dots!



# Graphical Interface: Arlington Library - AcornWeb.org

The screenshot displays the AcornWeb.org library website. At the top, the 'ACORN' logo is on the left, and 'ARLINGTON PUBLIC LIBRARY' with links to 'LIBRARY HOME' and 'MY LIBRARY ACCOUNT' is on the right. Below the logo is a navigation bar with 'VISUAL', 'CLASSIC', and 'KIDS' tabs. A search bar contains the text 'military intelligence'. To the left of the search results is a word cloud with terms like 'intelligence', 'military intelligence', 'operation', 'artificial', 'evolution', 'service', 'force', 'agent', 'knowledge', 'creativity', 'human', 'emotional', 'agency', 'mind', 'secret', 'inteligencia', 'smarts', and 'intelligencia'. A legend at the bottom left of the word cloud explains the colors: WHITE: ASSOCIATIONS, YELLOW: SPELLING VARIATIONS, GREEN: TRANSLATIONS, BLUE: HISTORY TRAIL.

The search results section shows 'Your query 'military intelligence' returned 90 results.' and 'The results are now sorted by: relevance'. There are navigation links for 'First', 'Previous', '1', '2', '3', '4', 'Next', and 'Last'. The results list includes:

- 1. Military intelligence**  
a picture history  
John Patrick Finnegan, United States  
Subject: military intelligence  
Found: intelligence (3); Military (2) 1984
- 2. Espionage and counterespionage**  
adventures in military intelligence  
Arthur George Joseph Whitehouse  
Subject: military intelligence  
Found: intelligence (2); Military (2) 1964
- 3. Military intelligence, 1870-1991**  
Research guides in military studies  
a research guide  
Jonathan M. House, Inc NetLibrary  
Subject: military intelligence  
Found: Military (3); intelligence (2) 1993
- 4. The Military frontier**  
Understanding computers  
Time-Life Books  
Subject: artificial intelligence, military art and science  
Found: Military (2); intelligence (1) 1988
- 5. Anticipating surprise**  
analysis for strategic warning  
Cynthia M. Grabo, Jan Goldman, Joint Military Intelligence College (U.S.)  
Subject: deception, intelligence service, ...  
Found: intelligence (5); Military (4) 2002
- 6. Intelligence in war**

On the right side, there are filters for 'SELECT BRANCH' (All locations), 'REFINE' (Format, Author, Subject, Language, Series), and 'Format' options like Book (2714), Kids (687), Book on Tape (242), Videocassette (221), eBook (155), and 7 more...



## How Does This Help Solve IC Problems?

- Allows concept descriptions in human-friendly Microsoft Office formats.
- Converts relationships to XML-based format; can manipulate with common XML tools.
- XML is really RDF and SKOS, which are *machine-friendly* formats. RDF was designed to be manipulated by machines.
- Semantic Web - moving from humans to machines; *we want computers to do the work for us.*
- SKOSaurus concepts are ripe for integration with commercial semantic tools: METS, Content Analyst, Siderean, Factiva, Images, etc.



## Potential Next Steps

- Class of problems with CONOPS (next slide)
- Graphical interface (topicmap-like?)
- Add on Reporting Tools (paper and graphics) - analytic searching, display portions, etc.
- Search across COIs
- Access control mechanisms
- Edit existing concepts
- Ingesting other common formats
- Integration with commercial semantic products



## Potential Next Steps: Class of Problems

- Glossary management
- De-confliction (detection and resolution)
- Data Reference Model (DRM) artifact problem
  - Conceptual Taxonomies
  - Conceptual Model to Logical Model
- CONOPS to be developed for specific applications of these concepts



## Summary and Conclusions

- Semantic concepts help reveal less than obvious associations.
- SKOS is a useful vocabulary for implementing a thesaurus.
- The U.S. Government would benefit from a unified approach to thesauri, especially when sharing terminology within and across Communities of Interest.
- Our approach assumes government term authors want to work in Excel, not XML/RDF/SKOS (although we permit SKOS upload).
- Other SKOS implementations are worth considering (e.g., Java-based NBII SKOS Thesaurus client).
- We hope W3C considers SKOS for the Recommendation Track.



## Resources: Semantics and Thesauri

- SKOS home page <http://www.w3.org/2004/02/skos/>
- XML 2005 Conference Proceedings and Slides
- W3C Semantic Web Activity home page
- Willpower Glossary of Terms Related to Thesauri
- W3C Semantic Web News and Events Archive
- SKOS: A language to describe simple knowledge structures for the web - A. Miles, XTech 2005 or paper
- SKOS Core Tutorial for DCMI 2005 - A. Miles, or PDF
- NBII SKOS Thesaurus
- SCoP: Semantic Interoperability (XML Web Services) Community of Practice - Brand Niemann et al
- Sall's Earlier Glossary Work