

# Lightweight Semantics for Web Information Systems

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# The End

- **Lightweight semantics**  
can be powerful
- **Metadata on activity**  
can be powerful
- There are **more webs**  
each needs specific treatment,  
no silver bullet yet

# **(Web) Information Explosion**

# Web Information Space Evolution

- Legacy Web

→ [Semantic |  
Social |  
Adaptive] Web



- Increasing size and information complexity
- Novel applications and modes of operation
- User diversity and social interaction complexity

# Implicit

becomes

# explicit

# Why Metadata (Semantics)?

- Deliver **great results**
  - Faster access to essential information
  - Not missing important information
- Richer and **more organized** exploring experience
  - Better organized results
  - Smart recommendations
- Accomplish **key tasks more easily**
  - Shopping, traveling, health
  - Decision making

**concept**

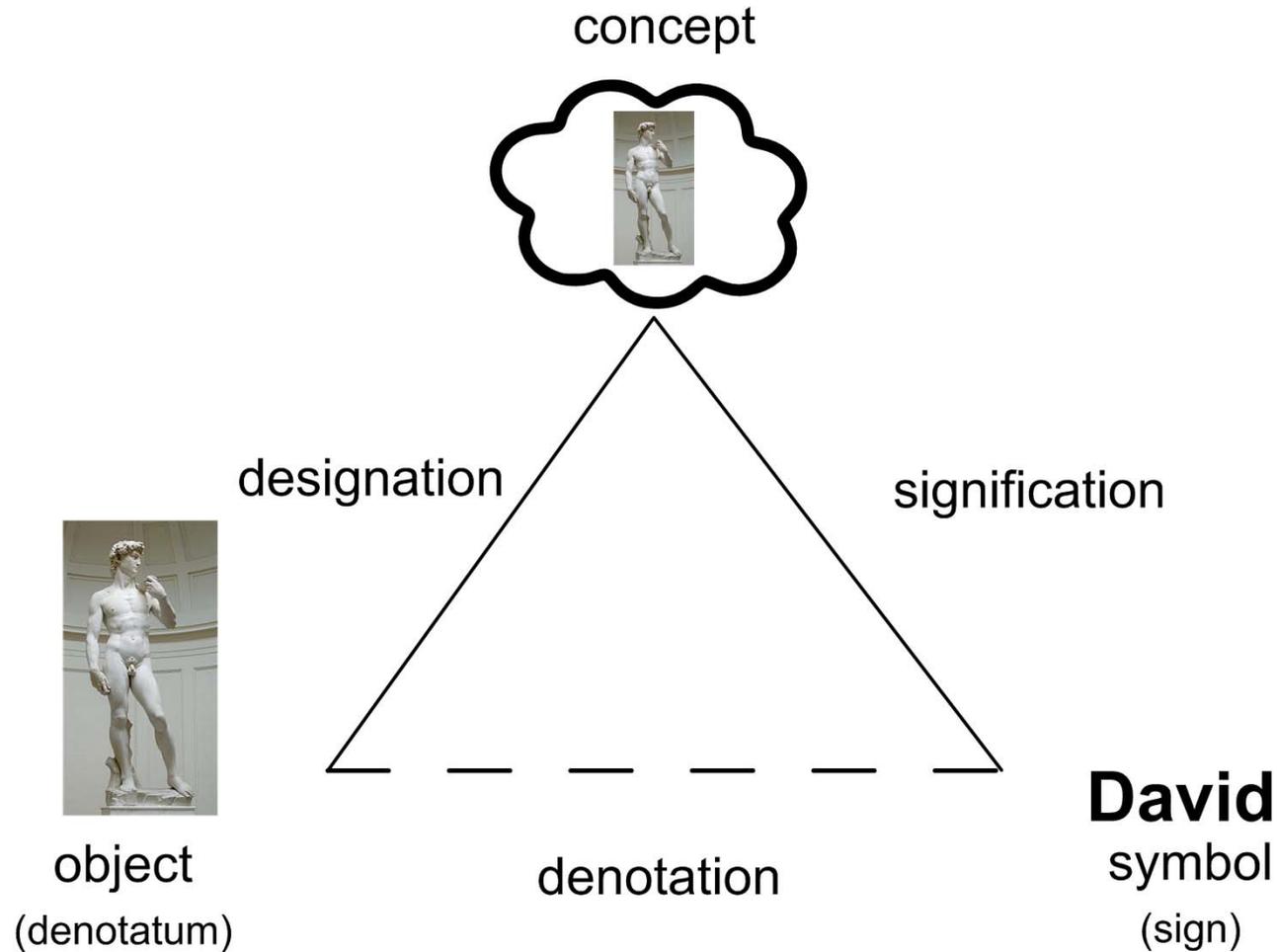
**entity**

**term**

**object**

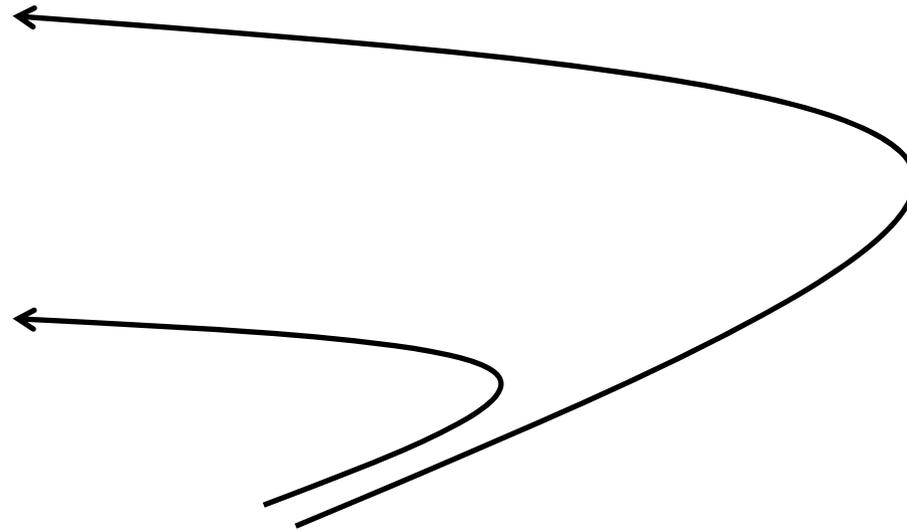


# (Web) Information Space as a Large Semiotic System



# Sources for Metadata

- Content
- Structure
- User activity
- Annotations

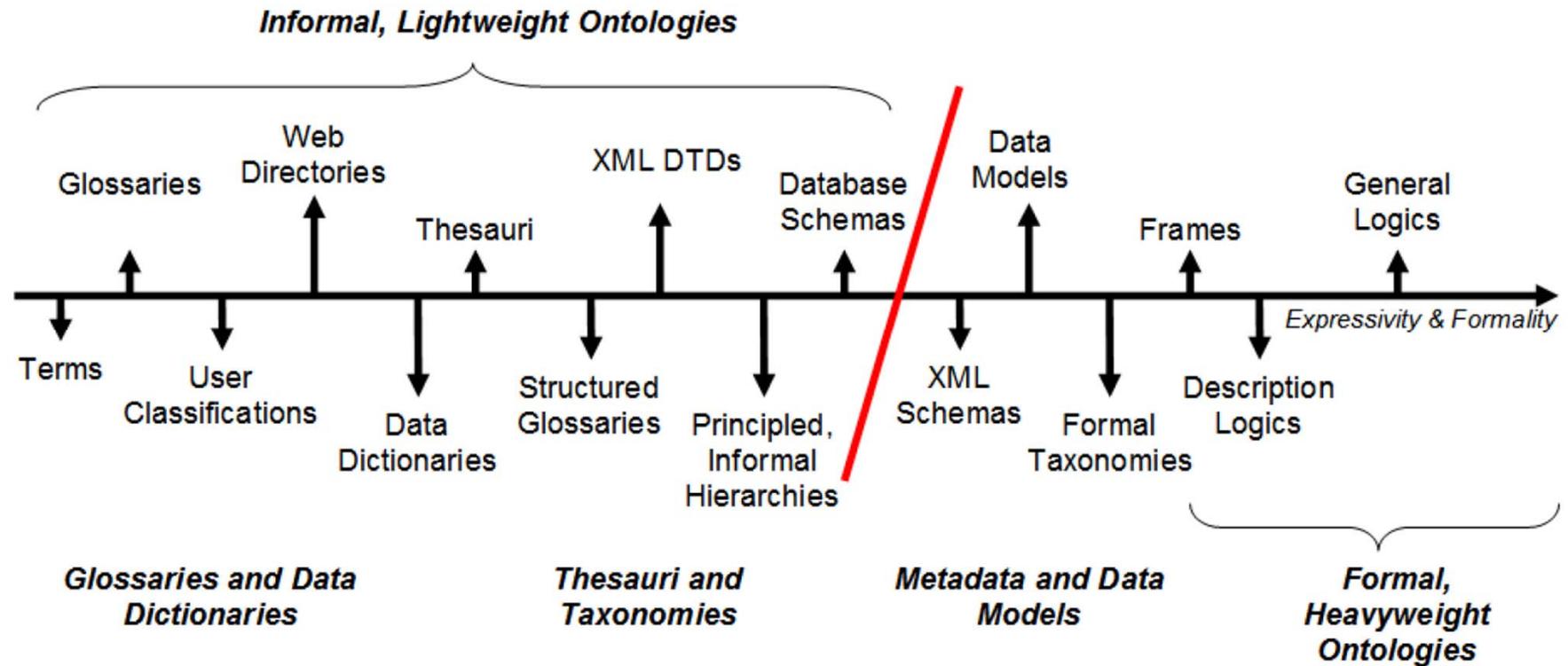


# How to Acquire Metadata of the Web Content?

## Automatically ...

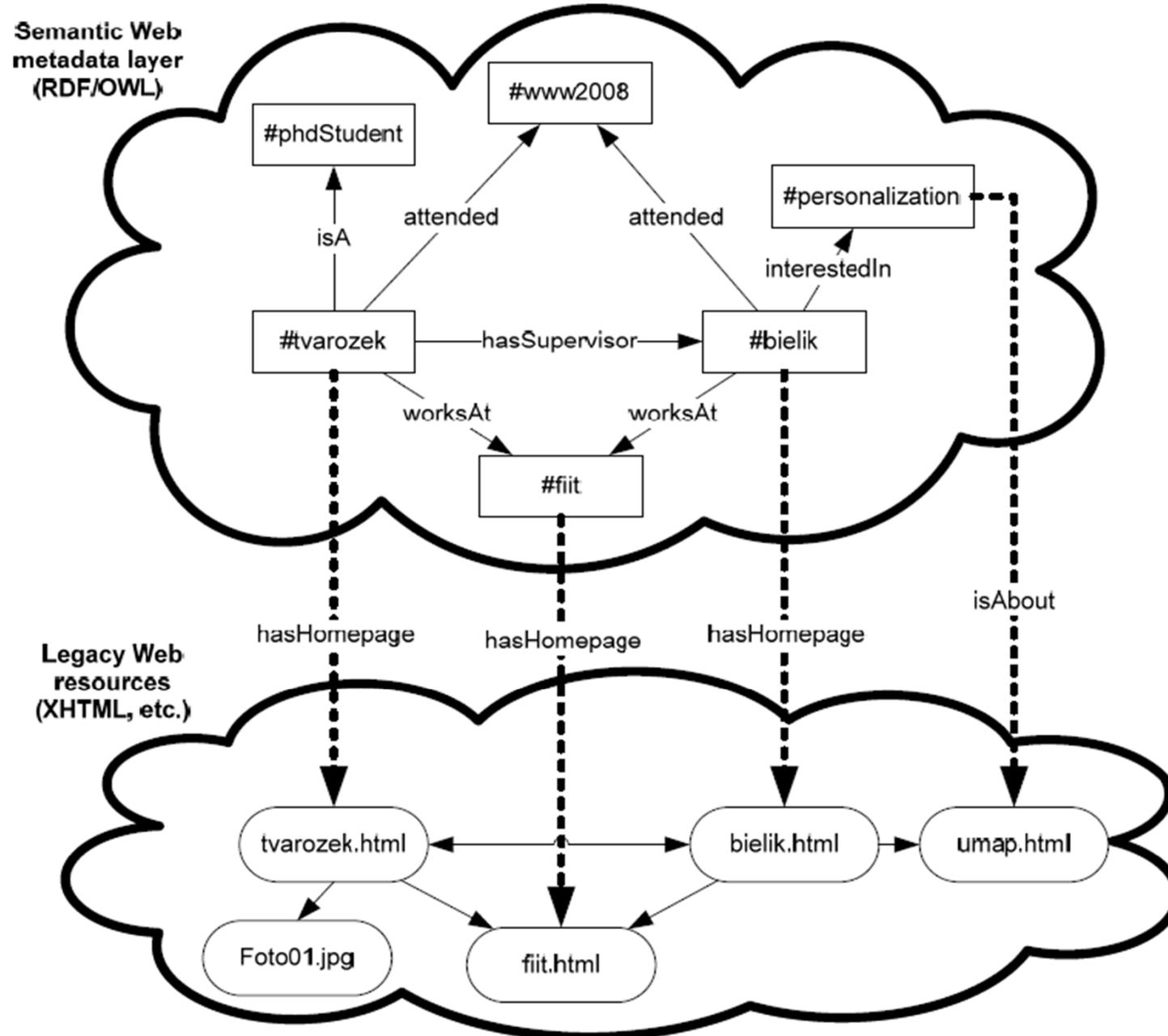
**What is the best  
expression of metadata  
(semantics)?**

# Representation of Metadata

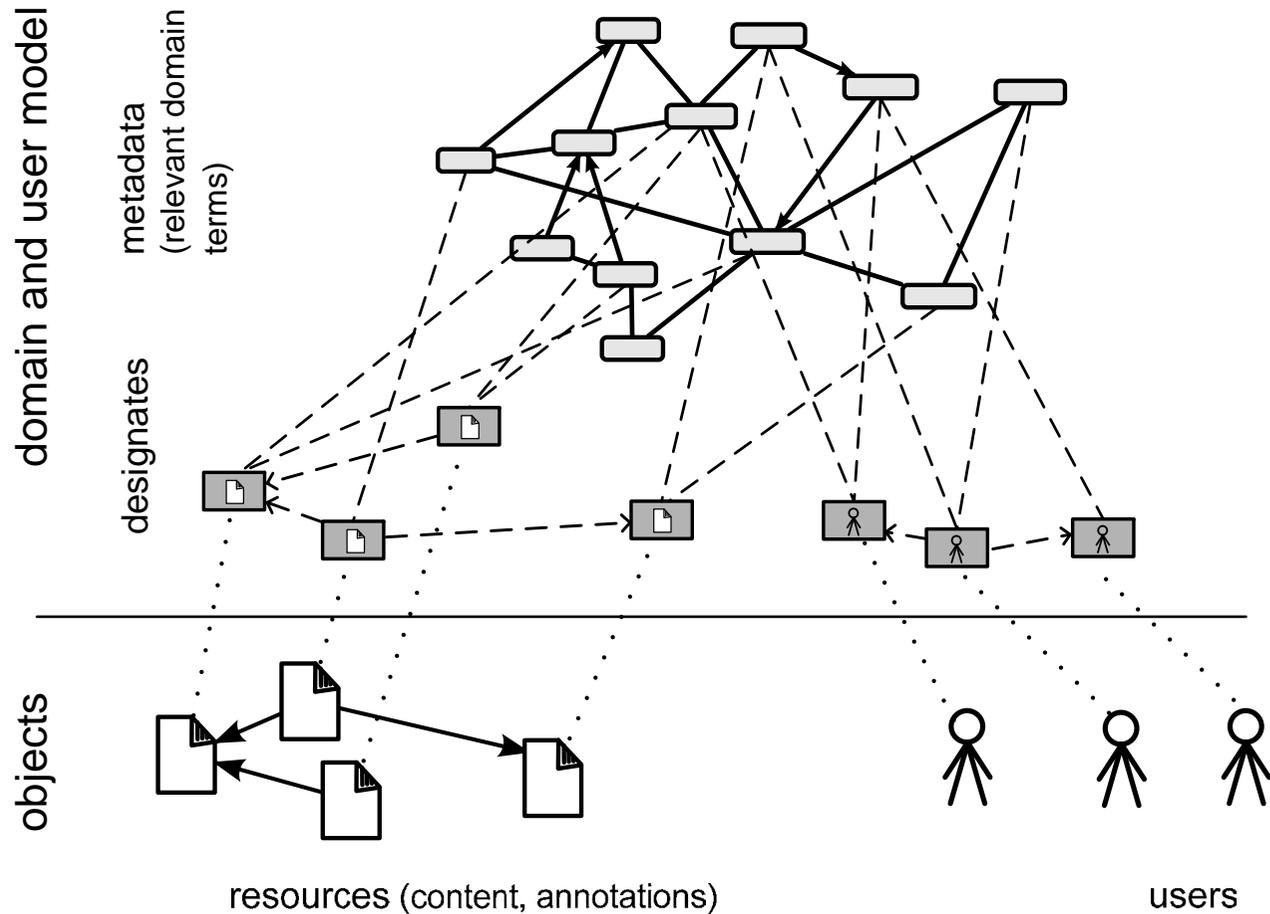


Wong, 2011

# Web Metadata



# Lightweight Domain and User Models



**Annotations**

# User Activity

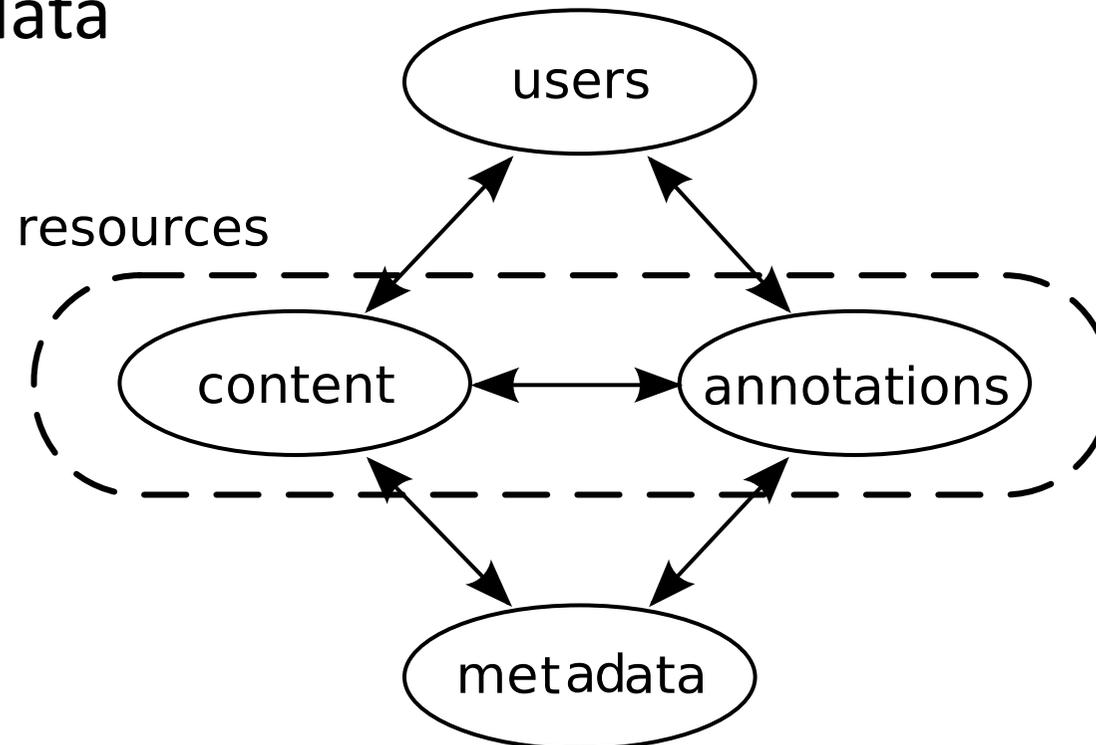
as a Source for Semantic

- User interests vs. visited information objects
- Explicit vs. implicit feedback

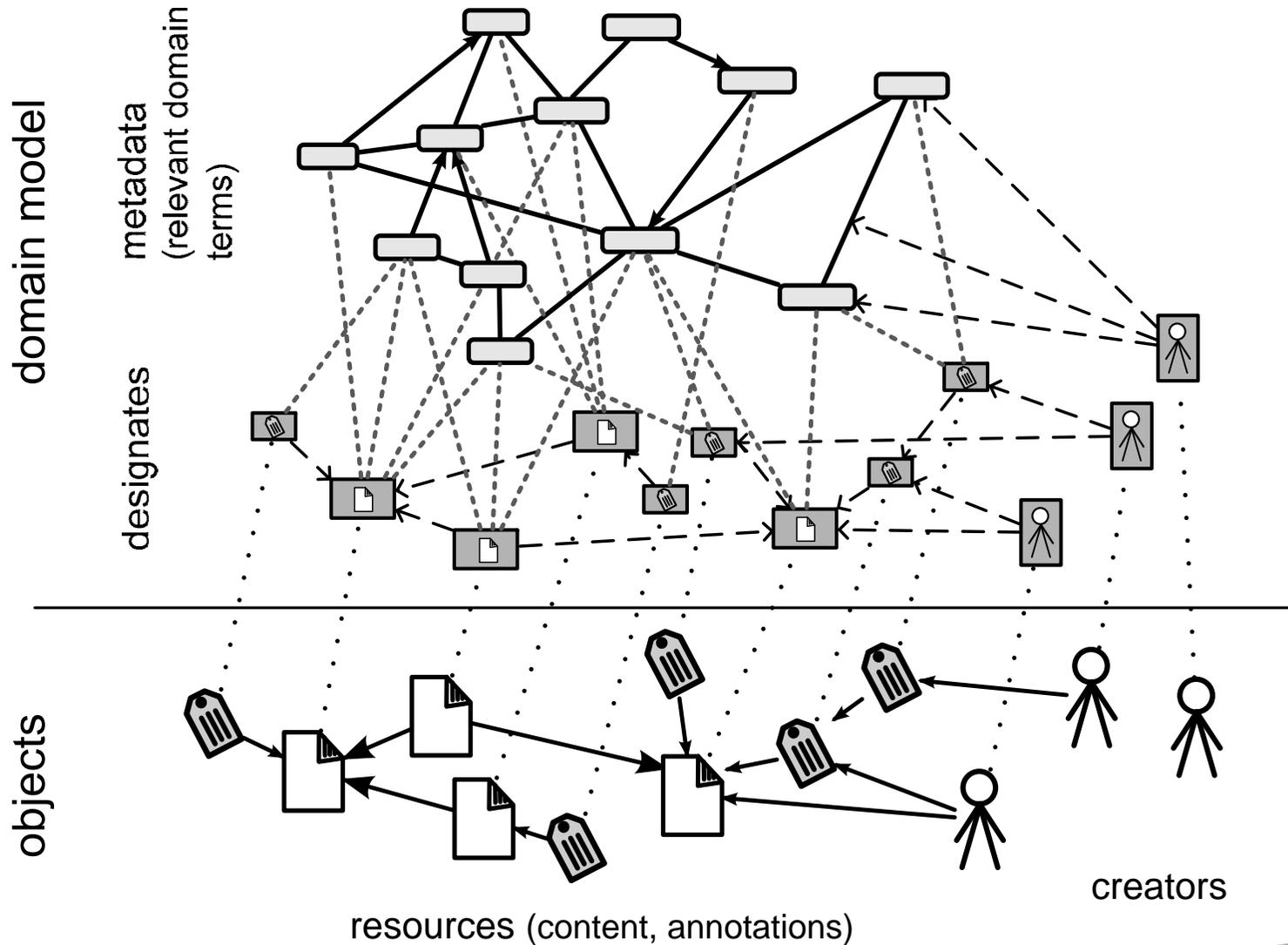
**Closed vs. open  
information spaces**

# Users and metadata

- users create and access resources described by metadata



# **Socially Enhanced Lightweight Domain Model**



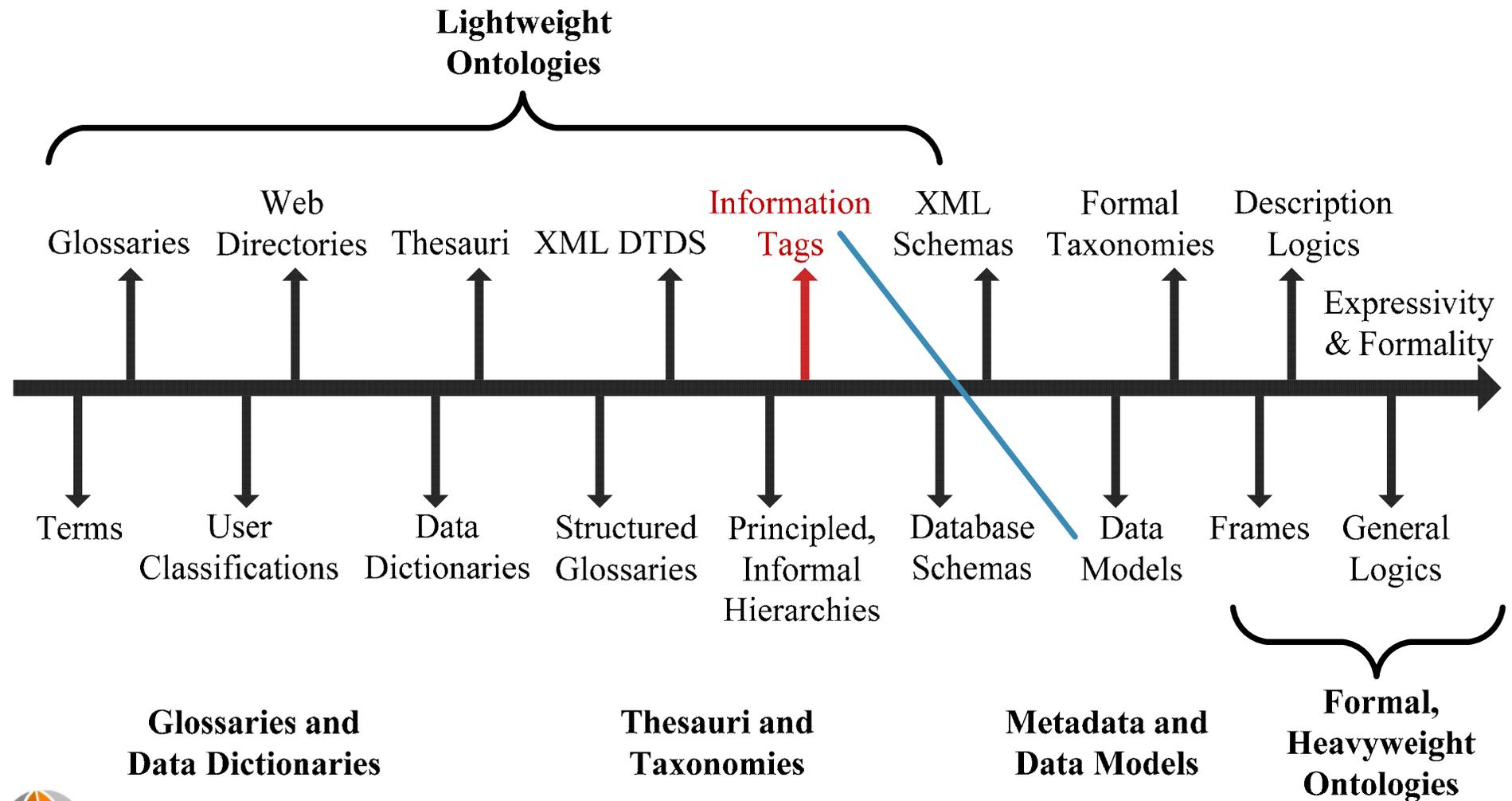
**Creators vs. Users**

# Information tag

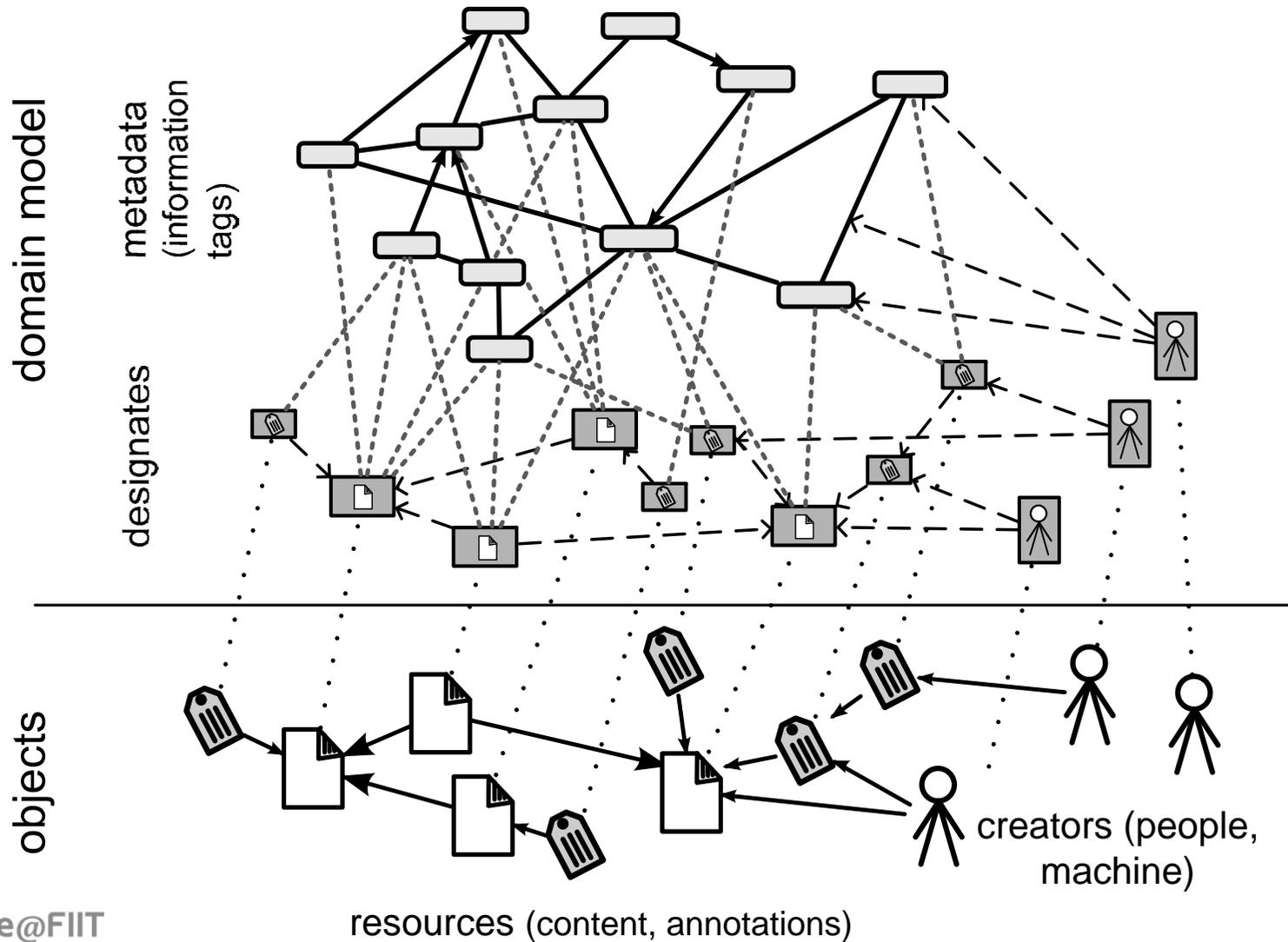
# Information Tag

- *descriptive metadata with a semantic relation to a tagged content*
- *defined by a triple of:*
  - *Type: defines a type and a meaning of the information tag*
  - *Anchoring: identifies a tagged information artifact*
  - *Body: represents a structured information, a structure of which corresponds to the type of the information tag*

# Information Tag Expressivity and Formality



# Lightweight domain model



# **Web-scalable Extendable Information tags Representation**

# Requirements to a repository

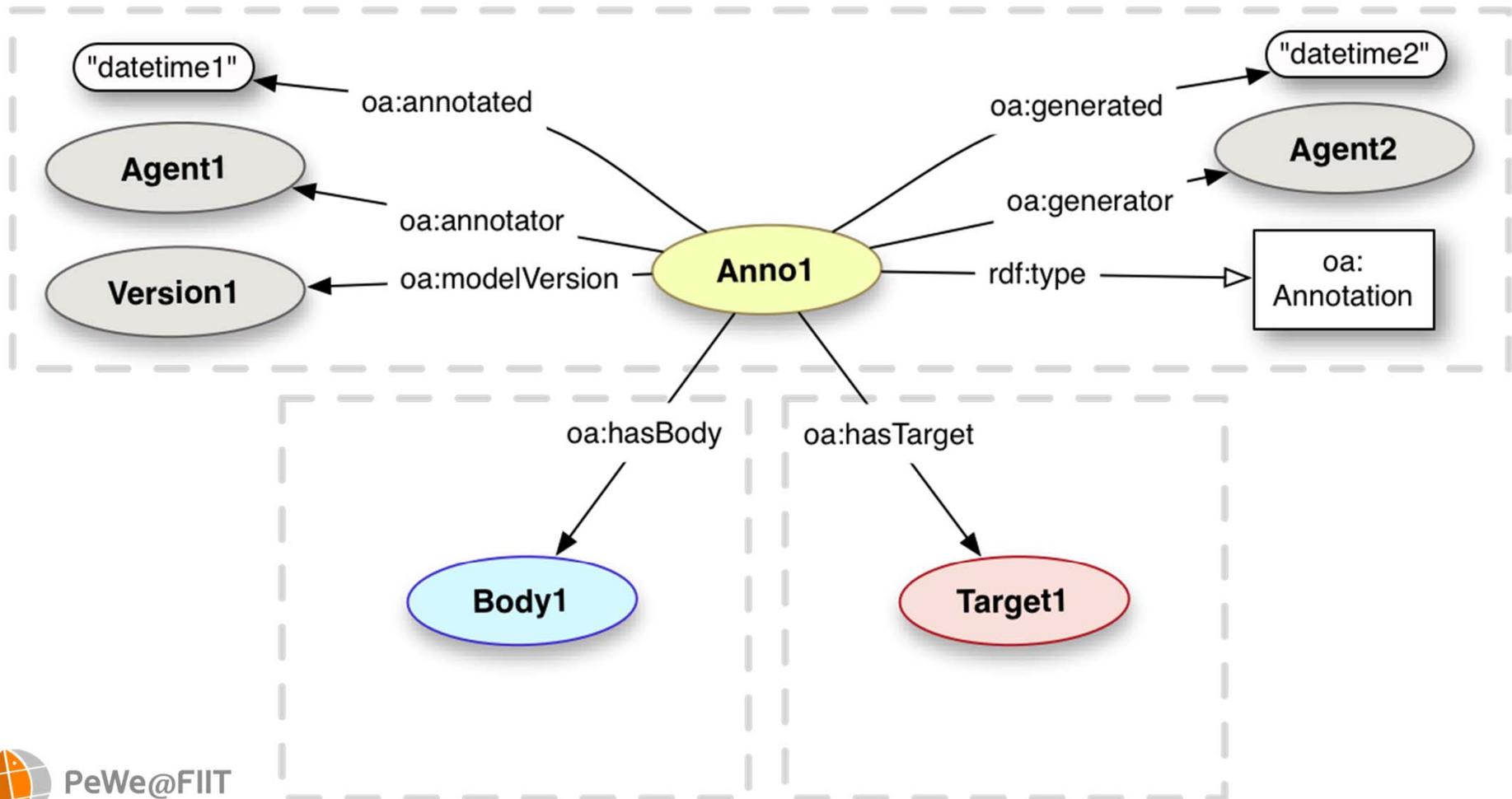
1. **VOLUME, VELOCITY - Web-scalable** – good read and modify performance despite of nontrivial number of stored information tags
2. **VARIETY - Extendable** – ability to store information tags in a *freeform model* which is easily extendable with new types
3. **VALUE - Querying support** – effective data access should be supported

# Effective and powerful data access

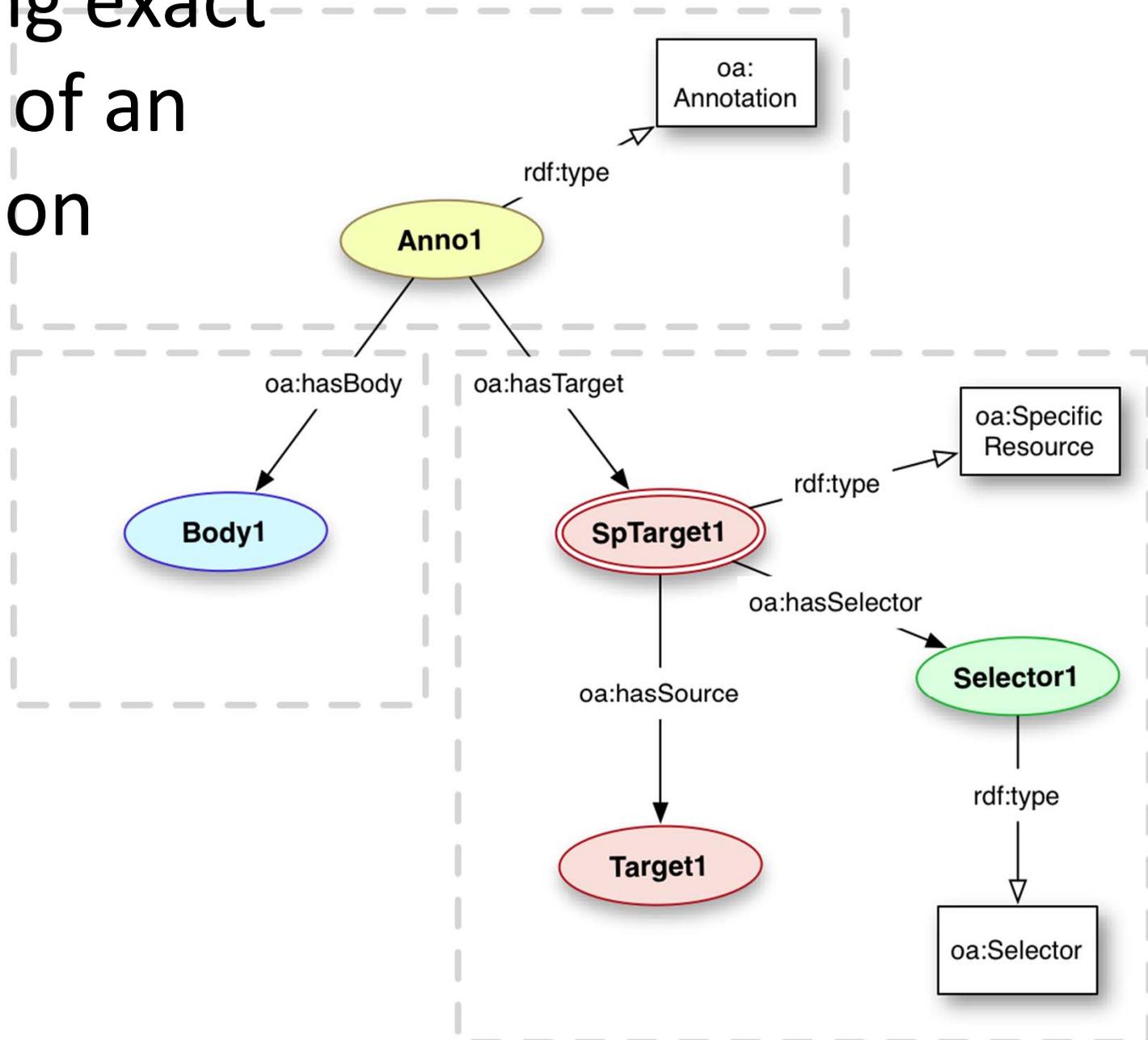
- *Store* – creation of new information tag for an object (document)
- *Update* – e.g. after modification of a tagged object
- *Obtain* – retrieve the information tag by its URI
- *Access history* – obtaining of previous versions of information tag
- *Obtain information tags anchored to an object*

# Information tag model

- Open Annotation Model



# Specifying exact position of an annotation



# Metadata anchoring and validity

- Changes in objects (documents)
  - Robust anchoring descriptor
- Consistency of information tags
- Validity of information tags

# RDF-like repository

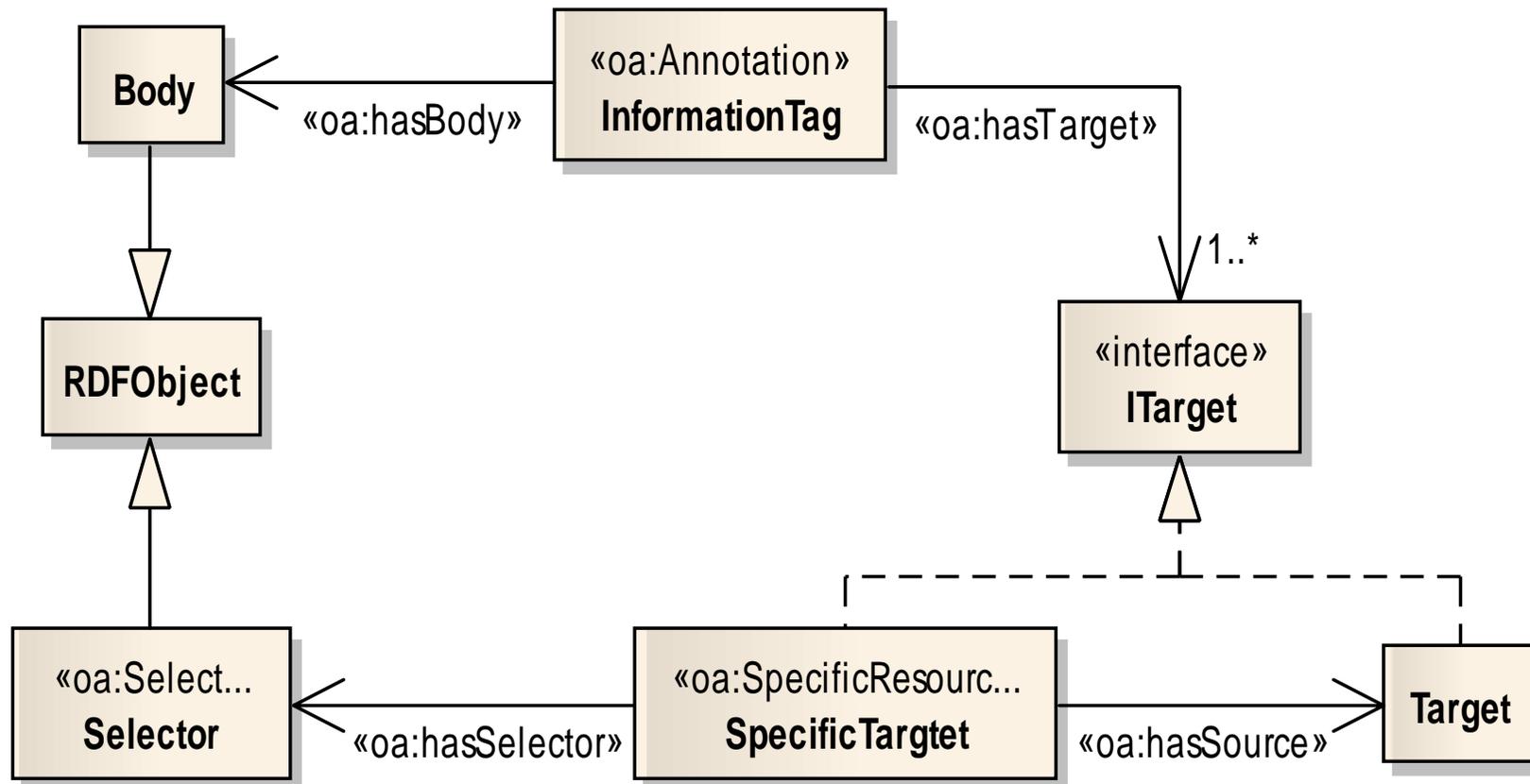
- efficient access to **complete objects**
  - support of basic SPARQL query processing
  - performance at least on the level of classical graph-based RDF stores

## → **Document databases**

- MongoDB with support of distributed processing via MapReduce
- Distributed SPARQL Query Processing

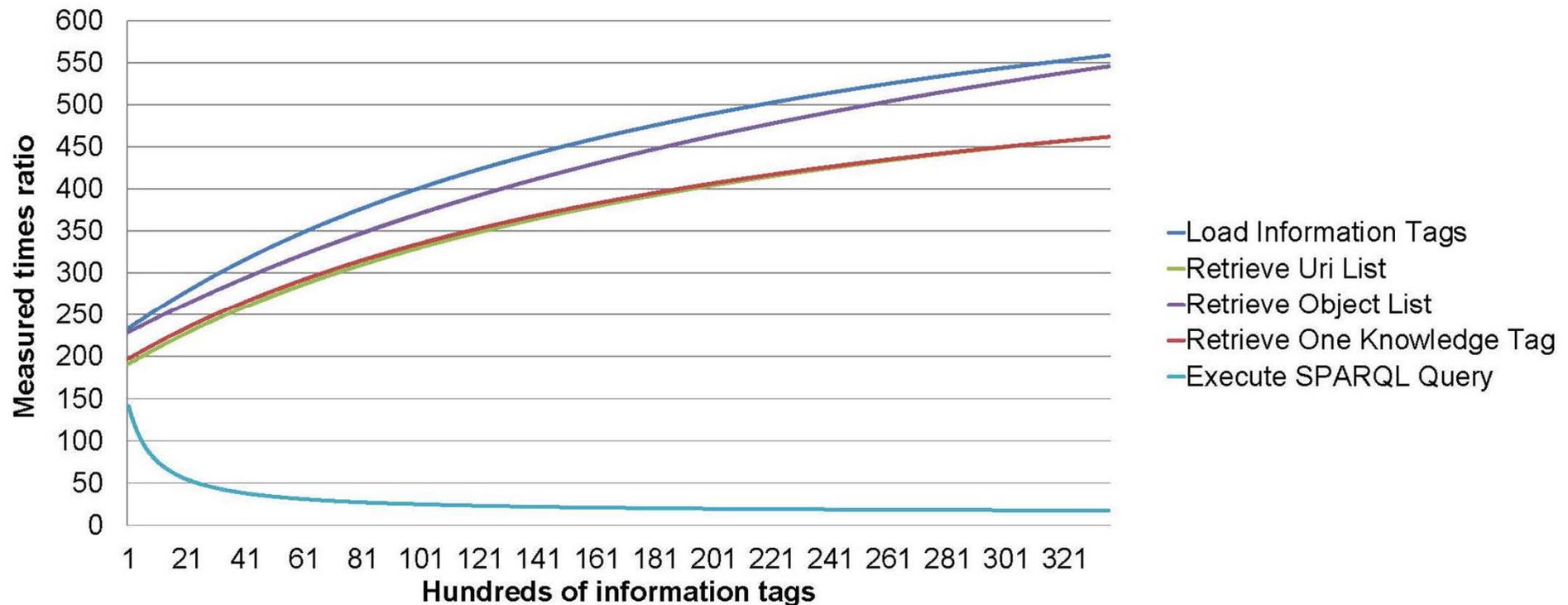
# Information tags repository

- SPARQL query processing via MapReduce



# Repository performance evaluation

- MongoDB vs. Bigdata RDF triple database

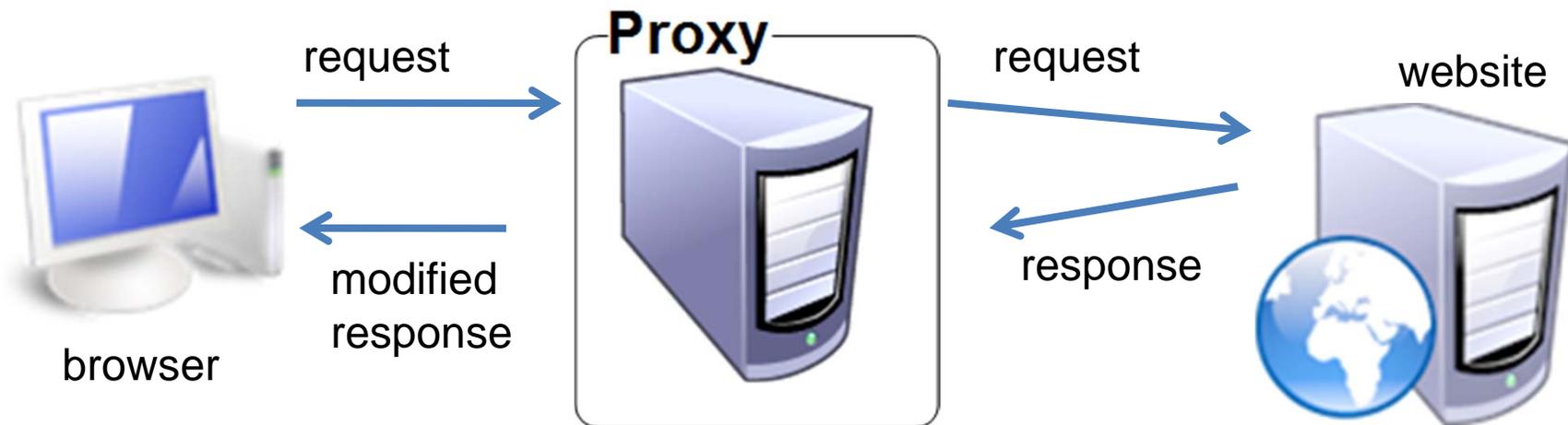


# Automatic Semantics Acquisition

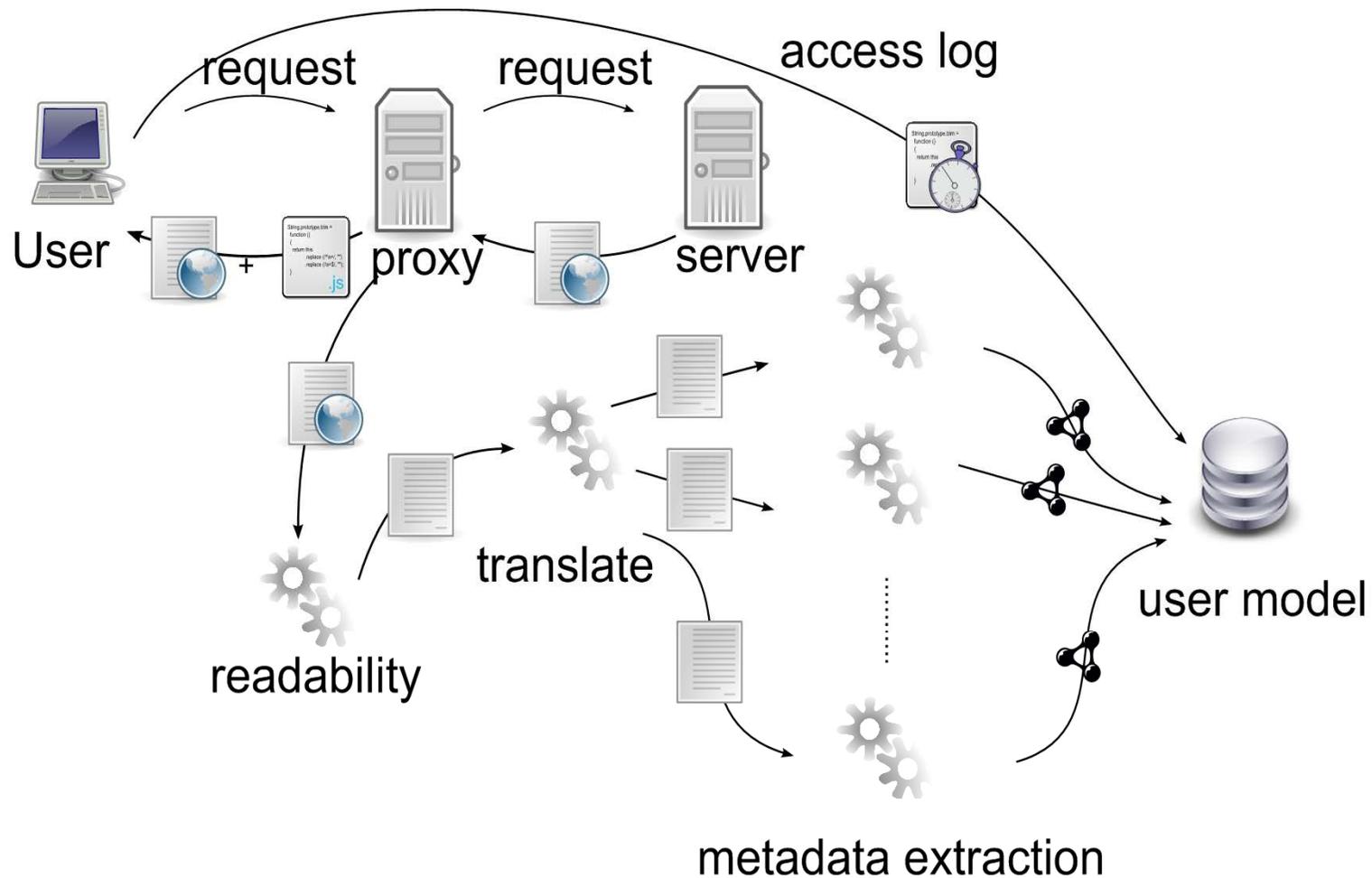
## SERVER SOLUTION

# Adaptive Proxy - PeWeProxy

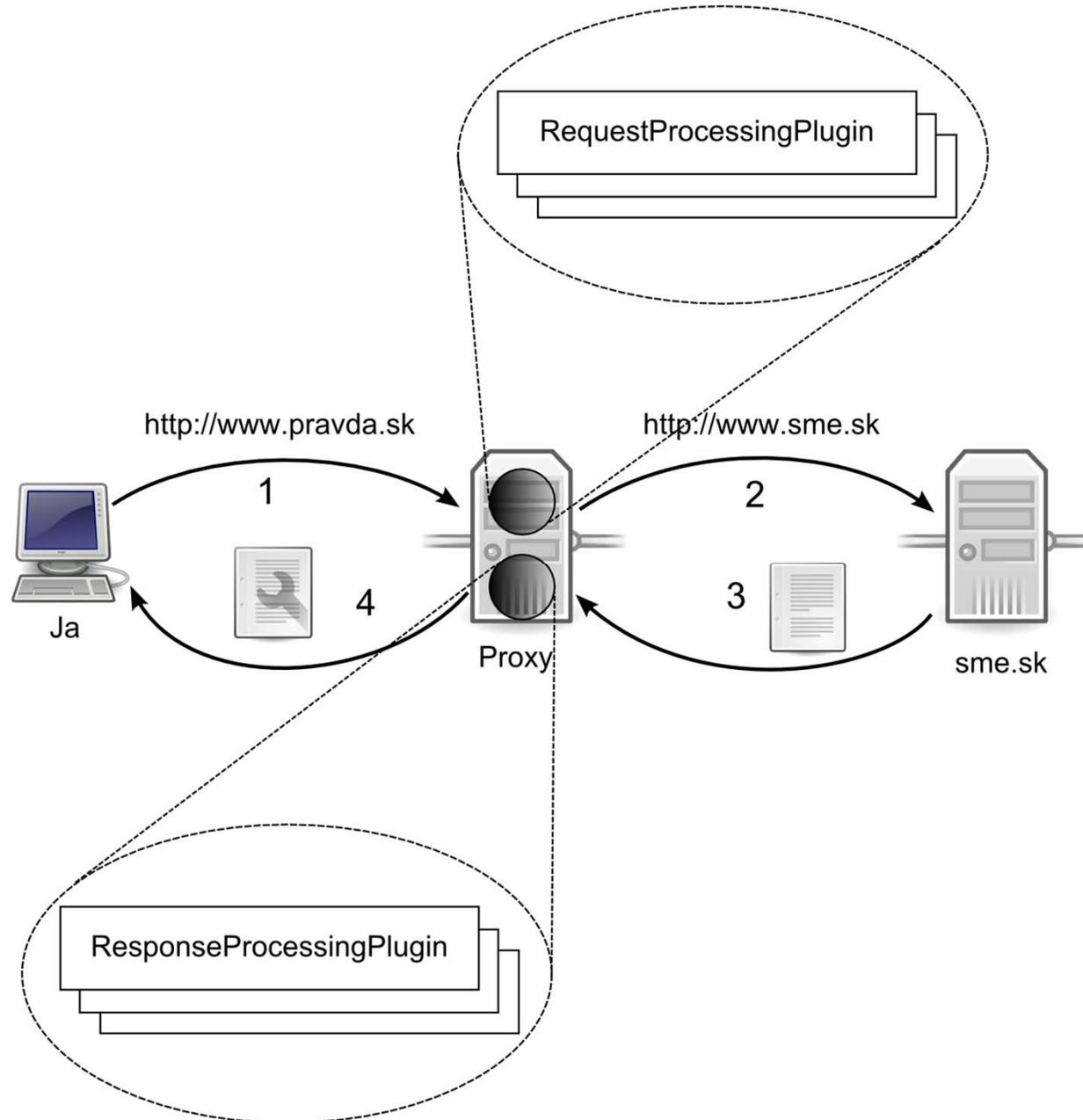
- Extracting metadata from available content
- Evaluating the content by users – (implicit) feedback



# Open Corpus User Monitoring



# Basic outline of the PeWeProxy operation



# Hello World

```
public class HelloWorldPlugin
    extends ResponseProcessingPluginAdapter {
public ResponseProcessingActions
    processResponse(ModifiableHttpResponse response) {
        HtmlInjectorService htmlInjector =
            response.getServicesHandle().
                getService(HtmlInjectorService.class);
        htmlInjector.inject("<h1>Hello world!</h1>",
            HtmlPosition.START_OF_BODY);
        return ResponseProcessingActions.PROCEED;
    }
```

# PeWeProxy Workshop



WISM 2012, Florence, October 18, 2012



# Colour your Web!

## NEWS TECHNOLOGY

Home UK Africa Asia-Pac Europe Latin America Mid-East South Asia US & Canada Business Health Sci/Environment Tech Entertainment Video

11 April 2011 Last updated at 11:47 GMT

646 Share    

### Laser gun fired from US navy ship

The US Navy has fired a laser gun from one of its ships for the first time.



Researchers used the high-energy laser (HEL) to disable a boat by setting fire to its engines off the coast of California. Similar systems had previously been tested on land, however moist sea air presented an extra challenge as it reduces a beam's power. The navy said that ship-borne lasers could eventually be used to protect vessels from small attack boats. The US military has been experimenting with laser weapons since the 1970s. Early systems used large, chemical-based lasers which tended to produce dangerous waste gasses. More recently, scientists have developed solid state lasers that combine large numbers of compact beam generators, similar to LEDs.

#### HELs fire



Until now, much of the development of HELs has focused on shooting down missiles or hitting land-based targets. The latest round of tests showed its wider possibilities, according to Peter Morrison from the Office of Naval Research. "This test provides an important data point as we move toward putting directed energy on warships. "There is still much work to do to make sure it's done safely and efficiently," he said. While a weaponised system would likely be restricted to military vessels, merchant shipping has also expressed an interest in laser technology. A gun which uses visible laser light to



The US Navy system uses a Joint High Power Solid State Laser mounted on deck

### Top Stories



Google sold to Facebook, Internet's future uncertain **NEW**

Powerful earthquake rattles Japan

Veiled women detained in France

Libya rebels weigh AU truce plan

Two activists die in Bahrain jail

### Features & Analysis



#### Decision time

Hard choices for those living inside Japan's nuclear exclusion zone



#### Sins of the flash

William and Kate's uneasy peace with the paparazzi



#### Day in pictures

Most striking images from around the world



#### Human limit

Could a marathon ever be run in under two hours?

# Bubbles – the real Social Web

**SME.sk** | Správy | Regióny | Služby | Nakupujte

**zajtrašie.sme.sk** | **TOP 10** | **Viac ako 10 rebríčkov** | **Sme.sk v mobile** | **Smejeme sa daňovák**

Vidíte budúcnosť? Tak povedzte, čo sa stane

Nemáte radi rebríčky typu Desať naj...? Fakt nie?

Už sme na Androide, iPhonoch aj Samsungu

Štát sa nedá poraziť. Ale vysmiať sa mu môžeme - ako Graus.

Video v novinách! [tv.sme.sk](#) | piatok 1. apríla 2011 | [meniny má Hugo](#) · [pošti oslávencovi vtipný pozdrav](#)

vyhľadávanie **HLADAJ ▶**

**TITULKA**  
**SPRAVODAJSTVO**  
**REGIÓNY**  
**ZAHRANIČIE**  
**KOMENTÁRE**  
**EKONOMIKA**  
**KULTÚRA**  
**ŠPORT**  
**TV.SME.SK**  
**DENNÍK**  
**PREDPLATNÉ**

**TERAZ.SME.SK**

**Z DOMOVA**  
 Štatistíci český chaos nepripúšťajú  
 Prezident oslavoval bez Schustera

**ZAHRANIČIE**  
 Labourista dostal basu za 10-tisíc eur  
 CIA už pomáha rebelom. Láka ľudí z vlády

**EKONOMIKA**  
 Šéf teplárne musí vysvetľovať prenájom na 30 rokov  
 Ryanair zavádza nový poplatok dve eurá

**ŠPORT**  
 Gáborík a Svatoš asistovali, Tampa ide do play off  
 Žilina môže zraziť prebudený Slovan

**NAJČÍTANEJŠIE**

4 hodiny | 24h | 25 dní | 7 dni | Odporúčané

- Slovensko bude mať **15** more 10 252
- Ryanair zavádza nový poplatok dve eurá 2 528
- 15** Prezident oslavoval bez Schustera 2 367
- Mŕtvy chrobák Orbána nepresvedčí 2 090
- Štatistíci český chaos nepripúšťajú 1 913
- CIA už pomáha rebelom. Láka ľudí z vlády 1 689
- Po ťažkej chorobe zomrel syn Alexandra Dubčeka 1 603
- Obce politiku neriešia, dohovoria sa bez zákona 1 596
- Šéf teplárne musí vysvetľovať prenájom na 30 rokov 1 502
- Medvedev ruší Putinov štátny kapitalizmus 896

**Obce politiku neriešia, dohovoria sa bez zákona**

To čo riešia? Asi tak sa dajú zhrnúť reakcie z národnostne zmiešaných obcí na debatu poslancov o menšinových jazykoch. Na úradoch sa rozpráva viacjazyčne už dávno.

**VEĽKÝ MEDER**  
**NAGYMEGYER**

WISM 2012, Florence, October 18-20, 2012

**HOROSKOP**  
 Lev  
 Levy by nemali nechať nič na náhodu, ich finančné operácie sa môžu

**POČASIE**  
 Od západu pribúdanie oblačnosti. 15 až 20 °C.

# DeNERDizer

[Forum Home](#) > [Java APIs](#) > [Networking](#)

## Thread: java nio socket server program "lost" messages

This question is **not answered**. Helpful answers available: **5**. Correct answers available: **1**.

[Reply to this Thread](#) [Search Forum](#) [Back to Thread List](#)

Replies: 5 - Pages: 1 - Last Post: Nov 3, 2010 4:53 PM Last Post By: EJP Threads: [ [Previous](#) | [Next](#) ]

[user5067725](#)  
Posts: 3  
Registered: 10/27/10

**Warning**  
It is 26°C now, sunny, with no chance of rain. Please consider going out to the wild instead of browsing this forum.

```
java nio socket server program "lost" messages  
Posted: Oct 27, 2010 1:41 PM  
Hi,  
trying this type of application for first time. Using:  
Java 6 (21)  
Suse Enterprise Linux (SLES) 64-bit  
Server is running on a bare metal  
// Infinite server loop  
for (;;) {  
    // Waiting for events  
    try {  
        selector.select();  
    }  
    catch (IOException e) {  
        logger.error("Could not perform selection on this channel with the given selector: " + e.getMessage());  
        return;  
    }  
    Set<SelectionKey> keys = selector.selectedKeys();  
    Iterator<SelectionKey> i = keys.iterator();  
  
    // For each key ...  
    while (i.hasNext()) {  
        SelectionKey key = (SelectionKey) i.next(); // key is bit mask  
  
        // Remove the current key  
        i.remove();  
    }  
}
```

WISM 2012, Florence, October 18, 2012

### Welcome, Guest

[Sign In / Register](#)  
[Guest Settings](#)  
[Search](#)  
[FAQ](#)

### Legend

Guru : 2500 - 1000000 pts  
Expert : 1000 - 2499 pts  
Pro : 500 - 999 pts  
Journeyman : 200 - 499 pts  
Newbie : 0 - 199 pts  
Oracle ACE Director  
Oracle ACE Member  
Oracle Employee ACE  
Java Champion  
Helpful Answer (5 pts)  
Correct Answer (10 pts)

# Web revisitation support

TV.SME.SK  
DENNÍK **SME**  
PREDPLATNÉ

NAJPOPULÁRNEJŠIE

- Regiony
- Auto
- Počítače
- Natankuj.sk
- Veda
- Primar.sk
- Deti
- Mobil
- Ťahaj
- Hry
- Domácnosť
- Žena
- Stažnosti.sk
- Reality
- Knihy online
- Reštaurácie
- Pracovné ponuky
- Zľavy

TÉMY

- TV Oko
- Viera
- Rozhovory

ANKETA

staršie ankety

SLUŽBY



AKTUALIZOVANÉ 14:57

## Zdravotnícke odbory vyhlásili štrajkovú pohotovosť

Vyše 300 zdravotníkov na zhromaždení pred ministerstvom opätovne odmietlo transformáciu nemocníc a požiadali o zvýšenie platby za poisťencov štátu.

## Členov bývalého vedenia FNM opäť obvinili

Bývalých nominantov SNS vo Fonde národného majetku vyšetrovatel' Úradu boja proti korupcii opätovne obvinil.

+ Fond národného majetku pripravil štát o milióny

## Rozsah verzii Valkovej vraždy sa zužuje

Vyšetovatelia vraždy 2012 Fm i verzia October 18, 2017 ktorých rozsah sa zužuje, povedal riaditeľ Odboru osobitného určenia Generálnej

## Desať naozaj (ne)podarených prvoaprilových žartov

Viete si predstaviť SME len na Twitteri? Guardian to skúsil. Desať prvoaprilových bláznovstiev.

### AUTO.SME.SK



Porovnáваме autá nižšej strednej triedy: Ktoré je najlepšie?

### ZLAVY.SME.SK



Sledujte najvýhodnejšie zľavy na jednom mieste

### DOMÁČNOSŤ.SME.SK



Karí - korenisté a pikantné

### HESEĎTE DOMA



Vyberte si z našich tipov na koncerty, výstavy a filmy

### STE RODIČ? MÁME WEB PRE VÁS



6. Povstalci určili podmienky - Kaddáthho sily sa musia stiahnuť 6 233
7. Matovič: Slotá berie plat za ničnerobenie 5 357
8. Výmenné lístky u lekárov oddnes skončili 5 240
9. Ryanair zavádza nový poplatok dve eurá 5 092
10. Poslanec SaS opäť pomaly prečítal návrh, Smer ho chce počuť ešte raz 4 575

### HOROSKOP



#### Váhy

Ste nahnevaní na nevinného človeka, dajte každému možnosť, aby sa obhájl.

### POČASIE



20 °C.

Od západu pribúdanie oblačnosti. 15 až

SERVISY televízia, kiná, divadlá

### KURZY

USD	1,414	↓	GBP	0,882	↓
AUD	1,365	↓	HUF	266,260	↑
CZK	24,512	↓	PLN	4,040	↑

Nákup/Predaj: 100 USD = 0 €

Najnovšie Najčítanejšie Top karma



1. Radovan Kleinr: O barcelonskej športovej rodine
2. Miroslav Chovan: Ako sa nedopustiť poistného podvodu pri poistení majetku
3. Matúš Holý: Som prostáček
4. Alojz Hlina: Cenzúra je prílišna horlivosť?Alebo...
5. Peter Badáň: UEFA a FIFA suspendovali Bosnu
6. Dalimír Bjeľ: Lesníctvo a ťažba dreva
7. Zdenko Fajčák: Vypalovanie trávy - nevyužitá možnosť agroturistiky

Zobrazovať články o politike

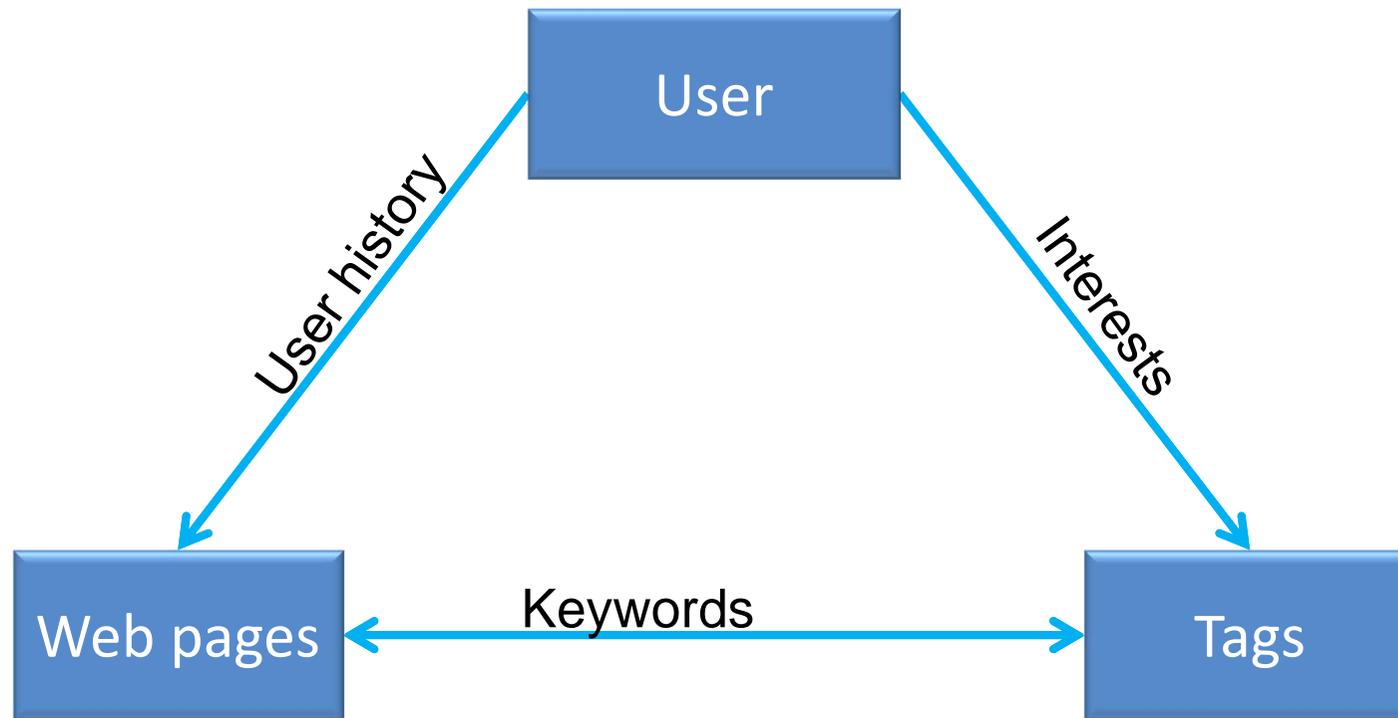
# PeWeProxy – advantages

- No limitation to a particular application domain
  - Our primary domain is information search
- No change of peoples' surfing habits
  - At least not dramatically
- Natural baseline to compare with
  - Google?

# Automatic Semantics Acquisition CLIENT SOLUTION

# MePersonality

- Decentralized platform for user modeling



# MePersonality

User Modelling And Personalisation Framework

## Welcome to MePersonality!

Home

My model

Extensions

Taggers

Settings

MePersonality presents a distributed multi-agent collaborative personalisation platform. Since the main purpose is to enable personalisation of browsed web content to user, MePersonality provides an interface for user interests model access. Via personalisation extensions, user can extend this model even further and based on gathered information about user interests and behaviour, user can modify content of browsed web pages to work more efficiently and comfortably.

### Setup

To have the best possible experience of using MePersonality, you need to have [your browsing history indexed](#). Note that this can take a few minutes and has rather heavy load on network traffic. You can do it manually whenever you feel comfortable enough to do so.

You are also contributing to better experiment results by having your unique user ID. If you do not feel comfortable with it, you can remove it and be [anonymous](#).

### Personalisation extensions

Personalisation extensions are basically pieces of JavaScript code which can personalise the web browsing according to user needs. Besides basic functionality of JavaScript language, MePersonality provides wider possibilities within personalisation extensions including:

- Built-in support of jQuery framework
- Use of other external JavaScript files, e.g. another third-party library
- Cross-origin requests
- Access to user browsing history
- Persistent storage via [database API](#)
- Personalisation API
- Communication API

This functionality is contained in a simple and fully asynchronous API which contributes to better user experience and more comfortable development of high-

MePersonality

User Modelling And Personalisation Framework

my model

Cancel indexing  Updating index (104/1000)



BRATISLAVA RUBY MONGOLIA PEOPLE IPSC TEAM  
 CMMI MOVIE PRESENTATION  
 RED GOOGLE HAVKA TETRIS TEAMS  
 WINTER KOROBENIKI TRAILER SANDERLING RUSSIA TERM IMDB BORODIN  
 VLAKY OPEN ALEXANDER ARMY AMAZON SYSTEMS DEGREE  
 RUSSIAN CHOIR JAVASCRIPT PROGRAMMING CLASSICAL MUSIC  
 RESEARCH 2011 SUMMER SEVEN PRINCE CENTRAL ASIA  
 SYSTEM MICROSOFT ENSEMBLE WEB SOVIET DEVELOPMENT  
 MOVIES STANDINGS DECIMAL MUSIC ONLINE CONTEST SUBMISSION THE

# **Case study: Webification of Software Development**

**Employing web-based methods  
in the software development  
domain one could improve  
software quality and  
development efficiency,  
e.g., support the creation of better code,  
improve progress visibility or help  
developers be more efficient**

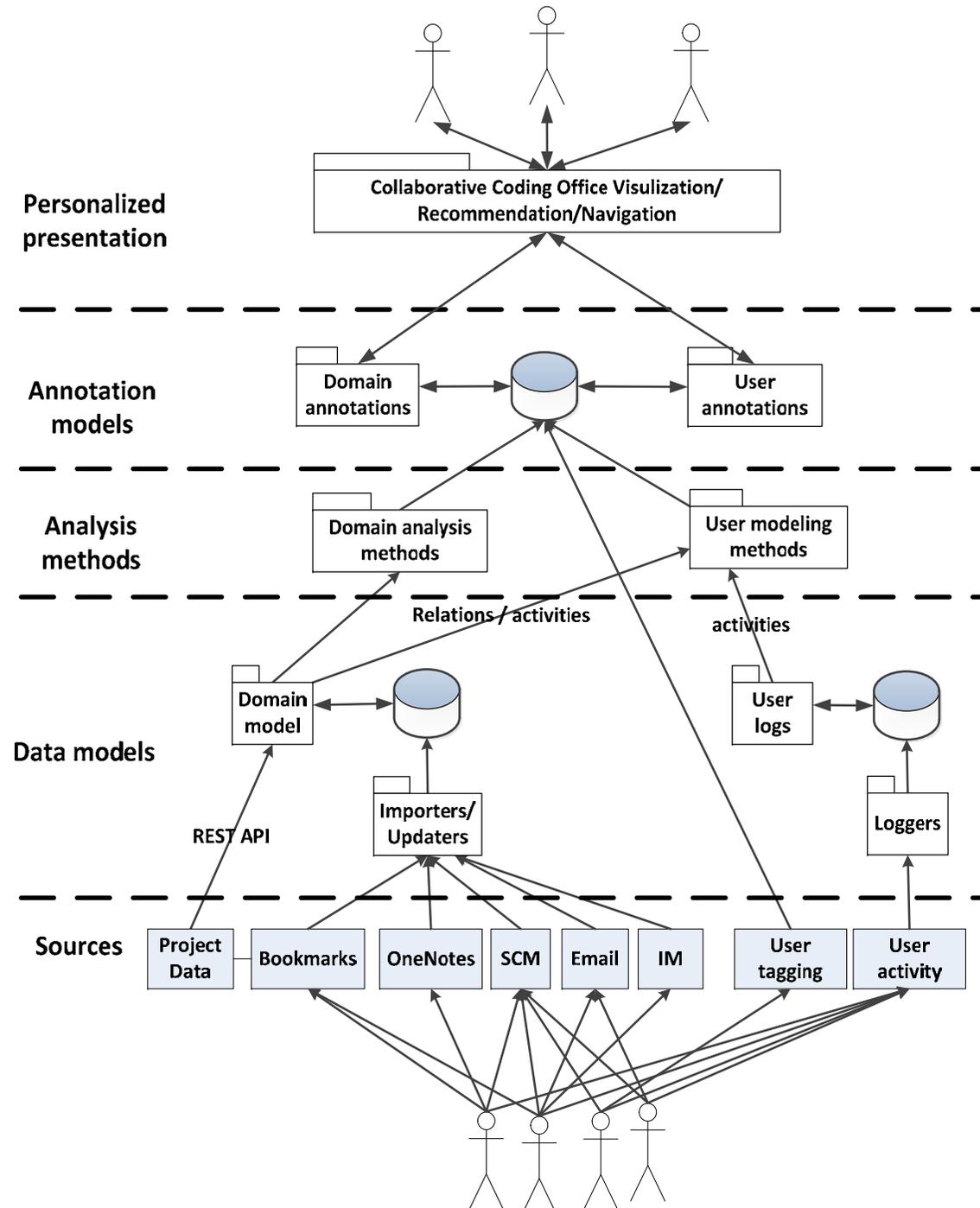
# Information artifacts and metadata

- Web-like structure of software company information space
  - Source codes
  - Knowledge documents
  - Developer interactions
- Information tags - metadata that describe an aspect of an artifact
  - User generated
  - Machine generated

# Programmer interaction

- *browsing within the content* (software artifacts) and on the Web
- *content creation* and other highly interactive activities
- *other (complex) domain-dependent activities*, e.g., testing content, which is unusual in the Web

# Collaborative software development architecture



# Concept of collaborative programming

- detection of virtual communities using multiple connections types
- evaluation of **source code quality** based on an estimation of the current user state based on his activity (including biometrics)
- evaluation of **software metrics** based on interaction analysis of developers
- estimation of **developer skill and proficiency**
- evaluation of source code similarity, identification of patterns, anti-patterns, code smells, bad practices, recommendation of code snippets
- recommendation of good programming practices and snippets used by others
- focused search and automatic recommendation of problem solutions based on the current user task
- mining user behavior in the IDE and in the web browser as acquired by a proxy server
- positive **motivation towards code revision**, improvement of their own code and self-education

# Developers

- see where in the source code their colleagues work (friends, team, group)
- see which source code is ‘interesting’, e.g., unstable, due to frequent changes, stable (can be safely used and are likely ‘good’), or forgotten
- receive recommendations for code snippet reuse, code revisions (e.g., based on similarity with other ‘bad’ code or written by someone who often writes ‘bad’ code)

# Managers

- see aggregated overviews of developer performance, reliability, 'quality'
- see aggregated overviews of software metrics for source code to observe progress
- identify critical source code or developers based on knowledge tags (e.g., bug, bad code, deprecated code)
- observe knowledge and experience transfer between developers (e.g., who uses whose code snippets)
- track capabilities and workload of developers

# MORE EXAMPLES

**pewe.fiit.stuba.sk**

# Gaming as source for semantics

# Game-driven crowdsourcing

- Goal: relevant domain terms (*concept relationship network*)
- Games
  - Motivate people to participate
  - Force people to develop winning strategies
  - Support emergence of the wisdom of the crowd

**Little Search Game**

# Little Search Game

- Discovery of concept relationships
- Game of search query guessing
- Query must follow specific pattern
  - “Jaguar –car –animal –company”
- Game goal: minimize amount of returned results
  - “Jaguar” – 56.2 millions of results
  - “Jaguar –car” – just 30.5 milions of results

# Little Google Game (beta)

Play instantly, login or register. Are you attending a special event (conference)? [Learn to play Little Google Game.](#)

Star

Play Unplayed Word

Play Random Word

Play Specific Word

Play Specific Event Word

View Rankings

Game

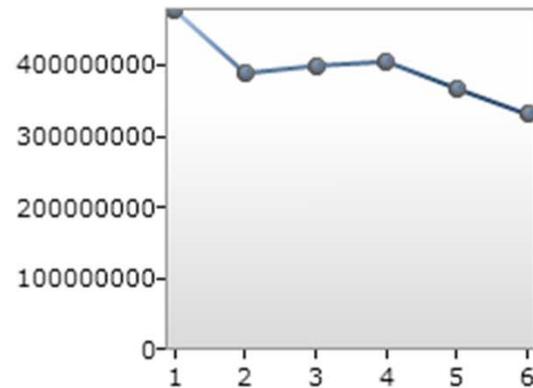
Statistics

Your current query: **Star -movie -wars -death**

Negative keywords: Last attempt score: **327 142 141**

- movie
- wars
- death
- 
- 
- 

Your score per attempt



Global ranking for task:

1	bencican	158 381 110
2	dalaman	167 683 893
3	cabba	238 605 222
4	semiir	254 144 218
5	misso	264 955 238
6	miky	275 377 724
7	crude	298 194 995
8	<b>kUbb</b>	<b>327 142 141</b>
9	kukikivo	331 784 312
.0	jakubko	444 916 368
.1	JozkoMrkvicka	450 602 580

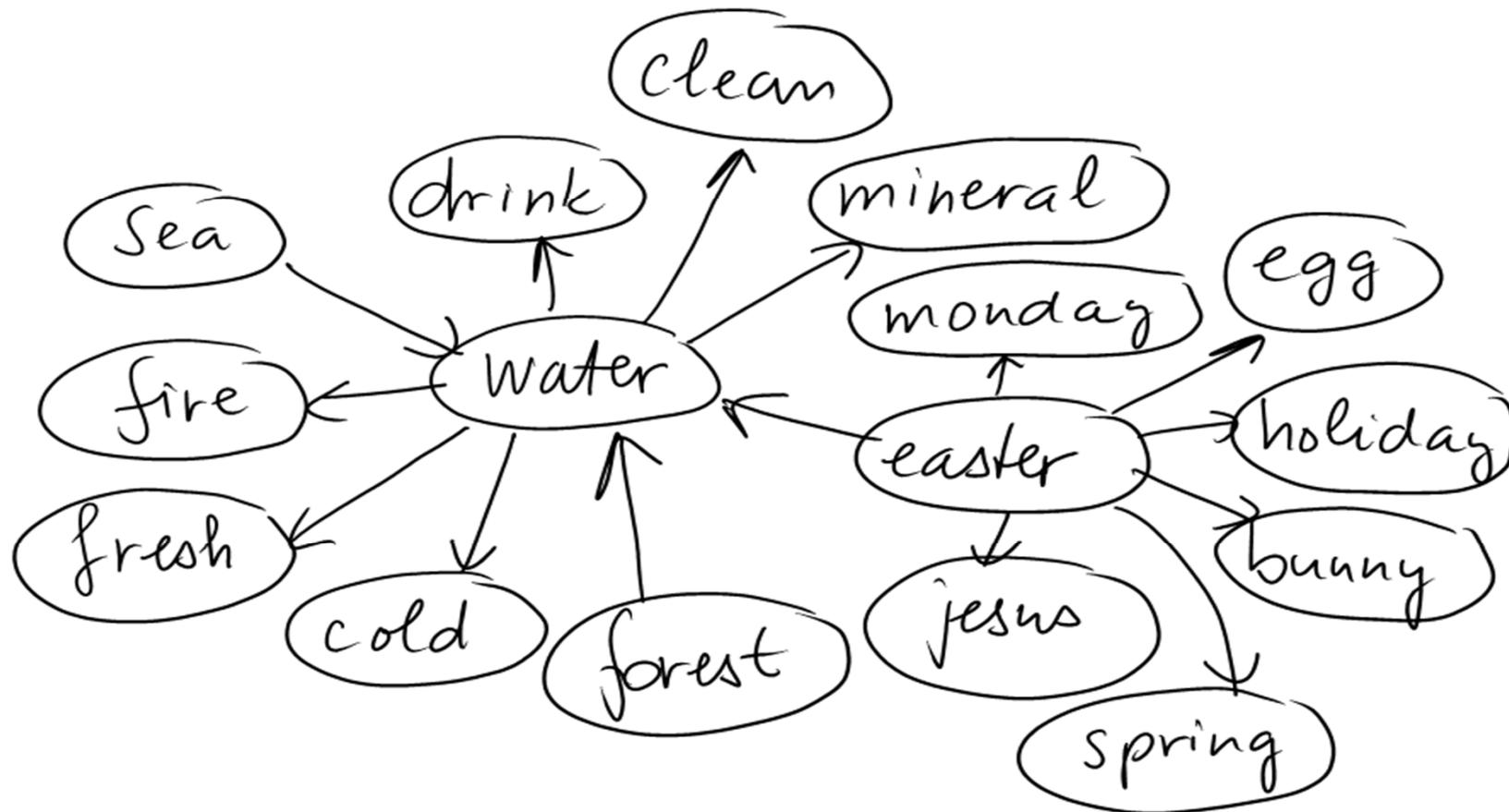
Make attempt

Confirm/Leave game

Score:

Rank:

**0/12**

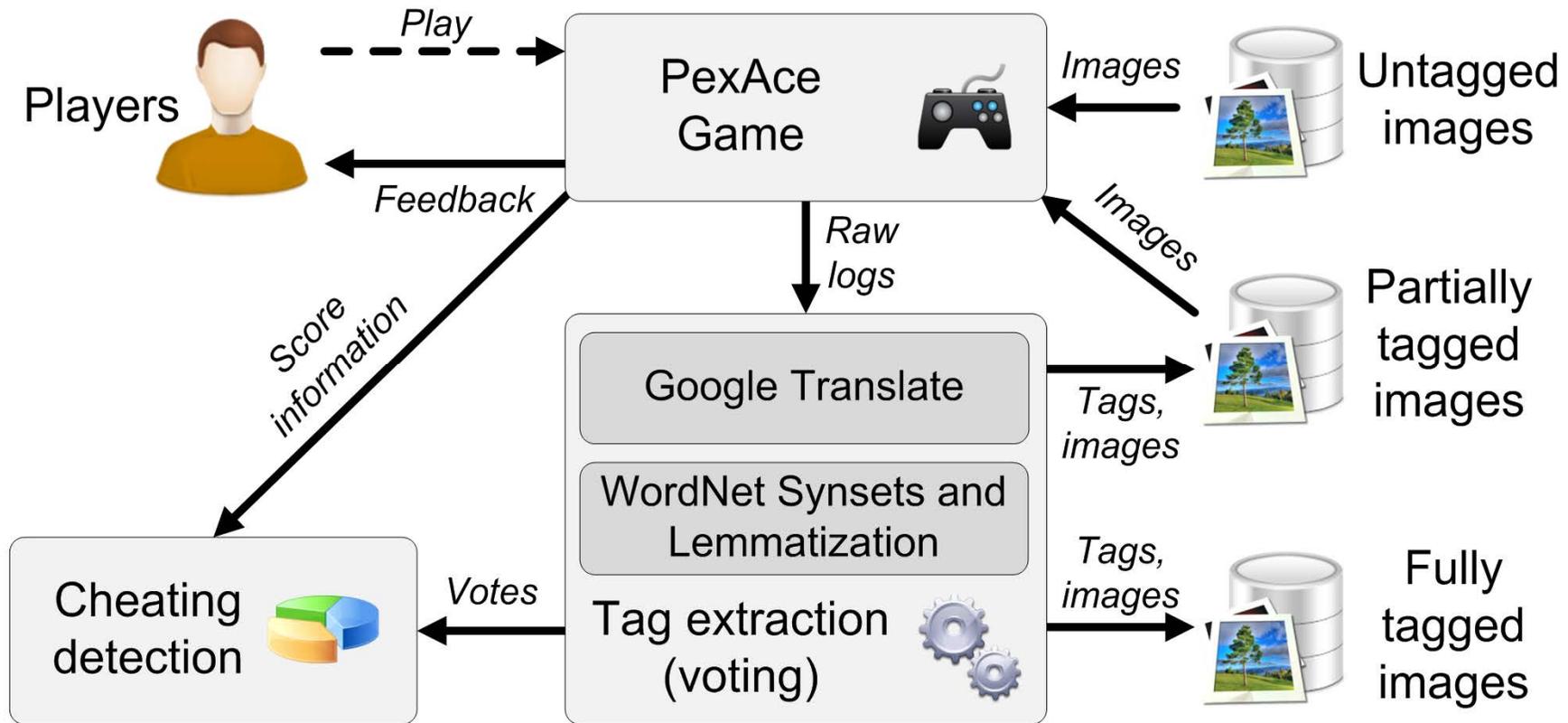


- Relationships are hidden in the guessed queries
  - “Easter –bunny –egg –spring”

# PexAce – metadata authoring

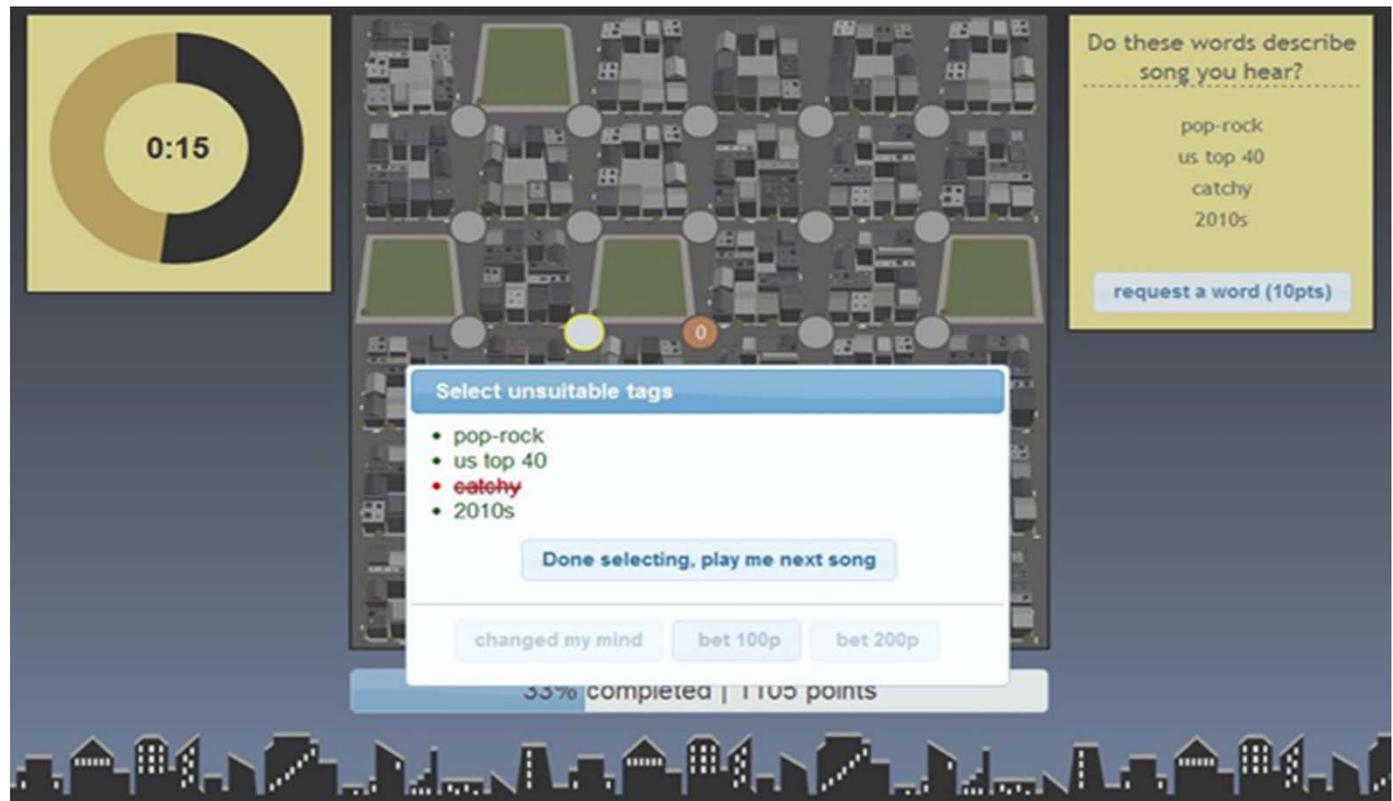
The screenshot displays the PexAce game interface. It features a 6x6 grid of image tiles on the left side. The tiles contain various images: a castle, a mountain lake, a bird, a dog, a ship, a woman's face, a pagoda, and a desert landscape. On the right side, there is a wooden background with several text elements: "New Game" and "Time: 00:47:8" at the top; "House in the mountains" and "write your notes here" in the middle; "dessert" and "write your notes here" at the bottom; and "Score: 1916" at the very bottom. A large image of a mountain landscape is visible on the far right.

# PexAce – metadata authoring



# City Lights – metadata validation

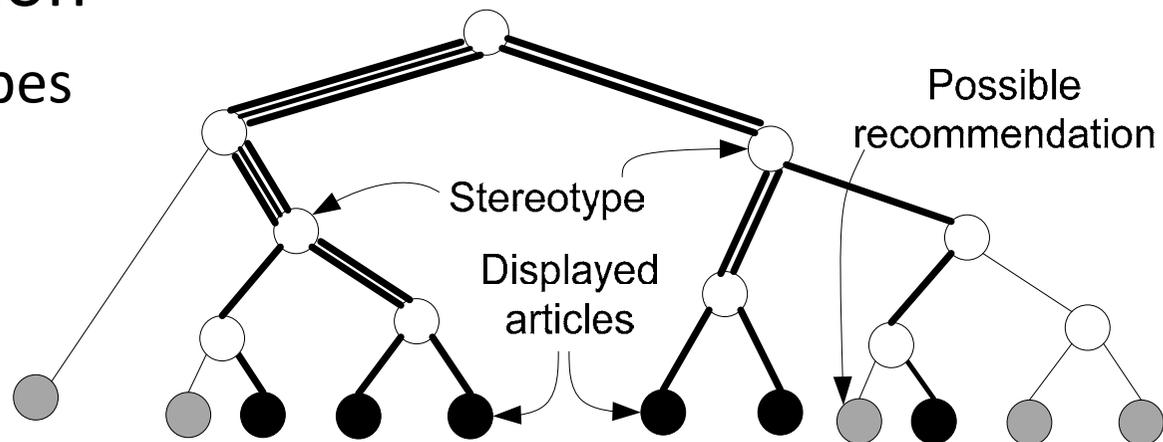
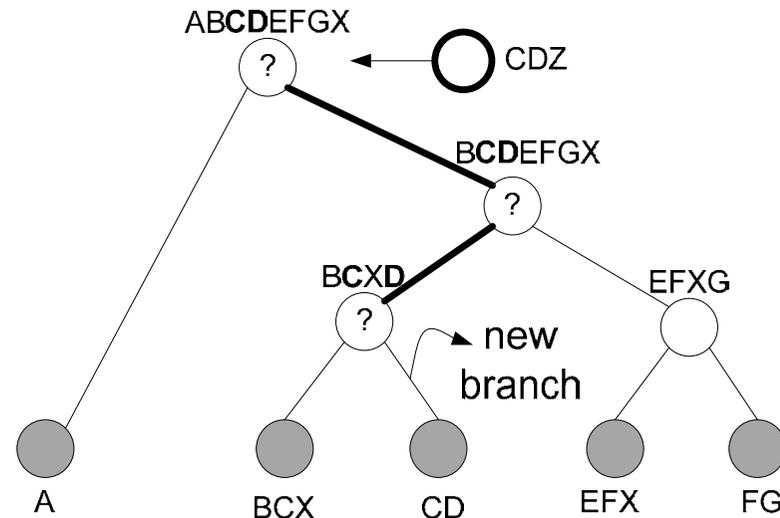
- The basic task for the player - to guess, which set of tags was originally assigned to the music track that is currently being played



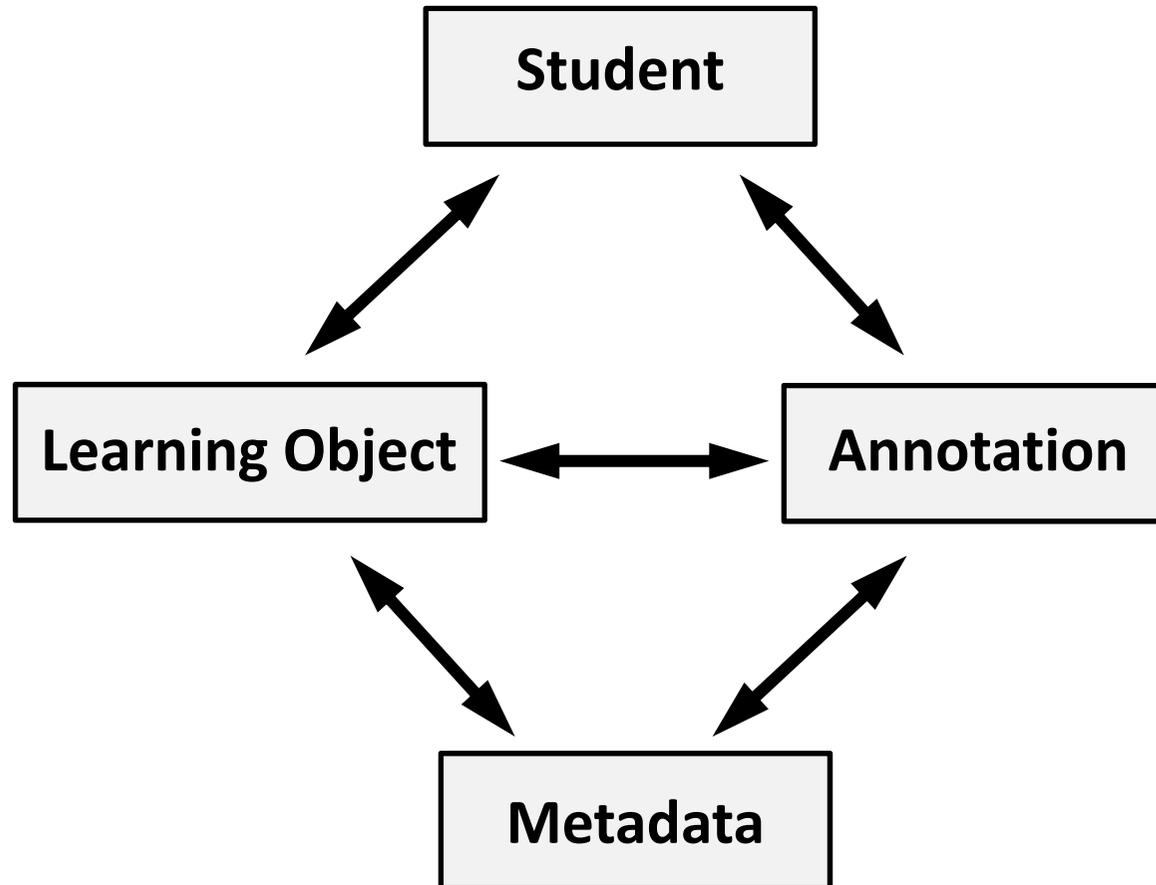
# Domain dependent approaches

# Content-based News Recommendation

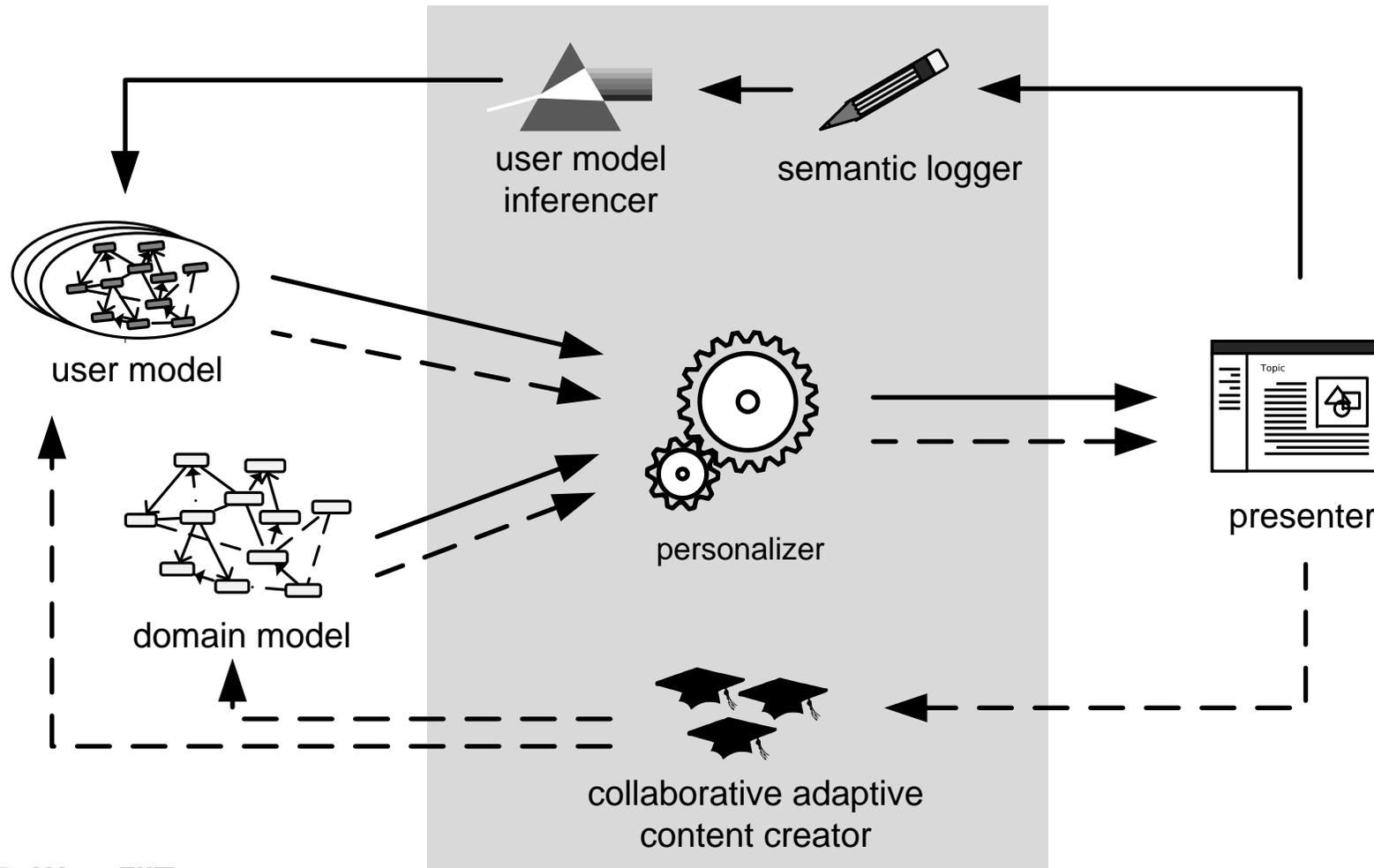
- Tree construction
  - binary decisions
  - add new branches
- Recommendation
  - locate stereotypes
  - find relevant



# ALEF – Adaptive Learning Framework



# Learning and Collaborating



# ALEF – student's view

The screenshot shows the ALEF student interface. At the top, there is a navigation bar with a home icon, the ALEF logo, and tabs for [Systém], Prolog, and Maros Uncik (administrátor) | Odhlásiť. The main content area is divided into three sections:

- Left sidebar:** A blue box titled "Odporúčame pozrieť:" contains links for "Otázka Podobnosť 2", "Príklad usporiadajv", "Príklad SUCIN", "Príklad LAVA-STRANA", and "Príklad PRAVA-STRANA". Below this is a table with columns "Texty", "Otázky", and "Cvičenia". The "Základné prvky jazyka prolog" row is highlighted.
- Center:** The main content area displays the title "Základné prvky jazyka prolog" and a filter box. The text describes the course content, mentioning the history of the Prolog language and the implementation of Arity Prolog and LPA Win-Prolog. It also includes a section "V učebnici používame Arity prolog a LPA WIN-PROLOG" and "V logickom programovaní problém špecifikujeme množinou formúl".
- Right sidebar:** A box titled "Your Score" shows a score of 71 with a question mark. Below it, a blue box titled "Related Questions from Students" contains a link for "Paradigm classification".

# Question-Answer Learning Objects

# ALEF – student creates a question

Náš spôsob, ako vytvárať otázky, sa opiera najmä o príklady. Na základe príkladu potom v ďalšej kapitole vysvetlíme princíp logického programovania formálnejšie.

## V učebnici používame Arity prolog a LPA WIN-PROLOG

Ako prostriedok logického programovania použijeme v učebnici dve implementácie jazyka prolog: Arity prolog 5.0 a LPA Win-Prolog 3.3. Obidve sú kompatibilné s prologom-10 (tiež známym ako edinburgský prolog), na základe ktorého sa vytvoril ISO/IEC štandard pre prolog.

The screenshot shows the ALEF web application interface. The top navigation bar includes the ALEF logo, a [Systém] button, and a Prolog tab. The user is identified as Maros Uncik (administrátor). The main content area displays the lesson 'Základné prvky jazyka prolog'. The text on the page includes an introduction to logic programming and a section titled 'V učebnici používame Arity prolog a LPA WIN-PROLOG' which is highlighted in green. A sidebar on the left contains a list of topics and a 'Texty' tab. On the right, a 'Your Score' box shows a score of 71, with a note that 8 other students scored higher. Below the score is a 'Related Questions from Students' section with a link to 'Paradigm classification'. An arrow points from the text in the screenshot to the text above it.



# ALEF – student creates a question

The image shows a screenshot of the ALEF system interface. A central dialog box is overlaid on a mobile application background. The dialog box contains the following fields and options:

- Title of Questions:** A text input field containing "Paradigms of Programming".
- Definition:** A text input field containing "Which terms of listed below don't represent any paradigm of programming?".
- Possible answers:** A list of radio buttons with corresponding text input fields:
  - object-oriented
  - functional
  - procedural
  - classical
  - (empty)
- Add** button: A button at the bottom of the dialog box with an arrow pointing to it.

The background mobile app interface shows a sidebar menu with categories like "Texty" and "Otázky". The main content area displays a list of programming paradigms: "object-oriented", "functional", "procedural", and "classical". Below this list, there is a section titled "V logickom programovaní problém špecifikujeme množinou formulí" (In logic programming, we specify a problem with a set of formulas) and another section "Logické programovanie sa zakladá na postupoch, ktoré sa používajú pri dokazovaní teorém v predikátovej logike prvého rádu. Špecifikáciu problému tvorí množina" (Logic programming is based on procedures used in proving theorems in first-order predicate logic. The specification of the problem is a set).

On the right side of the mobile app, there is a "Your Score" section showing a score of 71 and a message "There are 8 with higher score than you!". Below that, there is a "Related Questions from Students" section with a link to "Paradigm classification".

# ALEF – student answers a question

The screenshot displays the ALEF web application interface. At the top, there is a navigation bar with the ALEF logo, a [Systém] button, a Debug button, and a user profile for Maros Uncik (administrátor). The main content area is titled "Základné prvky jazyka prolog" and contains text about the Prolog programming language. On the right side, a "Your Score" box shows a score of 77, with a note that there are 8 other students with higher scores. Below the score, a "Related Questions from Students" box lists two questions: "Paradigm classification" and "Paradigms of Programming". An arrow points from this box to a larger, semi-transparent version of the same box above it. The left sidebar contains a list of recommended questions and exercises, including "Úvod - Paradigmy programovania", "Výrazy", "Základné prvky jazyka lisp", "Programovacie techniky", "Pravidlá dobrého programovania", "Základné prvky jazyka prolog", "Príklad: vzťahy na pracovisku", "Rozšírenie príkladu o pravidlá", "Rekurzívna definícia pravidla", and "Význam predikátov".

Related Questions from Students

- ▶ Paradigm classification
- ▶ Paradigms of Programming

**Your Score**  
**77**  
There are 8 with higher score than you!

Related Questions from Students

- ▶ Paradigm classification
- ▶ Paradigms of Programming

**Základné prvky jazyka prolog**

V tejto kapitole vysvetlíme základné princípy logického programovania na príkladoch v programovacom jazyku prolog (z angl. programming in logic). Jazyk prolog vychádza z predikátového kalkulu 1. rádu. So vznikom tohto jazyka sa spájajú mená Roberta Kowalského (vtedy na univerzite v Edinburgu) a Albina Colmerauer (Aix-Marseille univerzita) na začiatku 1970-tych rokov. R. Kowalski položil teoretické základy prologu a A. Colmerauer sa zaslúžil o implementáciu prvého interpreta jazyka prolog. Používanie jazyka prolog ovplyvnila jeho efektívna implementácia Davidom Warrenom o niekoľko rokov neskôr<sup>[1]</sup>. Rozšírenie prologu ovplyvnilo aj rozhodnutie Japoncov použiť prolog ako základný jazyk v projekte počítačov piatej generácie.

Náš spôsob výkladu látky sa opiera najmä o príklady. Na základe príkladu potom v ďalšej kapitole vysvetlíme princíp logického programovania formálnejšie.

**V učebnici používame Arity prolog a LPA WIN-PROLOG**

Ako prostriedok logického programovania použijeme v učebnici dve implementácie jazyka prolog: Arity prolog 5.0 a LPA Win-Prolog 3.3. Obidve sú kompatibilné s prologom-10 (tiež známym ako edinburský prolog), na základe ktorého sa vytvoril ISO/IEC štandard pre prolog.

Vieme už, že logické programovanie spolu s funkcionálnym programovaním sa označuje ako aplikatívne programovanie. Obidva prístupy majú viacero spoločných vlastností. V ďalších častiach nájdeme mnoho podobností s kapitolami venovanými funkcionálnemu programovaniu. Základné princípy (napr. rekurziu, použitie typu údajov zoznam) nebudeme podrobne rozoberať. Sústreďme sa na použitie už známych princípov (z funkcionálneho programovania) v logickom programovaní.

**V logickom programovaní problém špecifikujeme množinou formúl**

Logické programovanie sa zakladá na postupoch, ktoré sa používajú pri dokazovaní teorém v predikátovej logike prvého rádu. Špecifikáciu problému tvorí množina



# Collaborative validation of learning objects

Question 1430:

Which architectural styles do we recognize in software engineering? (List at least 3 of them)

Provided answer:

client-server, layers

Estimate correctness  
ratio of the provided  
answer



Rate

Next question

# ALEF – motivational element

Your Score

**77?**

There are 8 students with higher score than you.

The screenshot shows the ALEF web application interface. The main content area displays the title "Základné prvky jazyka prolog" and a paragraph of text explaining the history and use of Prolog. A sidebar on the left contains a list of topics under the heading "Texty", including "Úvod - Paradigmy programovania", "Výrazy", "Základné prvky jazyka lisp", "Programovacie techniky", "Pravidlá dobrého programovania", "Základné prvky jazyka prolog", "Príklad: vzťahy na pracovisku", "Rozšírenie príkladu o pravidlá", "Rekurzívna definícia pravidla", and "Význam predikátov". A top navigation bar includes "AleF", "[Systém]", "Debug", and "Maroš Uncik (administrátor) | Odm...". On the right side, a score notification box is overlaid, showing "Your Score 77?" and "There are 8 with higher score than you!". Below this, a "Related Questions from Students" section lists "Paradigm classification" and "Paradigms of Programming".



# User centric approaches

# We search...

Google

Search About 137,000,000 results (0.23 seconds)

**Everything**

- Images [CString - No Panty Lines! No Tan Lines!](#)   
<https://www.cstringdirect.com/>   
Cstring Logo. No Panty Lines! No Tan Lines! The CString is a completely new and exciting innovation in lingerie. Say goodbye to panty line and uncomfortable ...  
[Product](#) - [Testimonials](#) - [Online Retailers](#) - [Locate a Store](#)
- Maps
- Videos
- News
- Shopping
- More

**All results**

- Sites with images
- More search tools

[C string - Wikipedia, the free encyclopedia](#)   
[en.wikipedia.org/wiki/C\\_string](en.wikipedia.org/wiki/C_string)   
In computer programming, a **C string** is a character string stored as an array containing the characters and terminated with a null character ('\0', called NUL in ...  
[History](#) - [Limitations](#) - [Improvements](#) - [Standard terms and definitions](#) ...

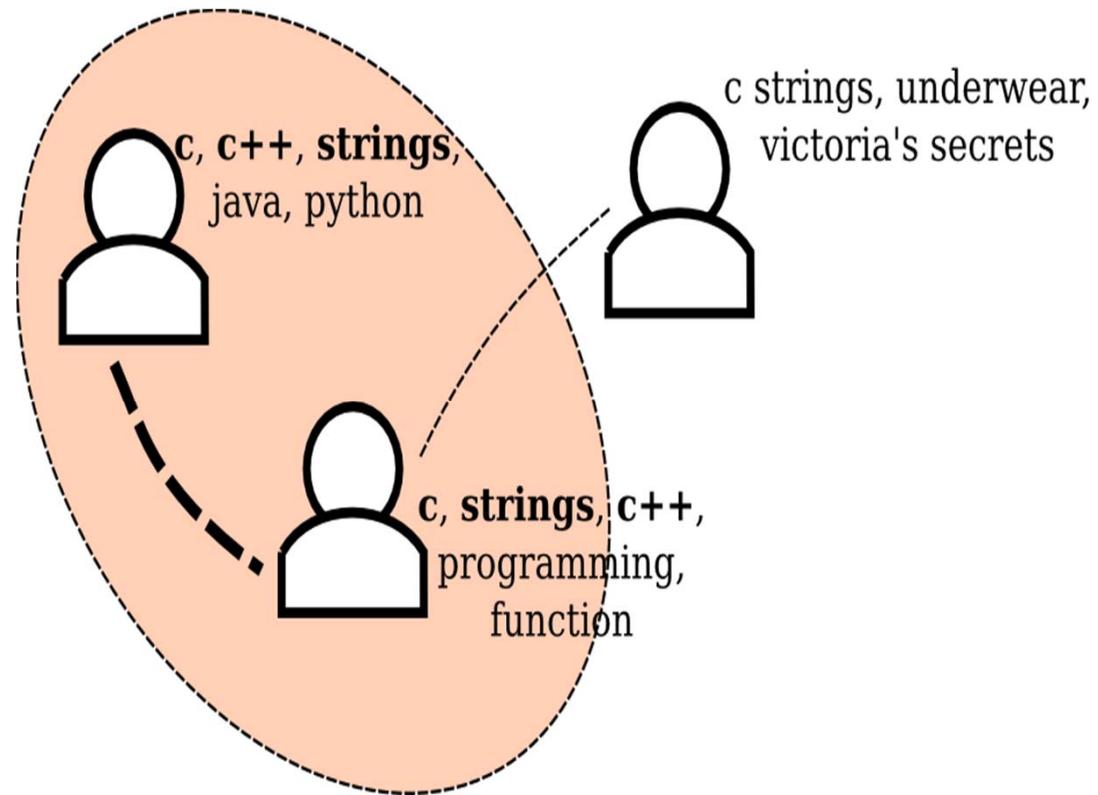
[Forget the G-string - can ANYONE wear the new C-string? | Mail ...](#)   
[www.dailymail.co.uk/.../Forget-G-string--ANYONE-wear-new-C-stri...](http://www.dailymail.co.uk/.../Forget-G-string--ANYONE-wear-new-C-stri...)   
31 May 2007 – This is the stuff of nightmares. A passing van driver leers at me and then beeps his horn. But it's not because of my blonde hair: it's because I ...

[Dailymotion - C-String Invisible Underwear - ein Lifestyle Video](#)   
 [www.dailymotion.com/.../xa67c4\\_c-string-invisible-underwear...](http://www.dailymotion.com/.../xa67c4_c-string-invisible-underwear...)   
15 Aug 2009 - 5 min  
German models Anna and Claudia show off the **C-String** invisible underwear in the shops, streets and nightclubs of Berlin.  
[More videos for c strings »](#)

[Images for c strings](#) - [Report images](#)



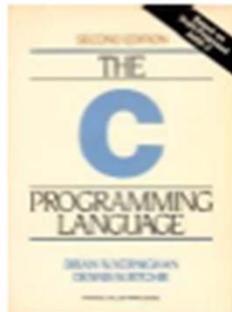
# Social Layer over Search



# Social-context driven query expansion

## C Strings

---



?



- Find keywords co-occurring with the keywords from the query
- Limit the search to user models from the user's communities
- Append the keywords to the original query

c strings

Search

About 5,430,000 results (0.24 seconds)

[Advanced search](#)

Results provided by peweproxy: [c strings c ++](#), [c strings character](#)

### [cstring \(string.h\) - C++ Reference](#)

cstring (string.h). header. **C Strings**. This header file defines several functions to manipulate **C strings** and arrays. ...

<http://www.cplusplus.com/reference/clibrary/cstring/> - Cached

### [C Strings - C Tutorial - Cprogramming.com](#)

In C++ there are two types of **strings**, **C-style strings**, and C++-style **strings**. This lesson will discuss **C-style strings**. **C-style strings** are really arrays, ...

<http://www.cprogramming.com/tutorial/lesson9.html> - Cached

### [7.1.2 Character Strings as Arrays](#)

Aug 17, 1994 ... In **C**, a **string of characters** is stored in successive elements of a **character array** and terminated by the **NULL character**. ...

<http://ee.hawaii.edu/~tep/EE160/Book/chap7/subsection2.1.1.2.html> - Cached

### [C Programming - Handling of character string](#)

**C Programming Handling of character string** In this tutorial you will learn about Initializing **Strings** Reading **Strings** from the terminal Writing **strings** to ...

<http://www.exforsys.com/tutorials/c-language/handling-of-character-strings-in-c.html> - Cached

# User interest estimation

- Analyzing browsing behavior within a web portal
  - finding patterns in navigation (path, loop, circle, spike)
  - grouping users according to patterns
- Behavior while visiting a particular web page
  - actions: time spent, scrolling, text copying
    - interest indicators (comparing to average)
  - comparing actions of current user with actions of others
  - estimating user's interest in visited page (CF based)

# User interest estimation

- Actions (scrolling, time spent, ...) = interest indicators
- Positive interest – indicators above average
- Negative interest – indicators below average
  
- Based on collaborative filtering
- Rating = estimated interest

interest prediction  $\rightarrow p_{a,i} = \bar{r}_a + \frac{\sum_{u=1}^N (r_{u,i} - \bar{r}_u) \times S_{a,u}}{\sum_{u=1}^N S_{a,u}}$

average rating  $\rightarrow \bar{r}_a$

ratings of similar users  $\rightarrow r_{u,i}$

correlation coefficient  $\rightarrow S_{a,u}$

# WebsiteImprover

same content for all users

content personalized for every user

mail phone directory virtual library

## Information Technologies

...one of the seven (SUT). FIIT SUT covers IT in both research and such mission. SUT ved several substantial ace of work which versity of Technology till hnologies.

study programmes 1/2002).

[UK](#)

---

[ride competition Imagine Cup 2008](#)  
sixth year in July 8, 2008.  
gine Cup 2008 at the Musée du Louvre (France),  
osen from a pool of more than 200,000 students  
es and regions.

SEARCH >

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- › doctoral theses
- › Software Systems
- › Applied Informatics
- › Application Form
- › Staff and PhD Students of Institute of I...

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- › Institute of Informatics Software Engineering
- › Institute of Computer Systems and Networks

FACULTY CENTRES >

- › Dean's Office
- › Centre of Computing and Communication Services
- › Centre of Information Library Services

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PERSONAL CALENDAR >

May 2010 >

Po	Ut	St	Št	Pi	So	Ne
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

ADDITIONAL LINKS >

- › Podateľňa FIIT STU
- › Quegee Team \*1\*
- › Edícia výskumných textov

PERSONAL NEWS >

- › iPhone Developer Program na FIIT STU Bratislava
- › Seminár umelej inteligencie

SEARCH >

FIIT  Google (FIIT)

Artificial Intelligence Seminar

User activity is great source  
for content metadata

- Major Features of **Lightweight Semantics**

– Relation between domain conceptualization and content  
– Different types of content

Effective representation of  
metadata for specific cases

– Explicit support for

Feasible automatic acquisition  
of content descriptions