



a modular software stack and reusable set of components for semantic content management

19. April, 2012

Semantic Content Management with Apache Stanbol

Traditional

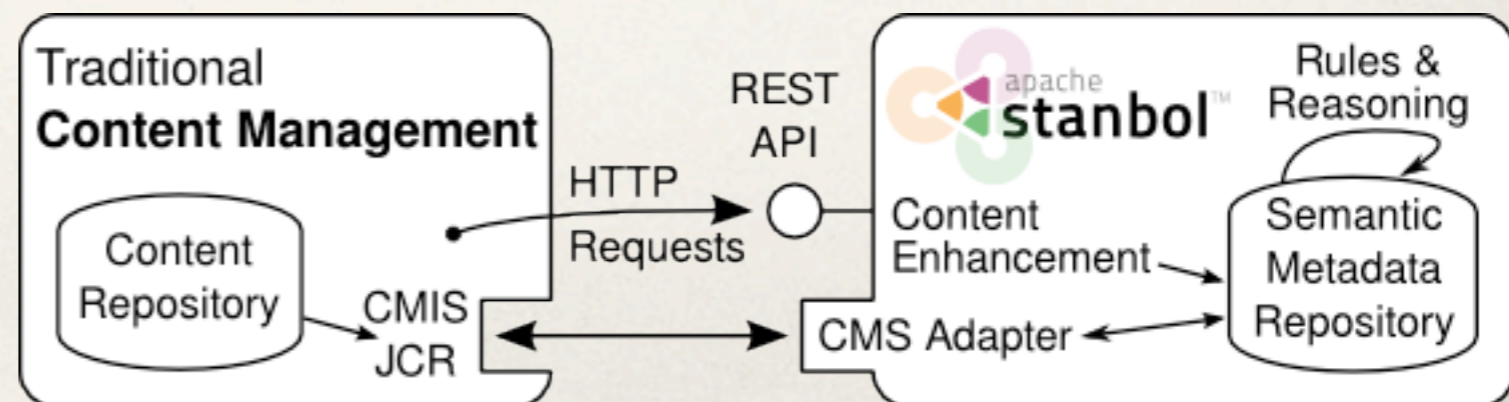


Semantic Engine



Semantic Content Management with Apache Stanbol

- ❖ **Enhancer:** Extracts Knowledge from parsed Content
- ❖ **Entityhub:** Manage Entities and Topics of Interest to your Domain
- ❖ **Contenthub:** Semantic Indexing / Search over your - semantic enhanced - Content
- ❖ **CMS Adapter:** Sync. your CMS with Apache Stanbol (JCR/CMIS)
- ❖ **Ontology Manager:** Manage your formal Domain Knowledge
- ❖ **Reasoners & Rules:** Apply Domain Knowledge to improve / validate extracted Information. Refactor / refine knowledge to align it to public schemas such as schema.org



Stanbol Enhancer

Get to
know your
Content

```
curl -X POST -H "Accept: text/turtle" -H "Content-type: text/plain" \  
  --data "The Stanbol enhancer can detect famous cities such as \  
    Paris and people such as Bob Marley." \  
  http://localhost:8080/enhancer
```



Enhancement Chain: **default** all 5 engines available

- ⚙️ **tika** (optional , TikaEngine)
- ⚙️ **langid** (required , LangIdEnhancementEngine)
- ⚙️ **ner** (required , NamedEntityExtractionEnhancementEngine)
- ⚙️ **dbpediaLinking** (required , NamedEntityTaggingEngine)



Extracted entities

People



Bob Marley

Places



Paris



RDF

Enhancement Engines 1/2

- ❖ Apache Tika Engine / Metaxa Engine



- ❖ Plain Text extraction; Metadata Extraction; Content Type detection

- ❖ Language Detection

- ❖ Topic Classification

- ❖ Trainingset / Classifier for your Topics

- ❖ supports hierarchical Classification Schemes

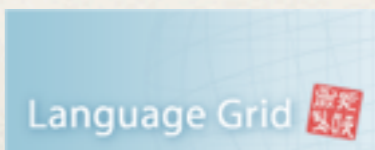


- ❖ Named Entity Recognition

- ❖ extracts Persons / Organizations / Places



soon:



Enhancement Engines 2/2

- ❖ Named Entity Linking
 - ❖ Links recognized Entities with Controlled Vocabularies
- ❖ Keyword Extraction
 - ❖ Label based extraction of Entities
- ❖ Refactor Engine
 - ❖ Rule based post-processing of Enhancements results
- ❖ Integrated “external” Services:

Zemanta

 **GeoNames**

 apache
stanbol™

 **CALAIS**
Powered by Thomson Reuters

Domain Specific Enhancement

Bring your own
Entities

If you have any of these other conditions, you may need a dose adjustment or special tests to safely take aspirin:

- * asthma or seasonal allergies;
- * stomach ulcers;
- * liver disease;
- * kidney disease;



Enhancement Chain: **ehealth** all 4 engines available

- ⚙️ **tika** (optional , TikaEngine)
- ⚙️ **langid** (required , LangIdEnhancementEngine)
- ⚙️ **ehealthExtraction** (required , KeywordLinkingEngine)
- ⚙️ **drugIdExtraction** (required , KeywordLinkingEngine)



Life Sciences

SIDER 2
Side Effect Resource

DRUGBANK
Open Data Drug & Drug Target Database

Diseasome

Extracted entities

Diseases	Drugs
? Asthma ◀	? Aspirin ◀
? Polycystic kidney disease ◀	
? Polycystic liver disease ◀	

Enhancement Chains

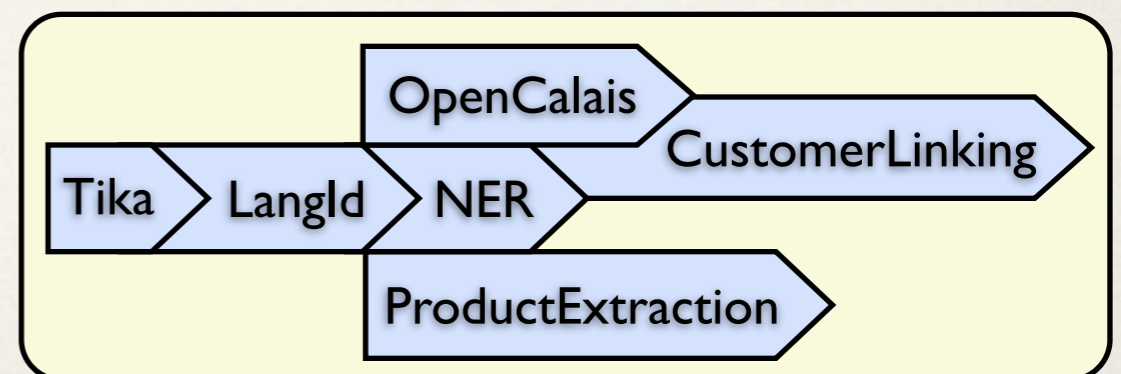
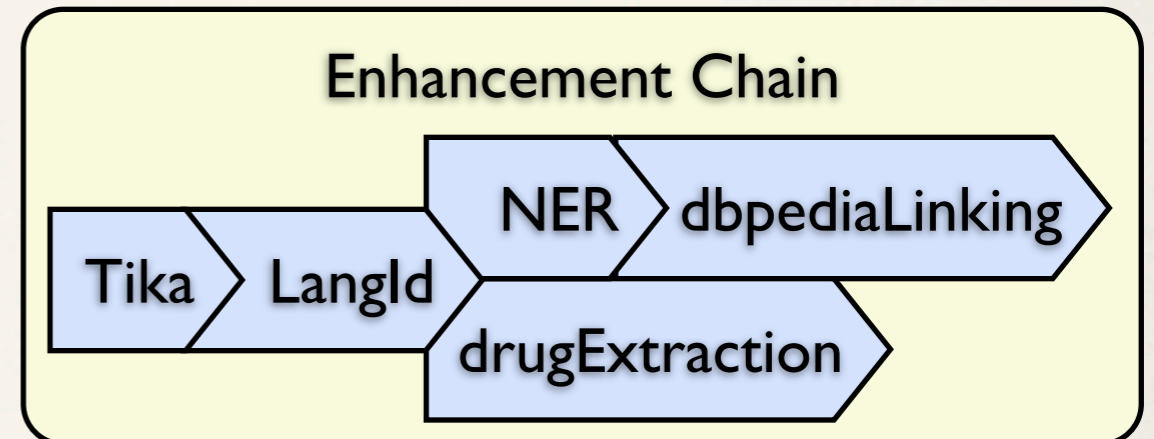
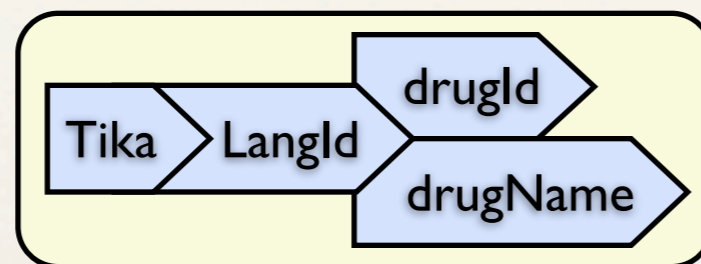
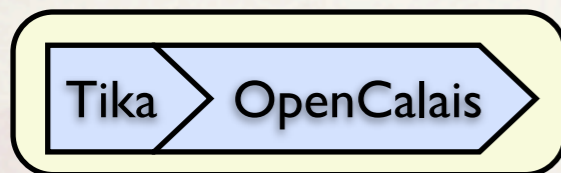
- ❖ Define how Content is processed by the Enhancer

- ❖ `/enhancer` calls the default Chain

- ❖ use multiple Chains
`/enhancer/chain/{name}`

- ❖ call single EnhancementEngines
`/enhancer/engine/{name}`

- ❖ Some Examples:



Using Stanbol in Web Applications

HALLO — ANNOTATING CONTENT WITH LINKED DATA

B I Tl [List Icon] [List Icon] [List Icon] [List Icon] [List Icon]

Before taking Lotrel

You should not use Lotrel if:

- you are allergic to **amlodipine** (Norvasc) or **benazepril** (Lotensin);
- you have ever had **angioedema** (hives or severe swelling of deep skin tissues sometimes caused by allergic reactions);
- you are allergic to any other ACE inhibitor, such as **captopril** (Capoten), **fosinopril** (Monopril), **enalapril** (Vasotec), **lisinopril** (Zestril), **moexipril** (Univasc), **perindopril** (Aceon), **quinapril** (Accupril), **ramipril** (Altace), or **trandolapril** (Mavik).

To make sure you can safely take Lotrel, tell your doctor if you have any of these other conditions:

- kidney disease (or if you are on dialysis);
- liver disease;
- heart disease or **congestive heart failure**;
- diabetes; or
- if you are on a low sodium diet.

Search:

Congestive heart failure (Other from www4.wiwiss.fu-berlin.de)

Decline Cancel

FDA pregnancy category: **C**
Do not become pregnant while taking Lotrel. Lotrel can cause miscarriage or birth defects. Tell your doctor if you are breastfeeding your child. Lotrel can pass into breast milk and may harm a nursing baby. Do not breastfeed your child while taking Lotrel.



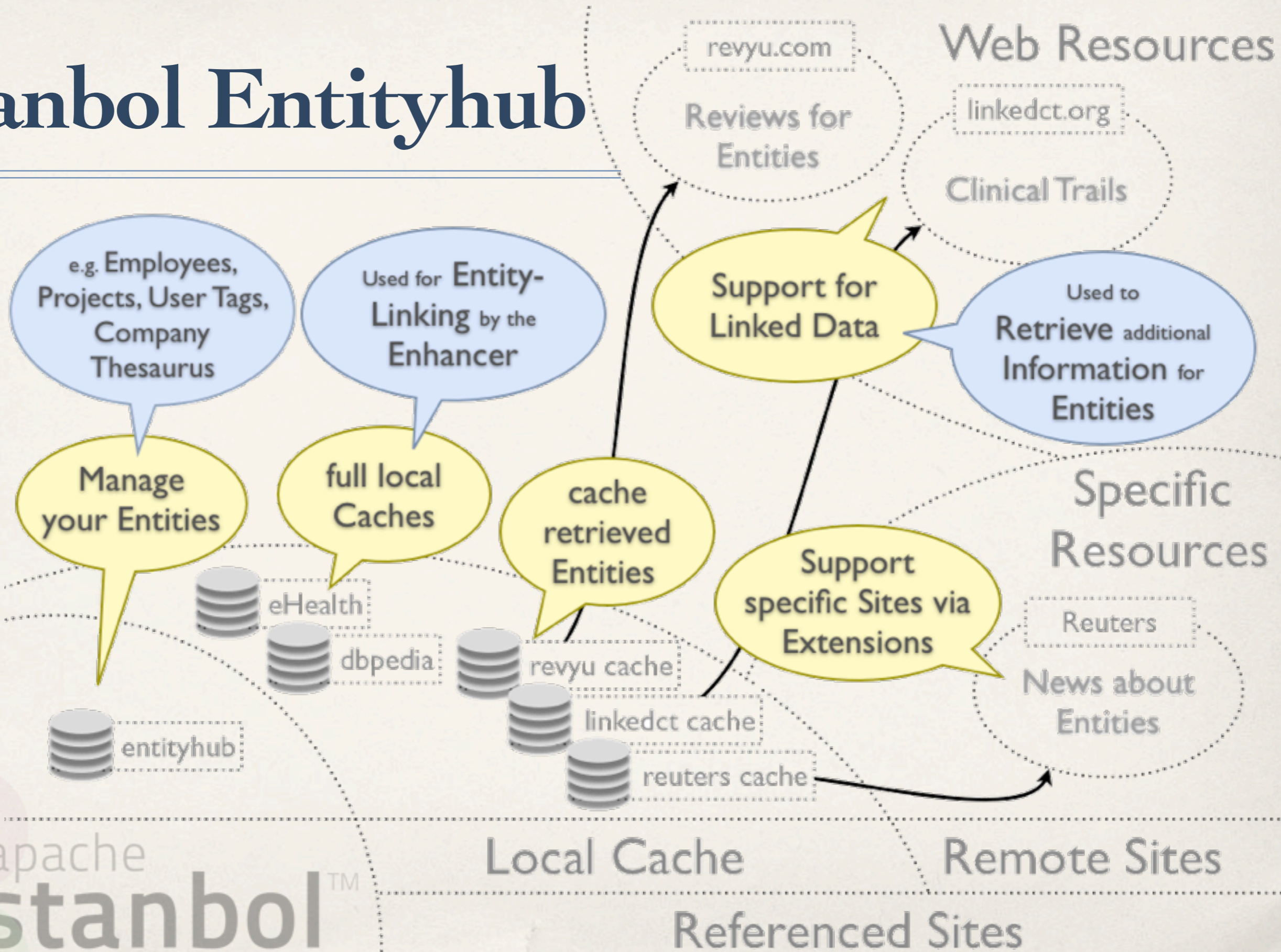
<http://viejs.org>
<http://hallojs.org>

We are looking for

Work with the
Stanbol
Community

- ❖ RDFa / Microdata support
 - ❖ Knowledge extraction while keeping positioning within the Content
- ❖ Entity Disambiguation
 - ❖ Entity-Linking + Disambiguation (e.g. by using Solr MLT)
 - ❖ Disambiguation of already linked Entities
- ❖ More Domain specific Customizations
 - ❖ Share as “/demo” with the Stanbol Community!
- ❖ <Your> Service as EnhancementEngine

Stanbol Entityhub



Stanbol Entityhub

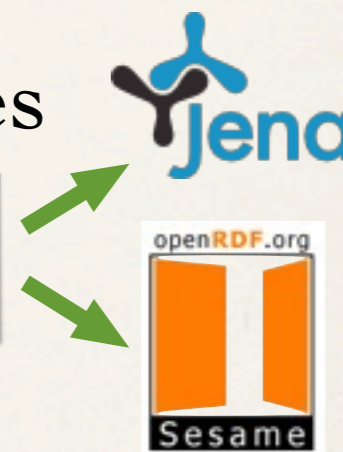
manage the
Entities of
your **Domain**

- ❖ Manage multiple Entity Source - Referenced Sites

- ❖ Supports fast local Caches using



or



- ❖ Query for Entities

- ❖ used by the Stanbol Enhancer

```
curl -X POST -d "name=lyon&limit=10" \  
http://localhost:8080/entityhub/site/dbpedia/find
```

- ❖ LDpath [1] support for:

- ❖ graph path retrieval

- ❖ schema translation

- ❖ simple reasoning

```
friend-names = foaf:knows/foaf:name
```

```
schema:name = rdfs:label[@en];  
schema:description = rdfs:comment[@en];  
schema:image = foaf:depiction;  
schema:url = foaf:homepage;
```

```
skos:broaderTransitive = (skos:broader)+;  
skos:related = (skos:related | ^skos:related);
```

[1] <http://code.google.com/p/ldpath/>

You can help by

Work with the
Stanbol
Community

- ❖ Integrate with Data Reconciliation Tools

- ❖ Google Refine:



- ❖ Silk: Entity Link discovery Framework



- ❖ Support for <your> Dataset

- ❖ direct access via EntityDereferencer implementation

- ❖ provide as Entityhub ReferencedSite (or RDF dump)

Stanbol Contenthub

CMS Adapter

plain Content

```
curl -i -X POST -H "Content-Type:text/plain" \  
--data "Add your content here" \  
http://localhost:8080/contenthub/contenthub/store
```

Enhancer

enhanced Content

Configure
your Semantic
Index Layout

Simple
Faceted Search

Semantic
Indexing

Apache
Solr
RESTful API

Semantic
Search

Semantic Index


apache
stanbol™

Stanbol Contenthub

- ❖ Add Semantic Search to your CMS

- ❖ RESTful Faceted Search Interface
- ❖ Related Keyword Search using Entityhub, Ontonet or Wordnet

- ❖ Improve Search by Semantic Indexing

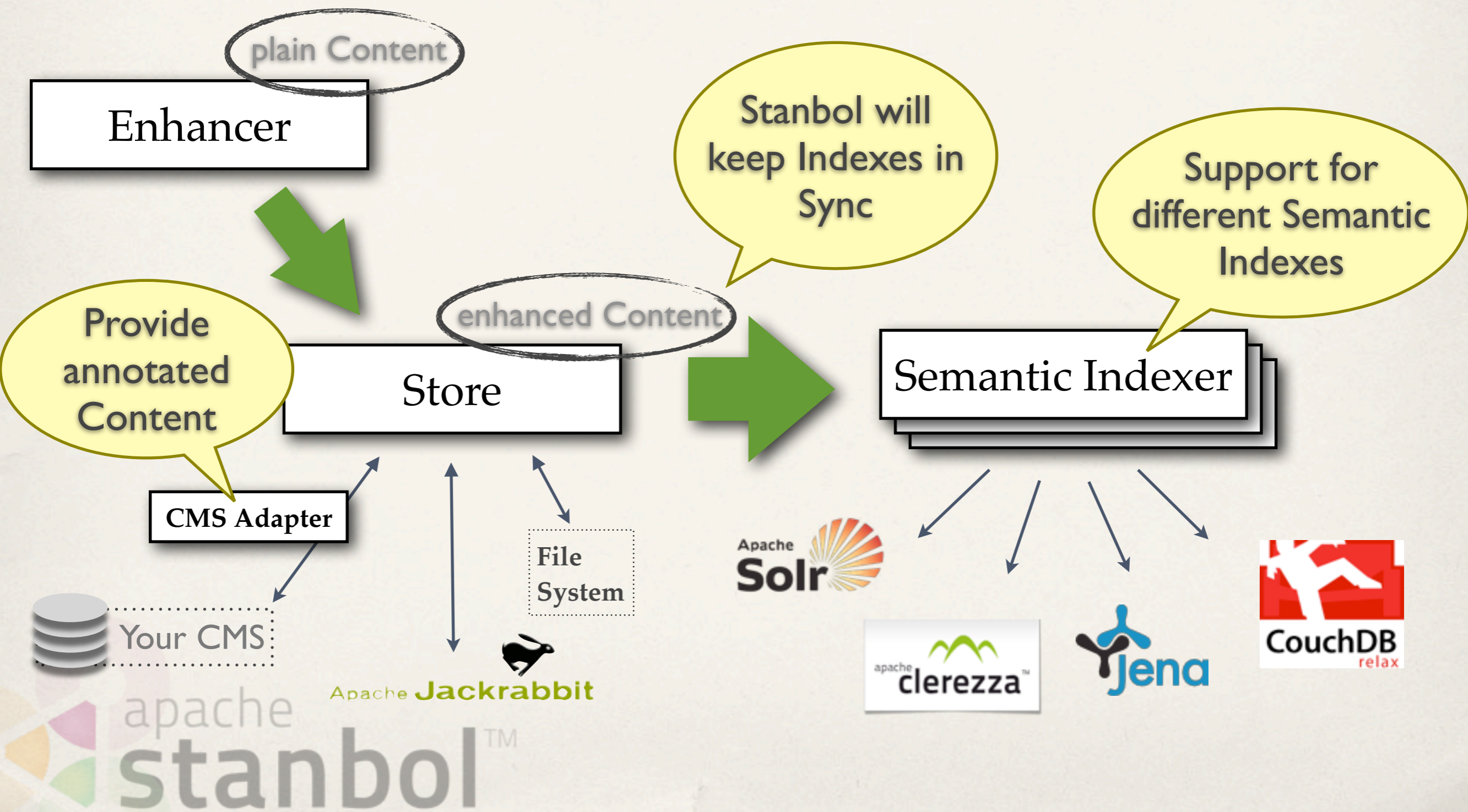
- ❖ Keep using  as your Search Engine
- ❖ Use the Stanbol Contenthub for semantic indexing
- ❖ Configure Semantic Indexes by using LDpath

easy way to add
**Semantic
Search**

Improve your
Search by
**Semantic
Indexing**

currently in Development

coming with **Stanbol 0.10**
follow STANBOL-471



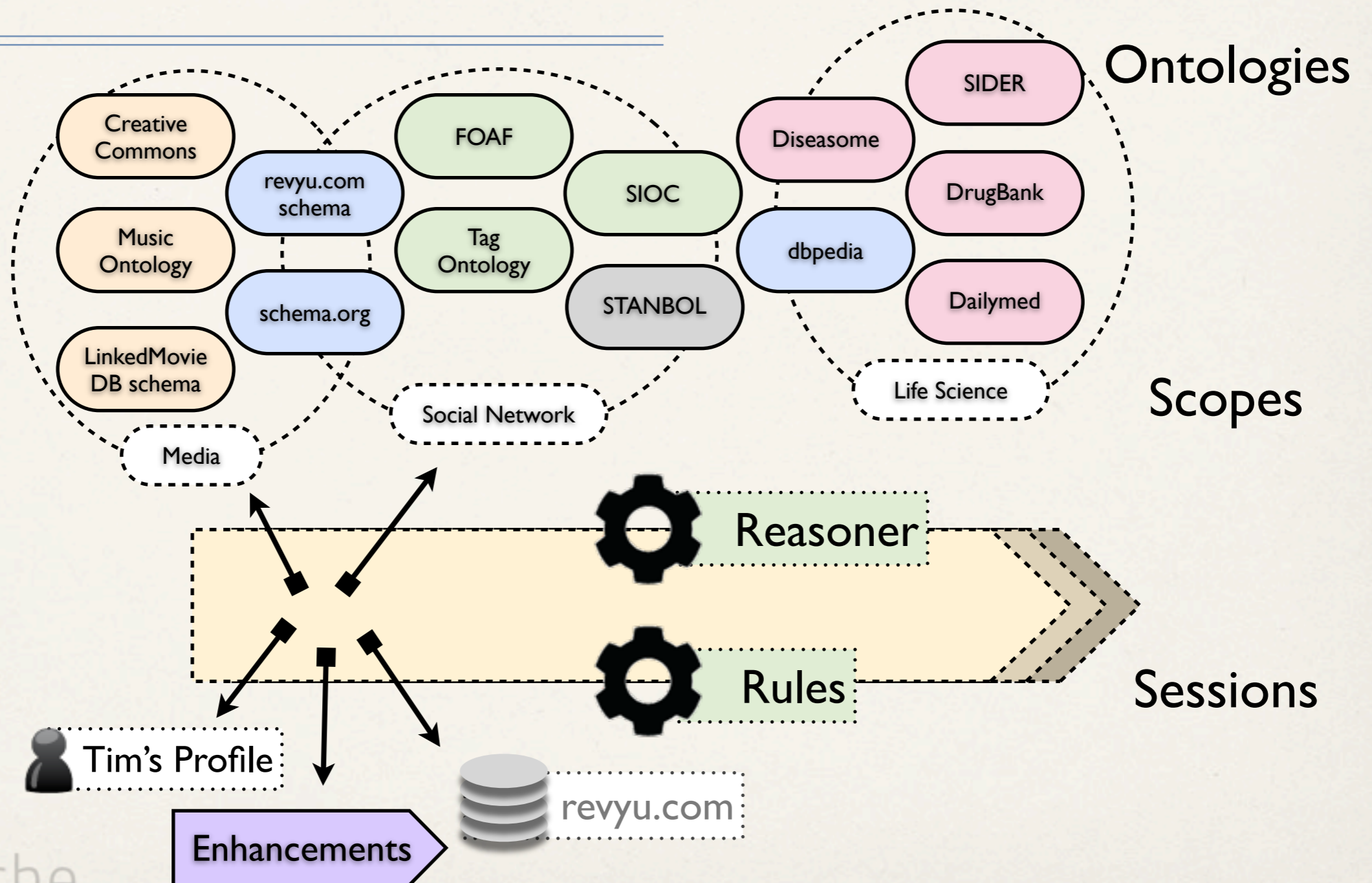
Stanbol Ontology

Manager, Reasoning and Rules

- ❖ Manage your Ontologies
 - ❖ and use/combine them in Scopes
- ❖ Reasoning
 - ❖ on volatile Data loaded into a Sessions
 - ❖ consistency check / classification / enrichment
 - ❖ RDFS, OWL and OWL - 2
- ❖ Support for background Jobs
 - ❖ for long running reasoning tasks

Stanbol Ontology

Manager, Reasoning and Rules



Stanbol Ontology

Manager, Reasoning and Rules

- ❖ Stanbol Rules

- ❖ Recipes: Manage a set of Rules that are executed together
- ❖ Rules are converted to SWRL, Jena Rules or SPARQL CONSTRUCT depending on the available RuleEngine

- ❖ Typical Use Cases

- ❖ integrity checks for imported Data
- ❖ harmonize Vocabularies e.g. simple SEO by using schema.org

- ❖ Refactor Enhancement Engine

- ❖ allows to execute Recipes on extracted Metadata

Contributions Welcome

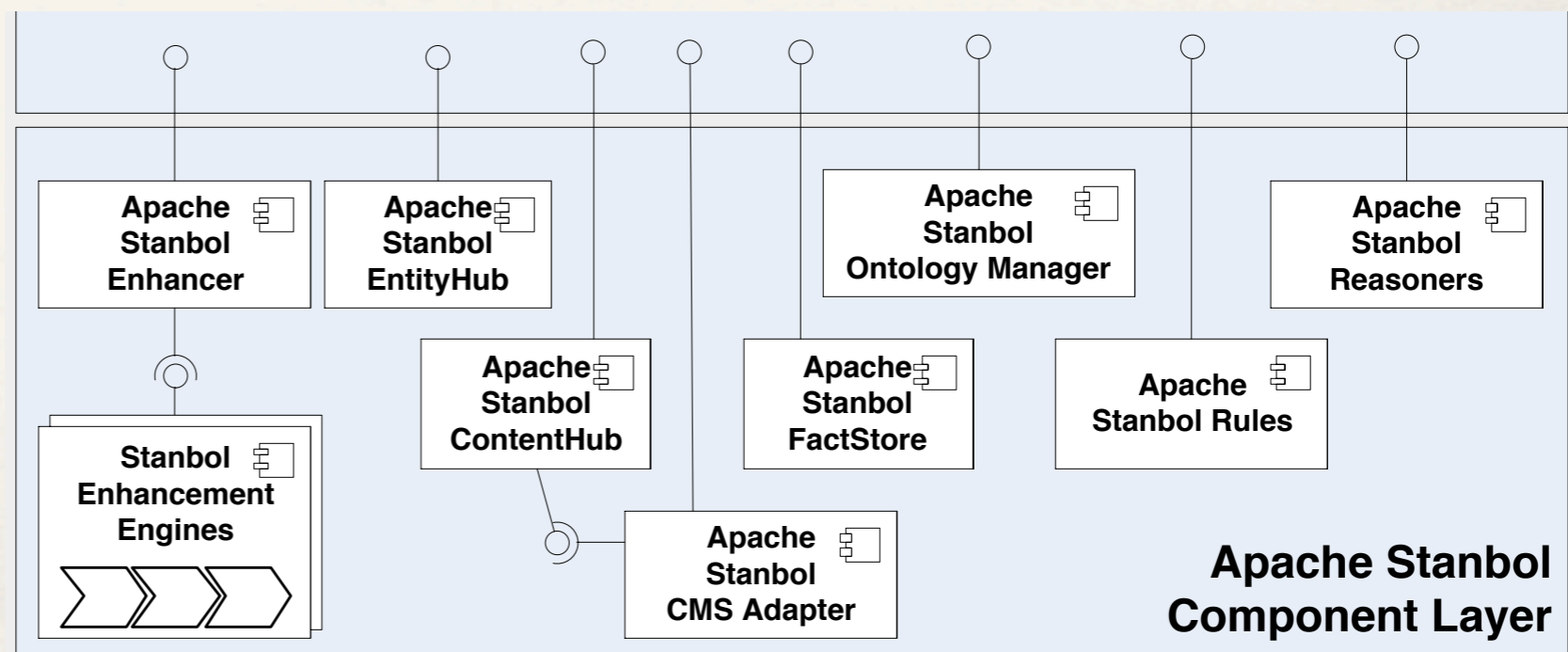
Work with the
Stanbol
Community

- ❖ Share alignment rules across multiple domains
 - ❖ Especially with schema.org.
- ❖ Benchmarking:
 - ❖ how large are the scopes you are managing?
 - ❖ Sessions you use in your applications
- ❖ Wrap <your> Reasoner/Rule Engine as a Stanbol service

Stanbol Design and Integration Patterns

Don't buy everything.
Take the
Components
you Need!

- ❖ Stanbol Components provide
 - ❖ RESTful API
 - ❖ Java API and OSGI services
- ❖ Stanbol Components do NOT depend on each other
 - ❖ however they can be easily combined to



Stanbol Facts

- ❖ Web: <http://incubator.apache.org/stanbol/>
- ❖ Mailing List: stanbol-dev@incubator.apache.org
- ❖ Release: in progress (currently: 0.9.0-incubation RC6)



- ❖ Incubation to Apache November 2010
 - ❖ based on code developed by the **IKS** project [1]