



Building a National Semantic Web Ontology and Ontology Service Infrastructure —The FinnONTO Approach

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- Next: Usage in Legacy Systems Using the ONKI Living Lab



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FinnONTO – A Vision of a National Semantic Web Infrastructure



- Semantic Web needs a **content infrastructure**
 - Like traffic needs roads
 - Like energy service needs powerlines, power plants, standards, ...
 - Like mobile phones need GSM or 3G-networks
- Especially useful in
 - Cross-domain applications
 - Collaborative Web 2.0 applications

FinnONTO Infrastructure Components



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- **1. System of mutually aligned cross-domain ontologies**
 - Distributed collaborative ontology development
 - Centralized global view for end-users

- **2. Public ontology services**
 - Centralized ontology Services for legacy applications
 - For mashups and web services

- **3. Metadata schemas**
 - Cultural heritage, health, learning, geodata, ...

- **4. Tools**
 - Metadata creation / annotation
 - Semantic portal creation
 - » Search and browsing



- **FinnONTO: National Semantic Web Ontology Project in Finland**
 - 2003-2004
 - » 14 funding organizations
 - 2004-2005
 - » 16 funding organizations
 - 2005-2006
 - » 30 funding organizations
 - 2006-2007
 - » 37 funding organizations
- **FinnONTO 2.0: Semantic Web 2.0 – Intelligent Collaborative Services**
 - 2008-2009
 - » 38 funding organizations
 - 2009-2010





KANSALLISKIRJASTO

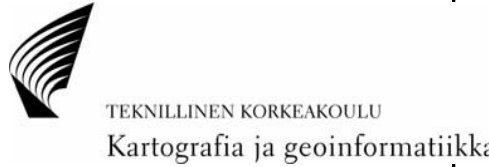


m-cult



SUOMEN MAATALOUSHMUSEO SARKA

Suomen valokuvataiteen museo
Finlands fotografiska museum
The Finnish Museum of Photography



VALTION TAIDEMUSEO



Antikvaria-ryhmä



HELSINGIN KAUPUNGINKIRJASTO
HELSINGFORS STADSBIBLIOTEK
HELSINKI CITY LIBRARY



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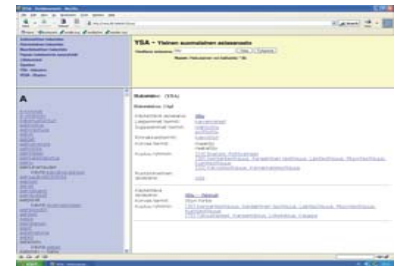
System of Mutually Aligned Cross-domain Ontologies

The Way to Go



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- Started a national cross-domain ontologization process
 - Making contents of different domains interoperable
 - Thesauri -> ontologies
 - » Human usage -> human/machine usage
 - Key ontologies should be open source and maintained publicly
 - » Wide acceptance and usage
- Business applications can be built effectively upon a solid infrastructure

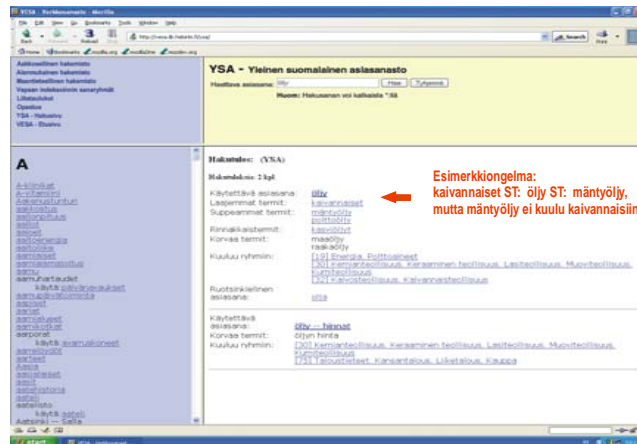


FinnONTO Ontology Development

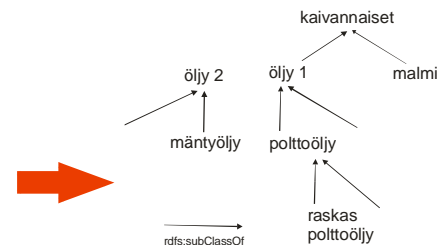


- Class ontologies
 - Keywords and concepts used in indexing nationally
 - Population strategy: mainly Thesauri -> Ontologies
- Instance ontologies
 - Persons, places, ...
 - Populated mainly from databases

YSA



YSO



A Method for Transforming Thesauri into Ontologies



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- **Input:** a thesaurus using standard ISO [2788] / SFS 5471
 - Semantic relations: NT, BT, RT, USE, USED FOR, ...
 - Used widely in Finland
 - Fairly large vocabularies, eg. YSA 23,000 terms
- **Output:** a light-weight ontology
 - Equivalence relationship
 - » Semantic disambiguation of term meanings
 - » Preferred vs. non-preferred terms (USE / USED FOR)
 - » Multilinguality
 - Hierarchical relationship
 - » Based on NT / BT
 - » Transitive subclass hierarchy skeletons
 - » Part-of relations distinguished from subclass-of
 - Associative relationship
 - » Based on refining RT relations of the thesaurus



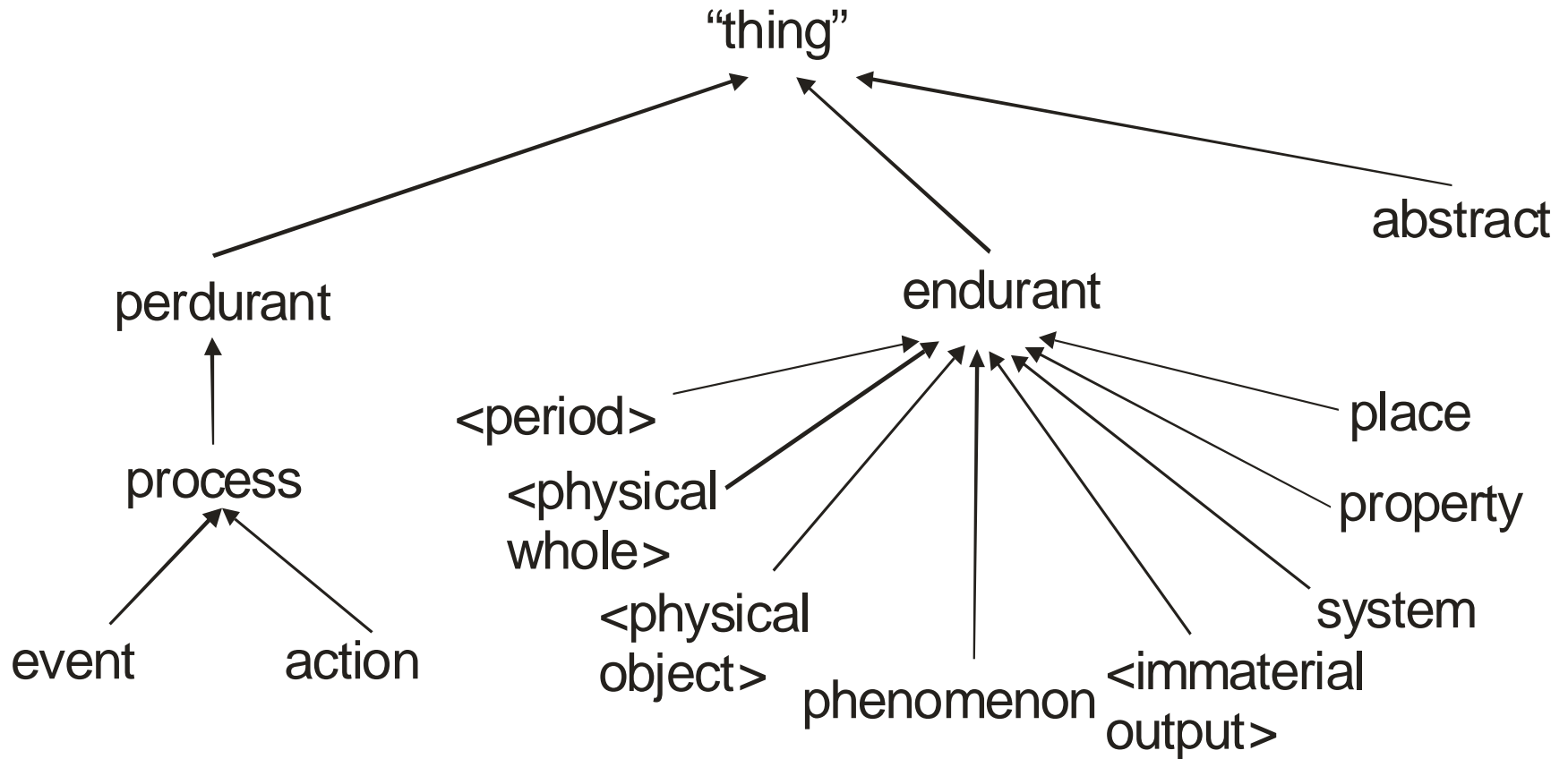
- **General Principles Used**

- Minimal useful ontologization but *more* than mechanical SKOS transformation
 - » Thesaurus semantics -> basic RDFS semantics
 - » Applications add application specific properties etc.
- Main category facets based on DOLCE
 - » Abstract (quantities, ...)
 - » Endurant (enduring objects and things)
 - » Perdurant (events, processes)
 - To be used for event-based annotations

YSO - The Finnish General Upper Ontology (Upper Structure)



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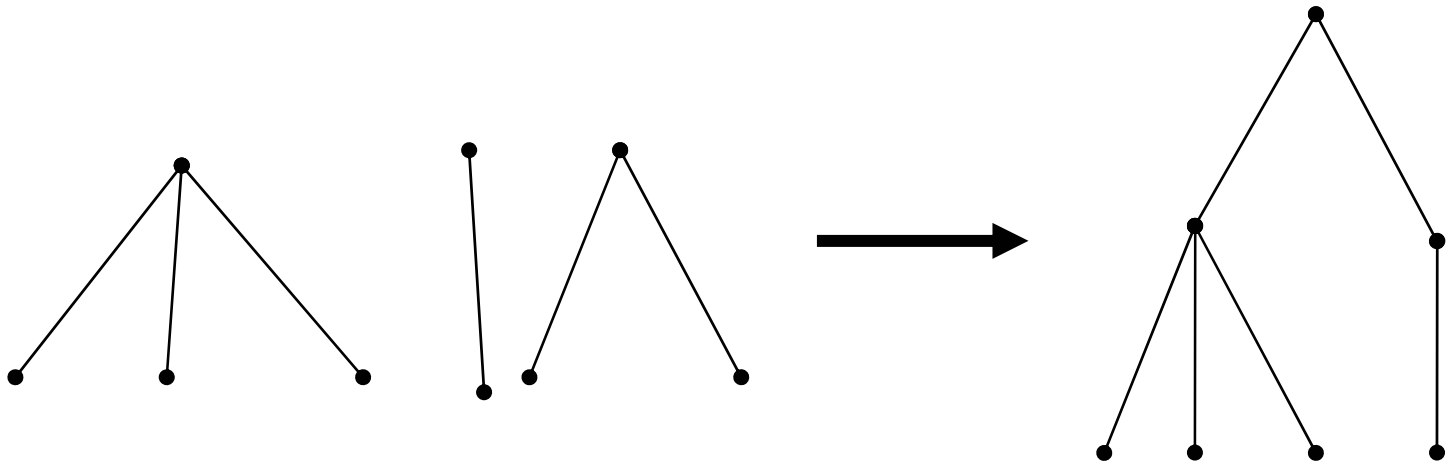


- Minimize multiple inheritance
 - » Allowed only within major facets
- The ontology is a model of the world not of the thesaurus
 - » Cf. SKOS where terms are instances of skos:Concept
- Terms are represented systematically as classes
 - » Instance vs. class distinction is left to applications
 - E.g. Halley's comet, Peace of Paris, ...
 - » Free indexing keywords -> instantiate a class
 - E.g. flower types, animal species, ...

Steps

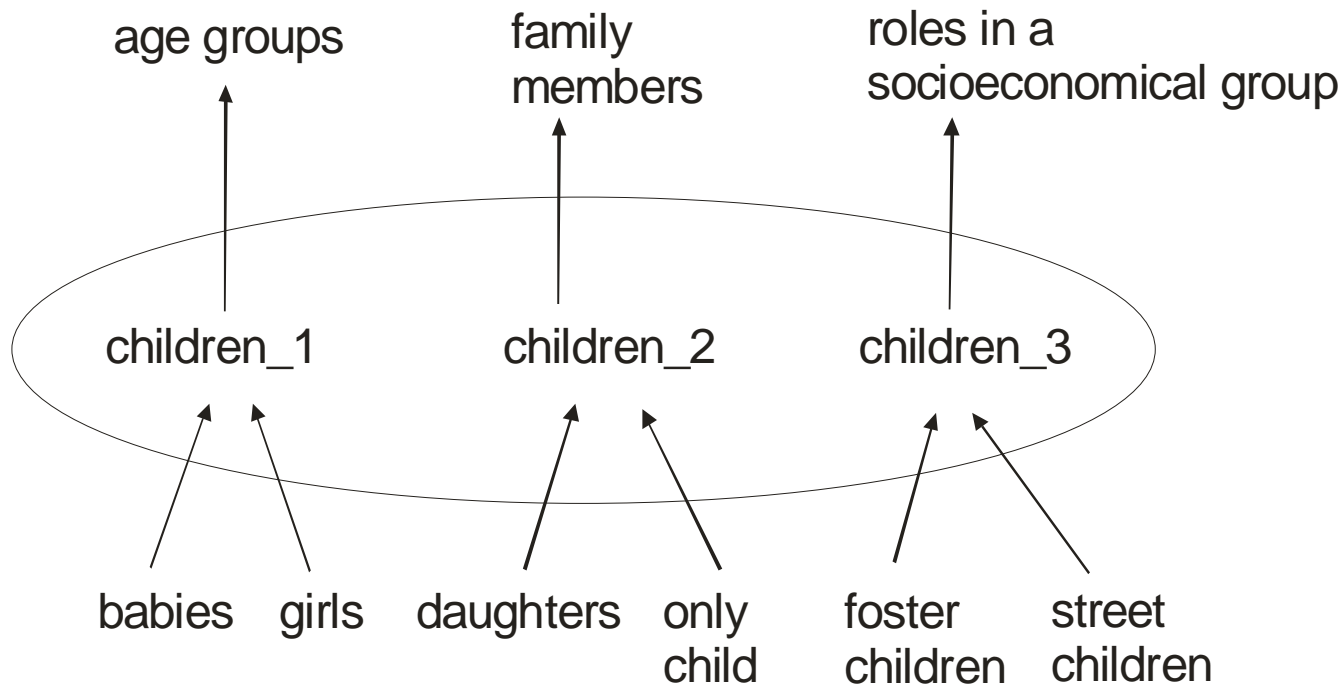


- Add missing links in the subclass hierarchy
 - E.g. the Cultural thesaurus MASA (6000 concepts) had 2500 top concepts





- Disambiguate term meanings
 - E.g. child / children





- Disambiguate BT relation meanings
 - subclassOf vs. part-of vs. instantiation
 - Halleys comet BT solar system (part-of)
 - lion BT cat animals (subclass of)

Solar system

BT

Comet

BT

Halleys'
comet



Solar system Celestial body

partOf

subClassOf

Comet

subClassOf / type

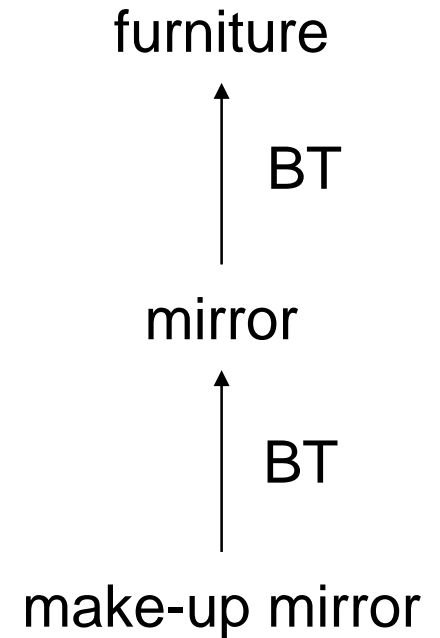
Halleys' comet



- Check transitivity of the BT chains

- make-up mirror BT mirror
mirror BT furniture

=> make-up mirror subclassOf furniture?



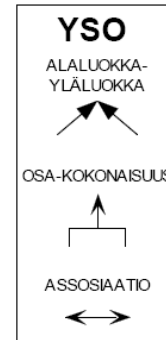
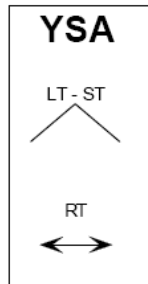
Example: University Terminology

YSA Thesaurus -> YSO Ontology

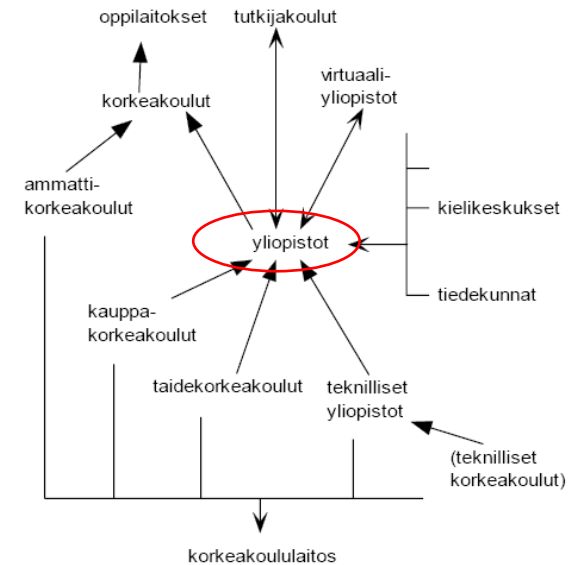


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Thesaurus



Ontology



Class Types



- Concept classes
 - Used for annotations
 - E.g. cat, unemployment, ...
 - Can be used by instantiation
 - » Free indexing terms
 - E.g. plant types, places, etc.
 - Can be used by instatiating nearest superclass
- Grouping concepts (collections)
 - For organizing concepts, not for annotations
 - E.g. enduring, clothes-by-sex
- Aggregate concepts
 - Aggregate multiple meanings
 - » E.g. child (age + family relation + econosocial role)
 - Desired for
 - » simplifying annotations
 - » compatibility with thesauri terms

Other FinnONTO Class Ontologies Using SKOS



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- Using existing classifications and vocabularies as they are
 - Mechanical transformation into SKOS
 - Accepting existing semantic ambiguities and confusions
 - Finnish translations produced as add-on
- Examples
 - ICONCLASS
 - Medical Subject Headings (MeSH)
 - Library classifications (e.g. HKLJ based on Dewey Decimal)

Instance Ontologies



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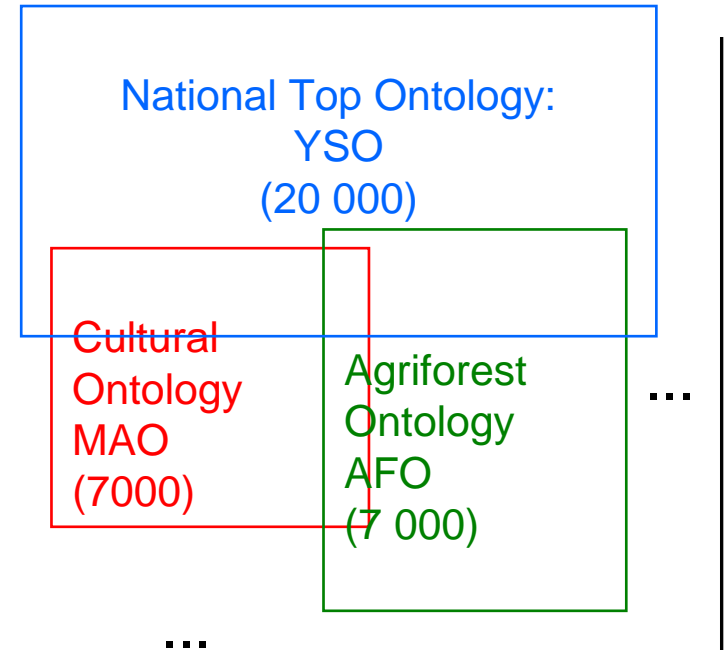
- Places
 - Small number of classes (< 1000)
 - Lots of particular places (N x 1 000 000)
- Actors
 - Small number of classes (< 1000)
 - Persons, groups, organizations (N x 100 000)
- (Historical) events

FinnONTO National Ontologies



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- Top ontology YSO as semantic glue
- Merges overlapping domain ontologies
 - Cultural ontology MAO
 - Geo-ontology SUO
 - Spatiotemporal geo-ontology SAPO
 - Actor ontology TOIMO
 - Applied arts ontology TAO
 - Photography ontology VALO
 - Agriforest ontology AFO
 - Ontology of Finnish History HISTO
 - ...
- Alignments with other classification systems and top ontologies
 - » HKLJ + YSO (library domain)
 - » ICONCLASS + YSO (fine arts domain)
 - » MeSH + YSO (medical domain)

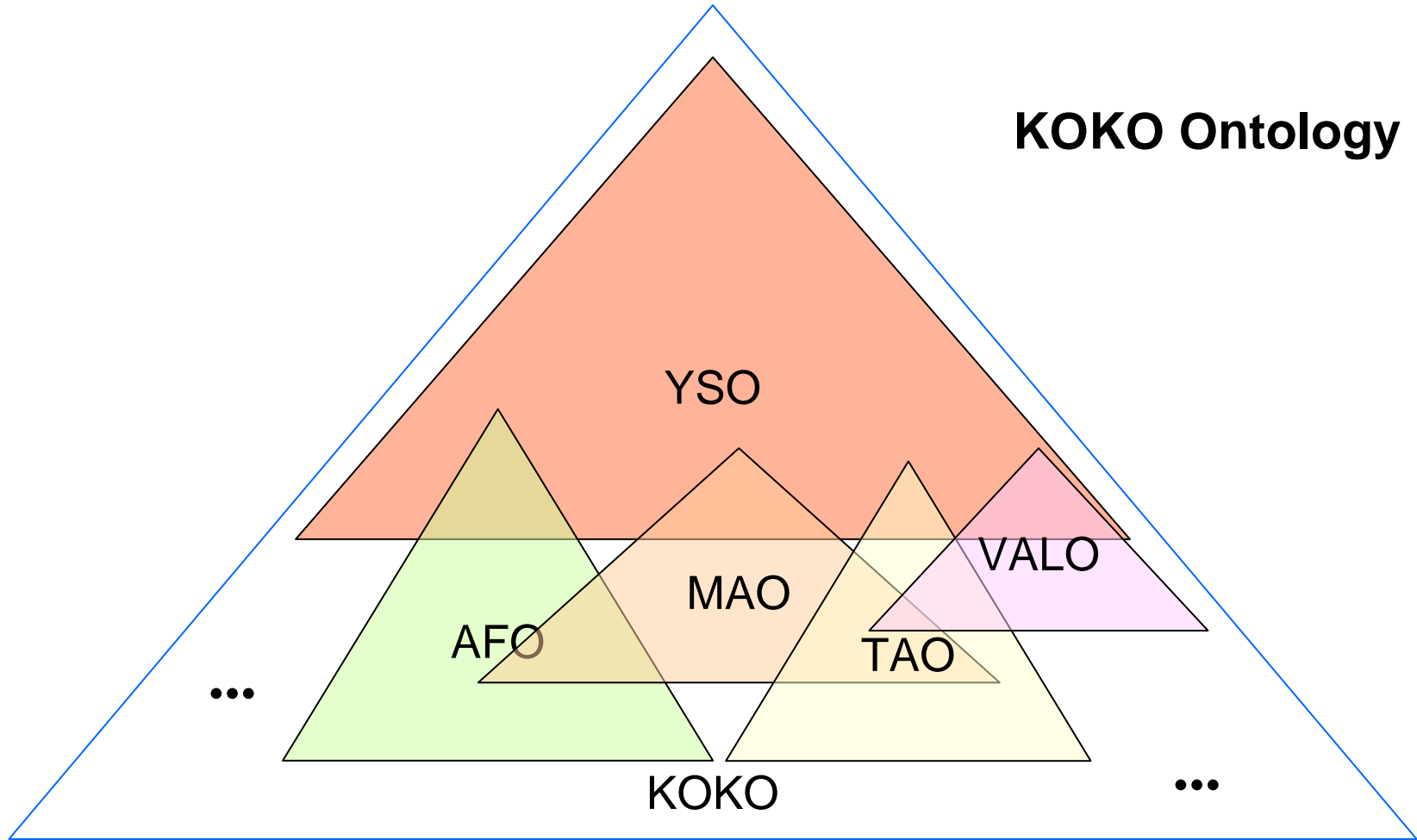


KOKO: Finnish Collaborative Holistic Ontology : Ontology developer groups' view



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KOKO Ontology



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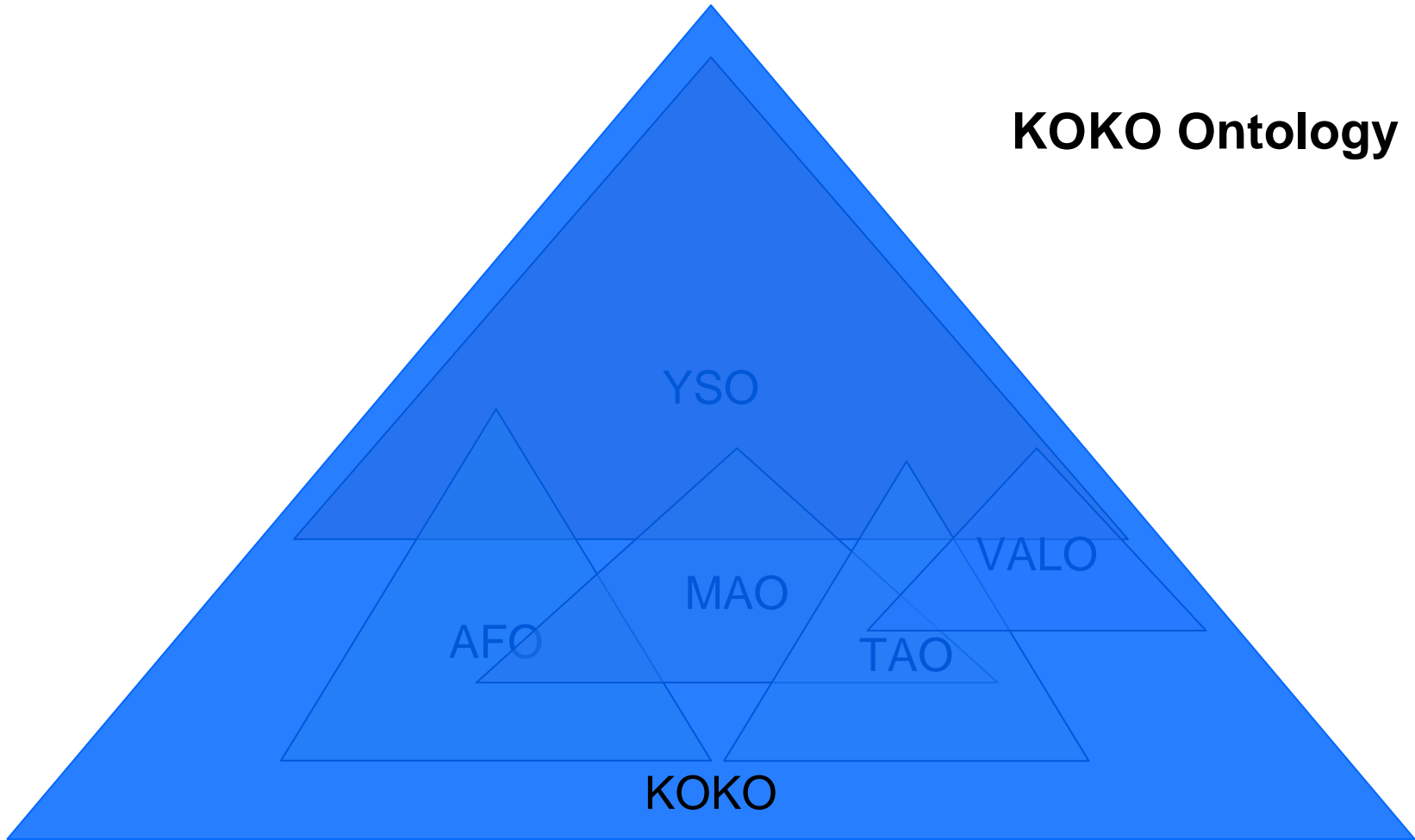
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Finnish Collaborative Holistic Ontology KOKO: Ontology end-users' view



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KOKO Ontology



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KOKO National Collaboration Principles



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- **Start thinging global / cross-domain**
 - Every domain should consider also cross-domain reuse of concepts
- **Add machine semantics**
 - Proceed in small steps
 - Keeps e.g. funding agencies happy
- **Reuse existing** vocabulary work and datasets
 - Maintain interoperability with the past and with others
- **Establish collaboration network** of independent domain expert groups
 - Based on current thesaurus developer groups
- **Coordinate nation wide** the work by a steering group
 - Now by the FinnONTO research project
 - Later by the National Library
- **Respect different ontological views**
 - **Encourage reuse** of others' ontology structures **but do not force**
 - It is not possible to come up with only one ontology view
 - » Different application views and opinions will survive

Ontology Production: Protege-editor for Aligning Ontologies



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maotaoyso_txt.rdf.xml.rdf.xml Protégé 3.2 (file:|D:\kaseppal_cvsroot\ontologies\varmuuskopio_ks\svn_checkout\mao\maotaoyso_txt.rdf.xml.rdf.xml.pprj, OWL / RDF Files)

File Edit Project OWL Code Tools Window Help

Metadata (mao) OWLClasses Properties Individuals Forms

SUBCLASS EXPLORER
For Project: maotaoyso_txt.rdf.xml.rdf.xml

Asserted Hierarchy

- kasityot = yso_kasityot_2
 - hoyhentyot
 - koulukasityot
 - kuitutyot = tao:kuitutyot
 - lakkatyot = tao:lakkatyot = yso_lakkatyot
 - lasityot = yso_lasityot
 - luutyot = tao:luutyot = yso_luutyot
 - metallityot = tao:metallityot = yso_mettalityot
 - nahka- ja_turkistryot
 - puhdetyot
 - pullolaivat
 - punontatyot = tao:punontatyot = yso_punontatyot
 - puutyot = tao:puutyot = yso_puutyot
 - sulkatyot
 - teelmat
 - tekstiilityot
- kasket
- kaste = tao:kaste = yso_kaste
- kastealtaat = tao:kastealtaat = yso_kastealtaat
- kasihuoneet = yso_kasihuoneet
- kasvit = yso_kasvit = tao:kasvit
- kattaukset = tao:kattaus = yso_kattaus
- katteet = yso_katteet = tao:katteet
- katukivet
- katupeilit
- kaukoputket = yso_kaukoputket
- kauppa = yso_kauppa

CLASS EDITOR
For Class: kasityot (instance of MaoConcept) Inferred View

Property	Value	Lang
rdfs:comment	käsin tai käsin koneella eri materiaaleista valmistetut esineet	

Annotations

Asserted Conditions

- NECESSARY & SUFFICIENT
 - yso_kasityot_2
- NECESSARY
 - mao_kasitellyt

Disjoints

skos:broaderGeneric

Value	Lang

altLabel

Value	Lang

partOf

Value	Lang

prefLabel

Value	Lang

Logic View Properties View

start ONKI-Selain : Ontolo... Inbox for Katri.seppal... Protege.exe maotaoyso_txt.rdf-x... Microsoft PowerPoint ... FI 10:09

Checking Ontologies Against Each Other Using the ONKI Browser



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ONKI-Selain : Ontologiakirjasto-selain - Mozilla Firefox

Tiedosto Muokkaa Näytä Sivuhistoria Kirjanmerkit Työkalut Ohje

http://www.yso.fi/ontki/tao/?c=http%3A%2F%2Fwww.yso.fi%2Fonto%2Fyso%23p4923&q=k%3%A4sity%3C%3B&t

The Mozilla Organization Latest Builds

www.yso.fi: concept ontologies | geo ontologies | thesaurus ontologies | create access key Yleinen suomalainen ontologiapalvelu

Taideteollisuusalan ontologia TAO

(yhdistetty Yleiseen suomalaiseen ontologiaan YSO ja Museualan ontologiaan MAO)

Ontologiaselein Tietoa ontologiasta Kieli Suomi Lähetä palautetta Tietoa ONKlsta

Käsitteiden haku

Käsitteen tyyppi: Kaikki tyyppi

0-9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z Ä Å Ö [Kaikki]

käsityöt

- käsityöt (mao)
- käsityöt (käsityötuotteet) (tao)
- käsityöt_1 (yso)
- käsityöt_2 (yso)
- käsityötaito (tao)
- käsityötiede (yso)
- käsityötiede (tao)

yso:käsityöt_2

URI: <http://www.yso.fi/onto/yso#p4923>

Konteksti

- [yso:yso-käsitteet](#)
- [yso:pysyvä](#)
- [yso:fyysinen objekti](#)
- [yso:konkreettinen eloton objekti](#)
- ▼ [yso:käsityöt_2 \(mao, tao\)](#) Näytä 208 vieruskäsitettä**
 - [yso:applikaatiotyöt \(mao, tao\)](#)
 - [yso:huopatyöt \(mao, tao\)](#)
 - [mao:höyhentyöt](#)
 - [yso:jalokivityöt \(mao, tao\)](#)
 - [tao:jalometallityöt](#)
 - [tao:keramiikkatyöt](#)
 - [tao:kirjontatyöt \(mao\)](#)
 - [yso:kivityöt \(tao\)](#)
 - [mao:koulukäsityöt](#)
 - [tao:kudonnaiset](#)
 - [tao:kuututyöt \(mao\)](#)
 - [yso:lakkatyöt \(mao, tao\)](#)
 - [yso:lasityöt \(mao\)](#)
 - [yso:luutyöt \(mao, tao\)](#)
 - [yso:metallityöt \(mao, tao\)](#)
 - [mao:nahka- ja turkistytöt](#)
 - [yso:nahkatyöt \(mao, tao\)](#)
 - [tao:nauhat \(mao, yso\)](#)
 - [yso:neuletyöt \(mao, tao\)](#)
 - [yso:olkityöt \(mao, tao\)](#)
 - [yso:ompelutyöt \(mao, tao\)](#)
 - [tao:pahkatyöt \(mao\)](#)
 - [yso:paperityöt \(mao, tao\)](#)
 - [yso:pitsit \(mao\)](#)
 - [mao:puhdeytöt](#)
 - [mao:pullolaivat](#)

Ominaisuudet

Asiasana (en): handicraft

Asiasana (fi): käsityöt_2

Asiasana (sv): handarbeten

Lähikäsite: [yso:askartelu](#)
[yso:harrastukset](#)
[yso:käsityö](#)
[yso:käsityöohjeet](#)
[yso:käsityöperinne](#)
[yso:taidekäsityö](#)

Tyyppi: [yso-meta:YSO-käsite](#)

Vastaava käsite: [mao:käsityöt](#)
[tao:käsityöt \(käsityötuotteet\)](#)

Yläkäsite: [yso:konkreettinen eloton objekti](#)

Valmis

start ONKI-Selain : Ontolo... Inbox for Katri.seppal... Protege.exe maotaoyso_txt.rdf-x... Microsoft PowerPoint ... FI 10:11



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Public Ontology Services



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Centralized Ontology Services



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1. Ontology Developers

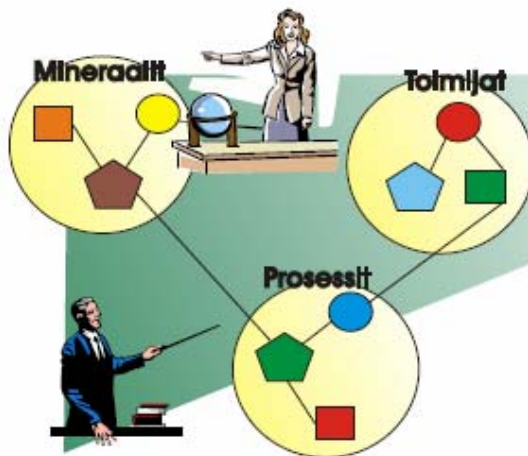
- Collaborative development of interdependent ontologies
- Versioning and support for updates

2. Information Searchers

- Support concept-based search
- Keyword disambiguation
- Finding the right search concepts

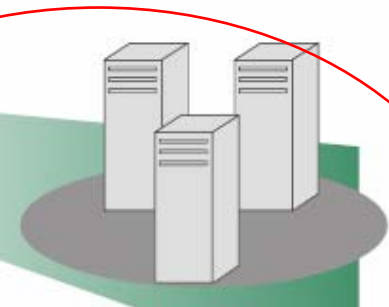


Nokia:
company or city?



2. Information Indexers

- Support indexing concept finding
- Keyword disambiguation
- Support indexing patterns



National Ontology Service YSO:

<http://www.yso.fi>



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www.yso.fi: concept ontologies | geo ontologies | thesaurus ontologies | create access key Yleinen suomalainen ontologiapalvelu

[suomeksi](#) | [in English](#)

The General Finnish Ontology Service

The ontologies

Ontology	Services	Links	Ontology status**
YSO: The Finnish General Upper Ontology	ontology browser , indexing widget	documentation	beta
SUO: The Finnish Geo-ontology	ontology browser , indexing widget	documentation	beta
HPMULTI: The European Multilingual Thesaurus on Health Promotion	ontology browser , indexing widget	documentation	beta
MeSH: Medical Subject Headings	ontology browser , indexing widget , IRMA-demo	documentation	beta
IC: ICONCLASS Ontology	ontology browser , indexing widget , IRMA-demo	documentation	beta
SAPO: The Finnish Time-Location Ontology	IRMA-demo	documentation	beta
MAO: Ontology for museum domain	ontology browser , indexing widget	documentation	beta
TAO: Ontology of Applied Arts	ontology browser , indexing widget	documentation	alpha
VALO: The Finnish Ontology of Photography	ontology browser , indexing widget	documentation	alpha
KAUNO: Kaunokki Ontology	ontology browser , indexing widget		alpha
YSA: Yleinen suomalainen asiasanasto	ontology browser , indexing widget	documentation	alpha
AUDIENCE: Terveystieteiden tutkimuskeskuksen Audiance	ontology browser , indexing widget		alpha
MEDIUM: Terveystieteiden tutkimuskeskuksen Medium	ontology browser , indexing widget		alpha
GENRE: Terveystieteiden tutkimuskeskuksen Genre	ontology browser , indexing widget		alpha
KS-PAIKKA: Kulttuurisampo: Paikka	ontology browser , indexing widget		alpha
KS-TOIMINTA: Kulttuurisampo: Toiminta	ontology browser , indexing widget		alpha
MEDIEQ-MESH: MedIEQ: MeSH (es-en)	ontology browser , indexing widget		alpha
YSO-OLD-KS: Kulttuurisampo: YSO (vanha)	ontology browser , indexing widget		alpha

** beta=public testing, alpha=internal testing (you may look).



Utilizing ONKI Ontology Services as Mashups in Legacy Systems



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- Idea related to Google Maps
 - Provide centralized service with end-user interfaces
 - Use it to create mashup services based on AJAX
 - Also Web Services can be used
- ONKI provides services for
 - Concept finding (semantic autocompletion)
 - Semantic disambiguation
 - Concept selection, browsing, changing
 - Also maps are used (based of Google Maps)
 - » For the General Finnish Location Ontology
- Services are used in legacy system using the **ONKI Widget**
 - Ready-to-use mashup interface component
 - 1 line of Javascript on your HTML page!

ONKI Ontology Servers



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- ONKI SKOS
 - Input your SKOS vocabulary and the services are ready to use on the web!
 - Supports also simple RDFS-ontologies
- ONKI Geo
 - For publishing geo-ontologies with Google Maps services
- ONKI Instance
 - For publishing instance ontologies (eg. authorities)

ONKI SKOS for Vocabularies & Simple Ontologies

E.g. <http://www.yso.fi/onki/yso/?l=en>



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- Supports W3C SKOS & simple RDF(S) ontologies

The screenshot shows a web browser window displaying the ONKI web interface. The browser's address bar shows the URL <http://www.yso.fi/onki/widget/?l=en>. The page title is "YSO - The Finnish General Upper Ontology". The interface includes a navigation bar with "Ontology browser" and "Information about the ontology" tabs, a language dropdown set to "English", and links for "Send feedback" and "About ONKI".

The main content area is titled "Concept Search" and "traffic noise". The "Concept Search" section has a dropdown menu set to "Class" and a list of search results including "traf", "traffic", "traffic accidents", "traffic administration", "traffic arteries", "traffic behaviour", "traffic casualties", "traffic contractors", "traffic control", "traffic count", "traffic crimes", "traffic education", "traffic fees", "traffic jams", "traffic law", "traffic licences", "traffic lights", "traffic markings", "traffic networks", "traffic noise", "traffic offences", "traffic planning", "traffic policy", "traffic psychology", "traffic regulations", "traffic restrictions", "traffic safety", "traffic services", "traffic signs", "traffic surveillance", "traffic systems", "traffic technology", and "trafficking in women".

The "traffic noise" section shows the URI: <http://www.yso.fi/onto/yso/p9151>. The "Context" section displays a hierarchical tree structure: "yso-kasitteet" -> "pysyvä" -> "phenomena" -> "luonnonilmiölliset ilmiöt" -> "physical phenomena" -> "noise" -> "traffic noise" (highlighted) -> "aircraft noise". A button "Show 1 coordinate concepts" is visible next to "traffic noise".

The "Properties" section lists the following information:

- Label (en): traffic noise
- Label (fi): liikennemelu
- Label (sv): trafikbuller
- Related concept: [noise areas](#)
- Type: [Concept](#)
- Matching concept: [liikennemelu](#)
- Superordinate concept: [noise](#)

A "Fetch Concept!" button is located at the top right of the "traffic noise" section. A "Hide additional properties" button is located below the "Type" property.



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ONKI Geo for Geo-ontologies

<http://demo.seco.tkk.fi/onkipaikka/>



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ONKI-Paikka search - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://demo.seco.tkk.fi/onkipaikka/ onki paikka

ONKI-Paikka search Semantic Computing Research Group (SeCo)

Place name
pyhäjär

Narrow by place name language place type time area

SEARCH RESULTS (13)

- Pyhäjärven Autiotupa, Kittilä (rakennus)
- Pyhäjärvenkaita, Inari (kohouma)
Pasejávrrskáid
Basejávrrskáid
- Pyhäjärvenlakki, Kittilä (kohouma)
- Pyhäjärvenranta, Inari (rakennus)
- Pyhäjärvi, Kittilä (vakavesi)
- Pyhäjärvi, Kittilä (rakennus)
- Pyhäjärvi, Inari (vakavesi)
Basejávri
Pasejávri
- Pyhäjärvi, Inari (rakennus)
- Pyhäjärvi, Kittilä (vakavesi)
- Pyhäjärvi, Pelkosenniemi (rakennus)
- Pyhäjärvi, Pelkosenniemi (asuinalue)
- Pyhäjärvi, Kittilä (vakavesi)
- Pyhäjärvi, Pelkosenniemi (vakavesi)

MAP
SATELLITE
HYBRID

REMOVE POLYGON

POWERED BY Google

Suomi Finland

Suomi Finland

SELECT CLOSE

800,000
contemporary
Finnish places

Finnish historical
places

Millions of
places abroad
(GNS,GNIS)

ONKI Instance Publishing Getty ULAN Register



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Technology

Index (+term:napoleon*) - Windows Internet Explorer

http://wrk-4.seco.hut.fi:8080/onkitoimija/main.htm?term=napoleon

DOLCE ontology

Google

Download Submis... PostGIS : Home ONKI-Browser : ... W Endurantism - Wi... http://www.seco... Index (+term... x

Actor Ontology

Search

nationality filters [klik to remove]:
napoleon

Results (27)

American 2	Angiolini, Napoleone (Italian painter, 1797-1864)
Belgian 1	Bellardel, Napoleon Joseph (French artist, active 19th century)
Brazilian 1	Bonaparte (French artist, 1811-1832)
Canadian 2	Bonaparte, Roland-Napoleon (French photographer, 1858-1924)
Corsican 1	Bourassa, Napoléon (Canadian painter, architect, and sculptor, 1827-1916)
French 7	Cocchetti, Napoleone (Italian painter, born ca. 1850)
German 2	Cocchetti, Napoléon (Italian painter, born ca. 1880)
Italian 11	Delaunois, Alfred (Belgian painter 1876-1941)
Romanian 1	Eugen (Swedish painter and printmaker, 1865-1947)
Scandinavian 1	Fiumi, Napoleone G. (Italian artist, born 1898)
SouthAmerican 1	Gimbredre, Joseph Napoleon (American engraver, born 1820, active 1841-1860)
Swedish 1	Heigel, Franz Napoleon (German portraitist, 1813-1888)
more...	Le Brun, Napoleon (American architect, 1821-1901)
role	Lepic, Ludovic (French painter, 1839-1889)
Architect 2	Maillart, Diogene Ulyssee Napoleon (French artist, 1840-1926)
Artist 21	Martinuzzi, Napoleone (Italian sculptor, 1892-1977)
Cardinal 1	Nani, Napoleone (Italian painter, 1841-1899)
Collector 1	Napoleon I, Emperor of the French (French ruler, patron, and collector, 1769-1821)
DecorativeArtist 1	Neureuther, Eugen Napoleon (German lithographer, illustrator, and painter, 1806-1882)
Draftsman 3	Orsini, Napoleone (Italian patron and cardinal, ca. 1263-1342)
Emperor 1	Parisani, Napoleone (Italian painter, 1854-after 1884)
FigurePainter 1	Poty (Brazilian engraver, born 1924)
HistoryPainter 1	Primoli, Giuseppe (Italian photographer, 1851-1927)
Illustrator 1	Sarony, Napoleon (Canadian photographer, 1821-1896, active in Great Britain)
Landscapeist 2	
Lithographer 1	
more...	
type	
Person 27	

120,000
instances

ONKI Widget for Mashups



- Ontology services are automatically available after publishing a vocabulary or ontology with ONKI
- Simple AJAX-based widget for creating mash-ups
 - Direct Web Remoting (DWR) API

1. ONKI Concept Search Widget in default state

ontology selector search field language selector open ONKI Browser

yso fi Open ONKI Ontology Browser

- yso
- ysoa
- paikka
- toimo
- maa
- ic
- hpmulti
- mesh
- genre
- audience
- medium
- yso-old
- ks-paikka
- ks-toiminta
- (all)

2. Autocompletion search result

yso ship en Open ONKI Ontology Browser

General Upper Finnish Ontology

- ship finds
- ship traffic
- ship travel
- shipbuilding
- shipbuilding industry
- shipmasters
- shipping administration
- shipping business

3. Concept collector for selected concepts

concept collector

yso:ship travel [change] [X]

yso ship en Open ONKI Ontology Browser

Using the ONKI Browser

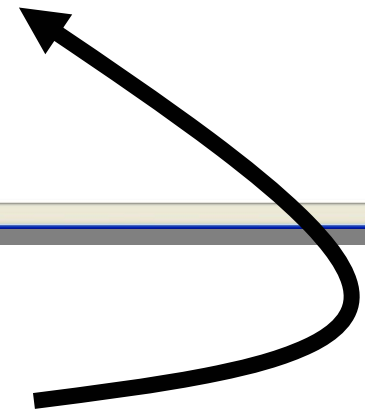


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The screenshot shows the ONKI Browser interface in Mozilla Firefox. The title bar reads "ONKI-Browser : Ontology Library Browser - Mozilla Firefox". The main header is "YSO - The Finnish General Upper Ontology" with "Ontology Server ONKI" on the right. Below the header are tabs for "Hierarchy" and "Statistics", and a language dropdown set to "English".

The left sidebar contains a "Concept Search" section with a "Type" dropdown set to "Class" and an alphabetical index from "A" to "Z" plus "A0+". A list of concepts is displayed, including "a priori knowledge", "a-clinics", "aallonpituus kooste", "aapa mires", "aardvark", "abandoned houses", "abandonment", "abbreviations", "abdomen", "abductions", "ability", "ability to write", "abnormality", "abortion", "abrasion resistance", "abrasion tests", and "absences".

The main content area is titled "yso-käsitteet" with a URI of "http://www.yso.fi/onto/yso/p4205". It features a "Context" section with "yso-käsitteet" and sub-concepts "Abstrakti", "Muuttuva", and "Lopysvä". A "Properties" section shows "Label (fi): yso-käsitteet" and "Type: Concept". A "Send feedback" button and "About ONKI" link are also visible.



Using the ONKI Browser



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The screenshot shows the ONKI Browser interface in Mozilla Firefox. The title bar reads "ONKI-Browser : Ontology Library Browser - Mozilla Firefox". The main header is "YSO - The Finnish General Upper Ontology" with "Ontology Server ONKI" to its right. Below the header are tabs for "Hierarchy" and "Statistics", and a language dropdown set to "English". A search bar is visible. A large red button with the text "Fetch Concept!" is overlaid on the page. Below the button is a list of concepts: [abandonment](#), [abbreviations](#), [abdomen](#), [abductions](#), [ability](#), [ability to write](#), [abnormality](#), [abortion](#), [abrasion resistance](#), [abrasion tests](#), and [absences](#). A "Properties" panel on the right shows "Label (fi): yso-käsitteet" and "Type: [Concept](#)". A black arrow points from the "Fetch Concept!" button to the "Properties" panel.

yso en



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Using the ONKI Browser



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The screenshot shows the ONKI Browser interface in Mozilla Firefox. The title bar reads "ONKI-Browser : Ontology Library Browser - Mozilla Firefox". The main header displays "YSO - The Finnish General Upper Ontology" and "Ontology Server ONKI". Below the header, there are tabs for "Hierarchy" and "Statistics", and a language dropdown set to "English".

The interface is divided into several sections:

- Concept Search:** Includes a search type dropdown (set to "Class"), an alphabetical index (A-Z, A, O, *), and a list of search results including "a priori knowledge" and "a-clinics".
- Context:** Shows the current concept "yso-käsitteet" with a "hide subordinate concepts" link and a list of related terms: "Abstrakti", "Muuttuva", and "Lopsvvä".
- Properties:** Displays "Label (fi): yso-käsitteet" and "Type: Concept".

Two large black arrows originate from the bottom of the screenshot. One arrow points from the "a priori knowledge" search result to the "yso" dropdown menu in the footer. The other arrow points from the "yso-käsitteet" context section to the "Open ONKI Ontology Browser" button in the footer.

yso en



Using the ONKI Browser



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The screenshot shows the ONKI Browser window titled "ONKI-Browser : Ontology Library Browser - Mozilla Firefox". The main content area displays "YSO - The Finnish General Upper Ontology" with tabs for "Hierarchy" and "Statistics". The "Concept Search" section includes a dropdown menu set to "Class" and an alphabetical index. Below the index, a list of concepts is shown, including "a priori knowledge", "a-clinics", "aapa mires", "aardvark", "abandoned houses", "abandonment", "abbreviations", "abdomen", "abductions", "ability", "ability to write", "abnormality", "abortion", "abrasion resistance", "abrasion tests", and "absences". The "yso-käsitteet" section shows the URI "http://www.yso.fi/onto/yso/p4205" and a list of properties: "abstrakti", "muuttuva", and "lopyvä". The "Properties" section shows "Label (fi): yso-käsitteet" and "Type: Concept".

yso:ship travel [change] [X]

yso en

ONKI Widget JavaScript Code



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To the HTML HEAD section:

```
<script type="text/javascript"
  src="http://www.yso.fi/onki.js"></script>
```

Update an HTML Form input field to ONKI Widget field:

```
<input id="dc:subject"
  onkeyup="onki['yso'].search()" />
```

ONKI-Widget Generator: specify->copy->paste into your web page

<http://www.yso.fi/onkiwidget/?l=en>



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www.yso.fi: concept ontologies | geo ontologies | thesaurus ontologies | create access key
suomeksi | in English

ONKI-Widget

ONKI-widget created for ontology **yso**.

Integrate the user interface component into your system by adding the following code line into the HEAD section of the HTML page:

```
<script type="text/Javascript" src="http://www.yso.fi/onki.js?INSERT_YOUR_KEY_HERE"></script>
```

and the following code line into the BODY section of the HTML page, into the location where the component is desired:

```
<input onkeyup="onki[yso].search()" id="yso"/>
```

By adding the codelines above, a widget as seen below is integrated into your system:

yso [v] [] fi [v] [] Open ONKI Browser

The functionalities of the generated ONKI widget can be modified by using the form below.

ontology	yso [v]	The ontology to be searched
key	INSERT_YOUR_KEY_H	Your access key to www.yso.fi services: generate access key
fieldid	yso	The id of the input field used for inputting the search term
addConceptFunction	[]	A javascript function defined by you to add concepts from search results to your application
autocompletionSearch	<input checked="" type="radio"/> true <input type="radio"/> false	Show the autocompletion search field
fieldName	url	The name of the hidden input fields used for storing the selected concepts
lang	fi	Search is limited to the labels of this language
languageMenu	<input checked="" type="radio"/> true <input type="radio"/> false	Show the available languages of the selected ontology in a selection menu
maxHits	[]	Maximum amount of search results
maxSelect	[]	The maximum amount of concepts that can be selected from search results
onkimenu	<input checked="" type="radio"/> true <input type="radio"/> false	Show all the www.yso.fi ontologies in a selection menu
openonkibutton	<input checked="" type="radio"/> true <input type="radio"/> false	Is the opening of the ONKI Browser allowed ("Open ONKI Browser" button)
openonkilabel	Open ONKI Browser	The label of the "Open ONKI Browser" button



Using ONKI Widget in a Legacy System:

<http://www.yso.fi/onki/yso/app/annotation/>



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Annotation demo using ONKI Mash-Up Component and IRMA Context Browser - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.yso.fi/onki/yso/app/annotation/ www2008


This demo page is a view to your organization's cataloguing system.
The ONKI Mash-Up component in the "Subject" field is integrated into the system by adding only two lines of code.

The component can also be used for annotating with terms from traditional thesaurus.
Thus it's possible to integrate the component to a legacy system, which isn't aware of URIs.

In addition to using ONKI Mash-Up component, the **IRMA** widget can be used to visualize the hierarchy of concepts (see demo part 3). IRMA is attachable to any HTML-based annotation system with JavaScript.

Title Text field for the title of the document.

Description Text field for the description of the item.

Picture  Field for the picture of the item

Demo part 1: fetching ontological concepts

Subject yso:car makes [change] [X]
yso en

Open ONKI Ontology Browser

- General Upper Finnish Ontology
- traffic
- traffic accidents
- traffic administration
- traffic arteries
- traffic behaviour
- traffic casualties
- traffic contractors
- traffic control
- traffic count

Semantic autocompletion search field for fetching concepts/instances from ontologies.

- Type some text in the text field to perform a search.
- By clicking a search result the concept's URI and label are fetched.
- The ontology used in search can be changed by using the leftmost menu.
- The language used in search can be changed by using the rightmost menu.
- The selected ontology can be opened in ONKI Browser by pressing the "Open ONKI Browser" button. In browser the "fetch concept" button can be pressed to fetch the selected concept to the cataloguing system.
- The label of a fetched concept functions as a link to the HTML representation of the concept.
- A fetched concept can be changed to another concept by clicking the "change" link next to the concept's label.
- A fetched concept can be removed by clicking the X-symbol next to the concept's label.



Selected FinnONTO Applications

Selected Collaborative National Semantic Portals



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- MuseumFinland – Finnish Museums on Semantic Web
 - <http://www.museosuomi.fi>
- CultureSampo – Finnish Culture on the Semantic Web
 - <http://www.kulttuurisampo.fi>
- HealthFinland – Finnish Health Information on the Semantic Web
 - <http://www.seco.tkk.fi/applications/tervesuomi/>
 - <http://www.tervesuomi.fi>
- ...

Next Steps



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- Official publication event of the **National ONKI Living Lab**
 - <http://www.yso.fi> (already there and operational)
 - Distribute open source ontologies
 - Support Public ONKI Services
 - Support publishing other groups ontologies
 - » Let us know if you would like to try it out!
 - Gain legacy end-user experiences of using the technology
- Continue aligning Finnish vocabularies and ontologies with those in other languages

Conclusions



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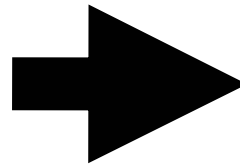
- Semantic Web needs **cross-domain content infrastructure**
 - Shared ontologies
 - » Collaborative development needed
 - Ontology services for applications
 - » Mashups and web services
- FinnONTO tries to facilitate this **on a national level** in Finland
- Technology being **tested in several collaborative semantic portals**
 - MuseumFinland, CultureSampo, HealthFinland ...
- Next step: **ontology support for legacy systems** using the ONKI Living Lab

Thanks!

More info, publications & demos on the SeCo-web



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Semantic Computing Research Group (SeCo)
Making computers and the web more intelligent and interoperable!

SeCo welcomes you!
The Semantic Computing Research Group (SeCo) researches machine-processable semantics related to, e.g., the Semantic Web. We are located at the [Helsinki University of Technology \(TKK\)](#).

»»» Työtä tanolla! SeCo is hiring! «««

Our research is **focused** on semantic media technologies, such as the Semantic Web and intelligent web services. In addition to research and **publications**, we also create prototype applications that demonstrate the new possibilities of semantic technologies, such as **semantic portals for end-users**, **semantic infrastructural services**, and **ontologies and tools** for creating semantic applications.

Selected SeCo Applications for End Users

MuseumFinland Try It! Crava Try It! KulttuuriSampo

Have you tested the semantic web?
Try ONKI Ontology Server!

Latest News
FinnONTO Awarded at FENIX Final Seminar. FinnONTO pakittiin FENIX-ohjelman oppusessioissa.
FinnONTO won the best project award in category of knowledge...
Several results were published at FENIX - Interactive Computing 2003-2007 Final Seminar. SeCo:n tuloksia julkistettu FENIX-tekniikkaohjelman oppusessioissa.
SeCo released a first version of YSO at FENIX Results Promotion 7...

<http://www.seco.tkk.fi/>