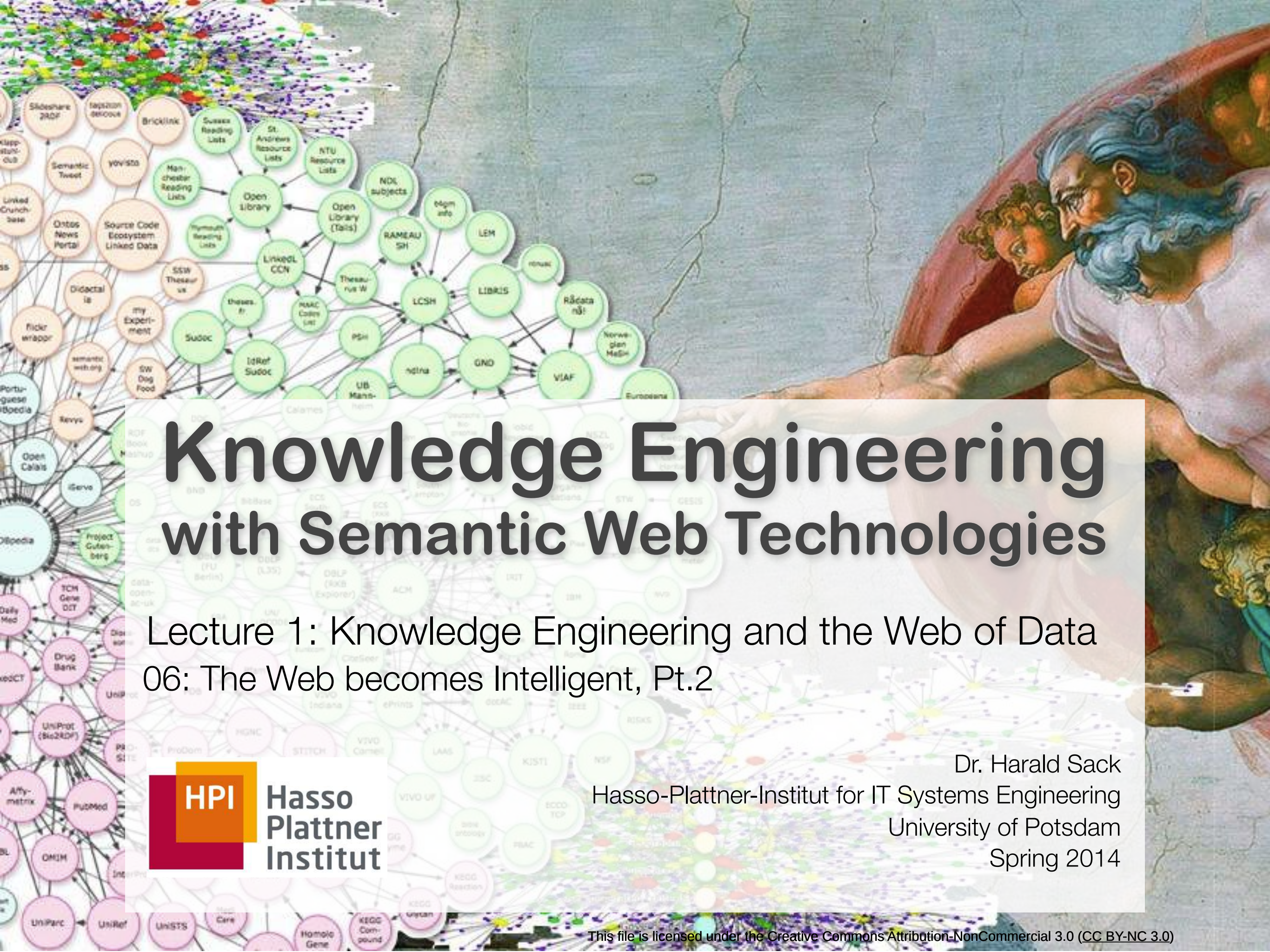




Knowledge Engineering with Semantic Web Technologies

Lecture 1: Knowledge Engineering and the Web of Data
06: The Web becomes Intelligent, Pt.2



Dr. Harald Sack
Hasso-Plattner-Institut for IT Systems Engineering
University of Potsdam
Spring 2014



Lecture 1: Knowledge Engineering and the Web of Data

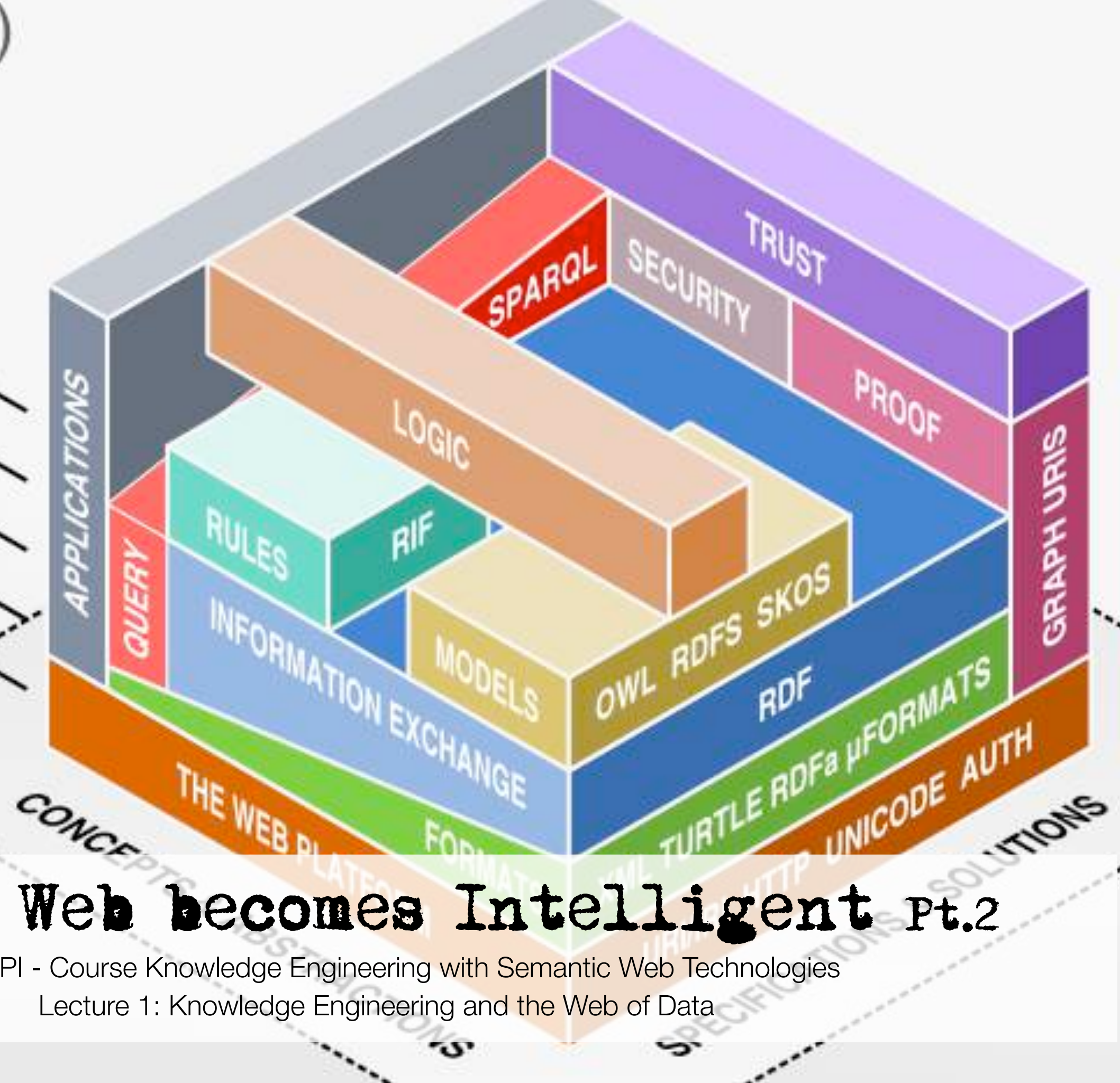
Open HPI - Course: Knowledge Engineering with Semantic Web Technologies

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06: The Web becomes Intelligent Pt.2

OpenHPI - Course Knowledge Engineering with Semantic Web Technologies

Lecture 1: Knowledge Engineering and the Web of Data

Semantic Web

...towards an „intelligent“ Web

The Semantic Web Technology Stack (not a piece of cake...)

Most apps use only a subset of the stack

Querying allows fine-grained data access

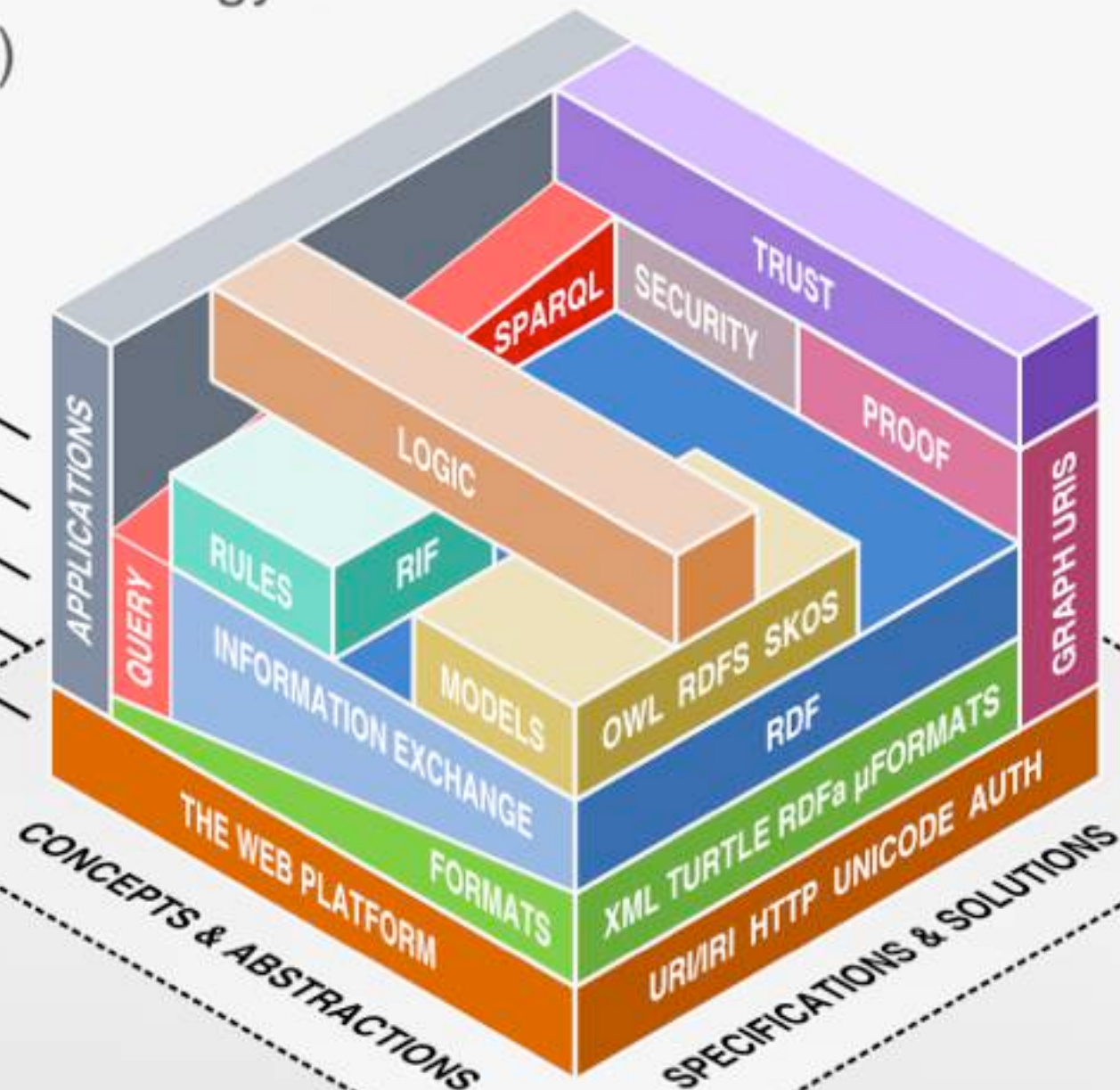
Standardized information exchange is key

Formats are necessary, but not too important

The Semantic Web is based on the Web

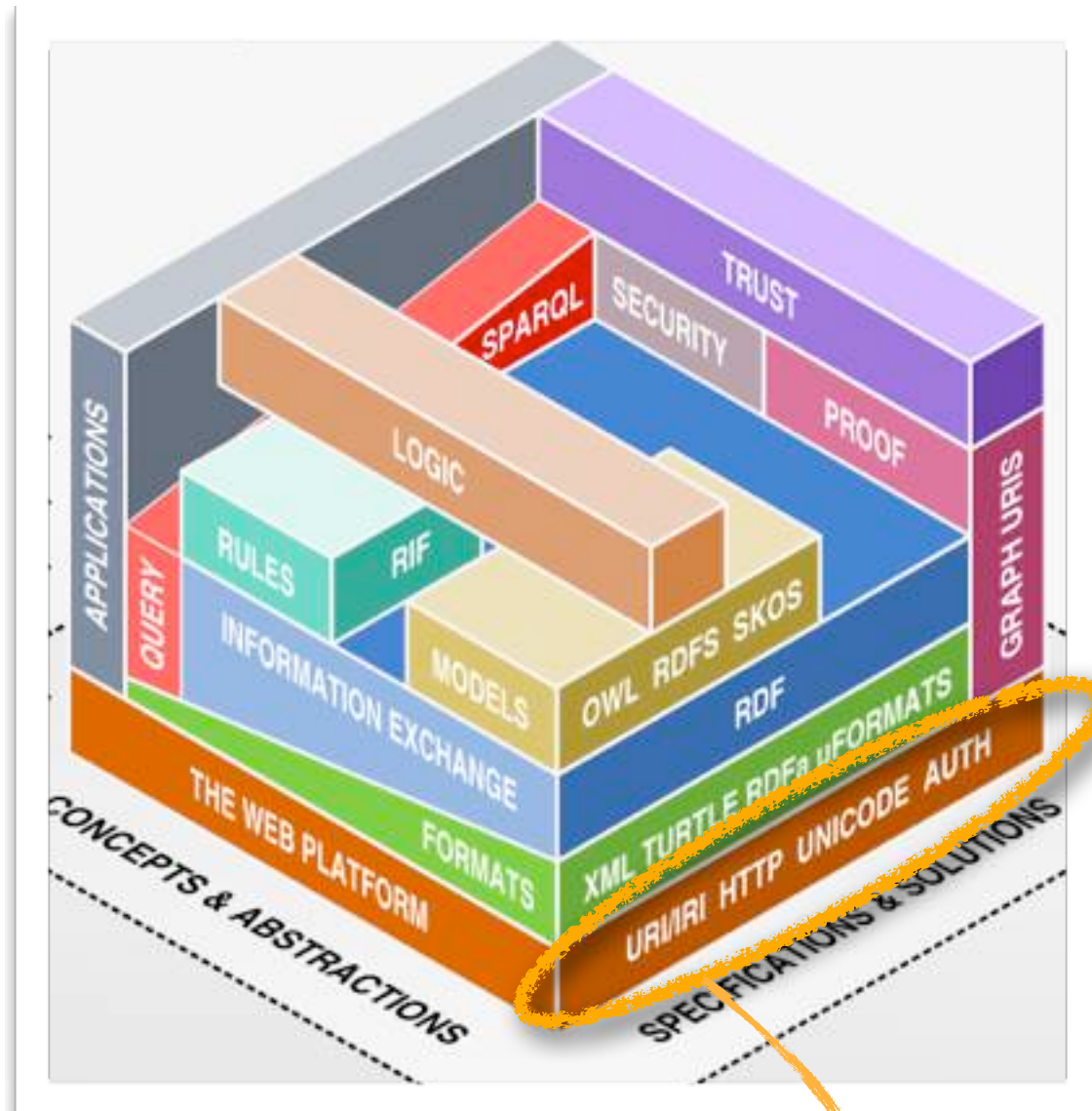
Linked Data uses a small
selection of technologies

LINKED DATA



Semantic Web

...towards an „intelligent“ Web



URI - Uniform Resource Identifier

Walter White

[http://dbpedia.org/resource/Walter_White_\(Breaking_Bad\)](http://dbpedia.org/resource/Walter_White_(Breaking_Bad))

Semantic Web

...towards an „intelligent“ Web

http://en.wikipedia.org/wiki/Walter_White_(Breaking_Bad)



WIKIPEDIA
The Free Encyclopedia

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Walter White (*Breaking Bad*)

From Wikipedia, the free encyclopedia

Walter Hartwell "Walt" White Sr. (also known by his clandestine alias, **Helsenberg**) is a fictional character in the American television drama series *Breaking Bad* on AMC. He was portrayed by Bryan Cranston and was created by series creator Vince Gilligan. Once a promising chemist who was one of the founding members of the multi-billion dollar company Gray Matter Technologies, Walter left the company for personal reasons and became an unhappy and disillusioned high school chemistry teacher. After being diagnosed with Stage IIIA lung cancer, he resorts to manufacturing methamphetamine to ensure his family's financial security when he dies. As the series progresses, Walter gradually becomes darker and takes on a more villainous role.

Although AMC officials hesitated to cast Cranston due to his previous comedic role on *Malcolm in the Middle*, Gilligan cast him based on the actor's past performance in the *X-Files* episode "Drive". Cranston has contributed much of his character, including Walter's *back story*, physical appearance, and personality traits. Gilligan had described his goal with Walter White as turning Mr. Chips into Scarface, and has deliberately made the character less and less sympathetic.

Both the Walter White character and Bryan Cranston's performance have received critical acclaim. Cranston won three consecutive *Primetime Emmy Awards* for Outstanding Lead Actor in a Drama Series, becoming the second actor to do so since *Bill Cosby* for *I Spy* in the 1950s.^{[1][2]}

In the Spanish-language remake *Metastasis*, his character is renamed Walter Blanco and is portrayed by Diego Trujillo.^[3]

Contents [hide]

- 1 Character biography
 - 1.1 Background and personality
 - 1.2 Season one
 - 1.3 Season two
 - 1.4 Season three
 - 1.5 Season four
 - 1.6 Season five
 - 1.6.1 Season 5a
 - 1.6.2 Season 5b
- 2 Development
- 3 Reception
 - 3.1 Reviews
 - 3.2 Awards
- 4 Obituary
- 5 References
- 6 Further reading
- 7 External links

Character biography [edit]

Background and personality [edit]

Walter White was a talented chemist who graduated with a Ph.D. in chemistry from the California Institute of Technology. He, along with colleague Vivek "Vodka" Kumar, contributed to research on proton radiography that helped a team win a Nobel Prize in Chemistry.^{[4][5]} After graduate school, Walter founded the firm Gray Matter Technologies with Elliott Schwartz, his former classmate and close friend.^[6] Around this time, Walter dated his lab assistant, Gretchen. However, he eventually left both Gretchen and Gray Matter Technologies, selling his fractional interest in the company to

Walter White
Breaking Bad character



Walter White

First appearance

"Pilot"

Last appearance

"Felina"

Created by

Vince Gilligan

Portrayed by

Bryan Cranston

Information

Aliases

Helsenberg
Mr. Lambert

Occupation

Meth manufacturer
Drug kingpin
Chemist at Sandia National Laboratories
Co-founder of Gray Matter Technologies
High school chemistry teacher
Car wash cashier, proprietor, and manager

Knowledge Engineering with Semantic Web Technologies , Dr. Harald Sack, Hasso-Plattner-Institut, Universität Potsdam

Semantic Web

...towards an „intelligent“ Web

http://en.wikipedia.org/wiki/Walter_White_(Breaking_Bad)

Wikipedia article for Walter White (Breaking Bad). The article includes a table of contents, a character biography, and a background and personality section. A red box highlights the infobox on the right, which contains a photo of Walter White and a table of information.

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Walter White
Breaking Bad character

Photo of Walter White.

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Last appearance	"Felina"
Created by	Vince Gilligan
Portrayed by	Bryan Cranston

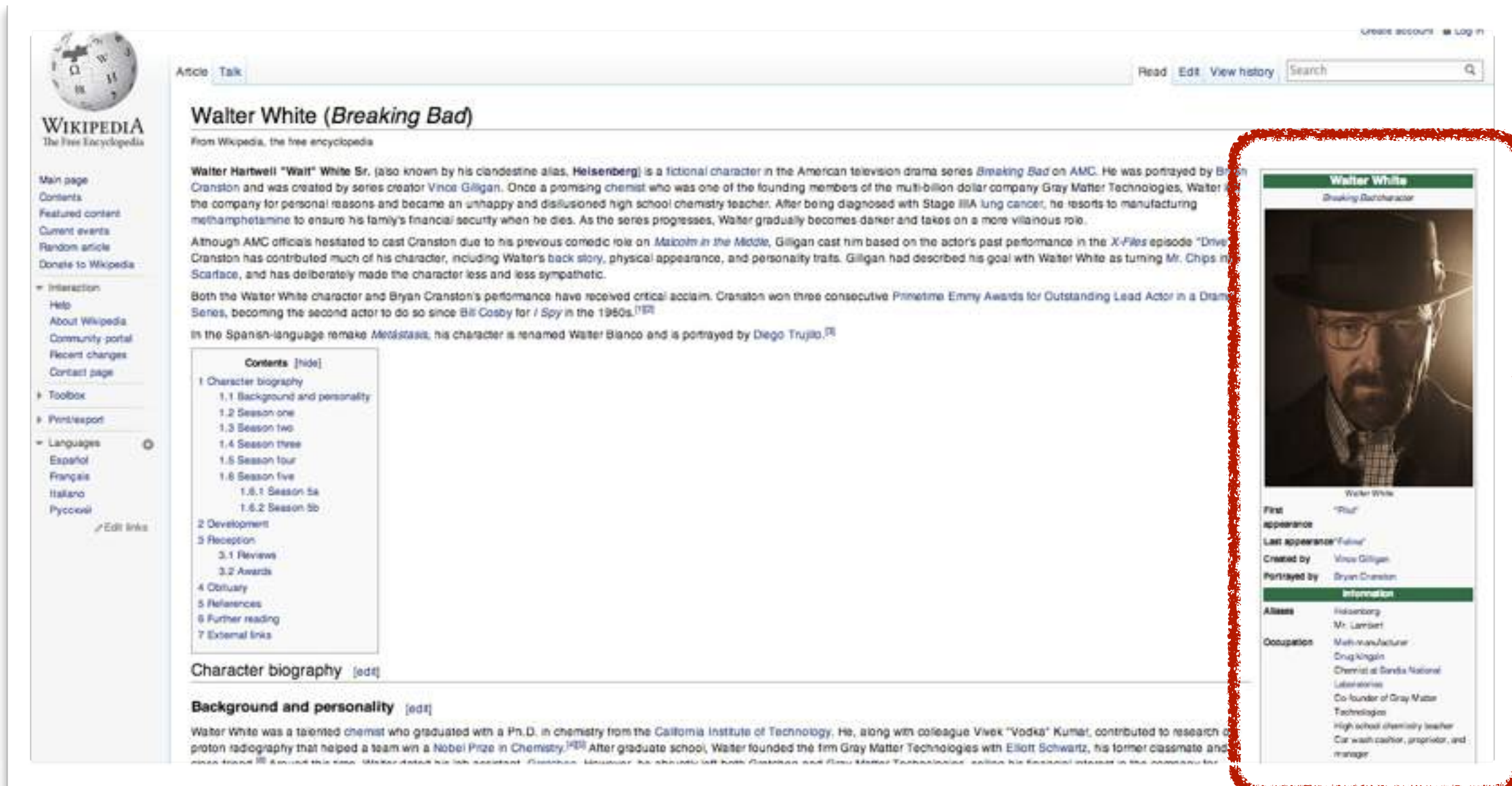
Information

Aliases	Helsenberg Mr. Lambert
Occupation	Meth manufacturer Drug kingpin Chemist at Sandia National Laboratories Co-founder of Gray Matter Technologies High school chemistry teacher Car wash cashier, proprietor, and manager

Semantic Web

...towards an „intelligent“ Web

6 [http://en.wikipedia.org/wiki/Walter_White_\(Breaking_Bad\)](http://en.wikipedia.org/wiki/Walter_White_(Breaking_Bad))



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Walter White
Breaking Bad character



Walter White

First appearance	"Pilot"
Last appearance	"Feluda"
Created by	Vince Gilligan
Portrayed by	Bryan Cranston

Information

Aliases	Helsenberg Mr. Lambert
Occupation	Meth manufacturer Drug kingpin Chemist at Sandia National Laboratories Co-founder of Gray Matter Technologies High school chemistry teacher Car wash cashier, proprietor, and manager

[http://dbpedia.org/resource/Walter_White_\(Breaking_Bad\)](http://dbpedia.org/resource/Walter_White_(Breaking_Bad))

Semantic Web

...towards an „intelligent“ Web

7 [http://dbpedia.org/resource/Walter_White_\(Breaking_Bad\)](http://dbpedia.org/resource/Walter_White_(Breaking_Bad))

About: Walter White (Breaking Bad)
An Entity of Type : [fictional character](#), from Named Graph : <http://dbpedia.org>, within Data Space : [dbpedia.org](#)

Walter Hartwell "Walt" White (also known by his clandestine alias, Heisenberg) is a fictional character and the protagonist of the American television drama series Breaking Bad on AMC. He is portrayed by Bryan Cranston and was created by series creator Vince Gilligan.

Property	Value
dbpedia-owl:abstract	- Walter Hartwell White è il protagonista della serie televisiva Breaking Bad - Reazioni collaterali, interpretato da Bryan Cranston e doppiato da Stefano De Sando. - Walter Hartwell "Walt" White (also known by his clandestine alias, Heisenberg) is a fictional character and the protagonist of the American television drama series Breaking Bad on AMC. He is portrayed by Bryan Cranston and was created by series creator Vince Gilligan. Once a promising chemist who was one of the founding members of the fictional, now multi-billion dollar company "Gray Matter Technologies", Walter left the company for personal reasons and became an unhappy and disillusioned high school chemistry teacher. After being diagnosed with inoperable lung cancer, he resorts to manufacturing methamphetamine to ensure his family's financial security when he dies. As the series progresses, Walter gradually becomes darker and takes on a more villainous role. Although AMC officials hesitated to cast Cranston due to his previous comedic role on Malcolm in the Middle, Gilligan cast him based on the actor's past performance in an episode of The X-Files. Cranston has contributed to much of his character, including Walter's back story, physical appearance and personality traits. Gilligan had described his goal with Walter White as turning Mr. Chips into Scarface, and has deliberately made the character less and less sympathetic. Both the Walter White character and Bryan Cranston's performance have received critical acclaim. Cranston won three consecutive Primetime Emmy Awards for Outstanding Lead Actor in a Drama Series, becoming the second actor ever to do so and the first since Bill Cosby for I Spy in the 1960s. - Walter Hartwell = Walt = White est le personnage de fiction principal de la série Breaking Bad créé par Vince Gilligan. Il est interprété par Bryan Cranston et doublé en version française par Jean-Louis Faure. L'acteur Bryan Cranston fut récompensé à plusieurs reprises : dans la catégorie Meilleur acteur dans une série dramatique pour les Satellite Awards ; Meilleur acteur principal dans une série dramatique pour les Emmy Awards 2008, 2009 et 2010.
dbpedia-owl:alias	- Heisenberg - Mr. Lambert
dbpedia-owl:child	dbpedia:List_of_Breaking_Bad_characters
dbpedia-owl:creator	dbpedia:Vince_Gilligan
dbpedia-owl:firstAppearance	dbpedia:Pilot_(Breaking_Bad)
dbpedia-owl:occupation	dbpedia:Methamphetamine dbpedia:Sandia_National_Laboratories
dbpedia-owl:portrayer	dbpedia:Bryan_Cranston
dbpedia-owl:relative	dbpedia:Hank_Schrader dbpedia:List_of_Breaking_Bad_characters
dbpedia-owl:series	dbpedia:Breaking_Bad
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dbpedia-owl:wikiPageExternalLink	http://www.amctv.com/shows/breaking-bad/cast/walter-white
dbpedia-owl:wikiPageID	22530352 (xsd:integer)
dbpedia-owl:wikiPageRevisionID	548300209 (xsd:integer)
dbpprop:affiliations	dbpedia:Jesse_Pinkman - Saul Goodman - Gustavo Fring



Semantic Web

...towards an „intelligent“ Web



[http://dbpedia.org/resource/Walter_White_\(Breaking_Bad\)](http://dbpedia.org/resource/Walter_White_(Breaking_Bad))

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:Walter_White_(Breaking_Bad) rdf:type :FictionalCharacter .  
:Walter_White_(Breaking_Bad) dbpp:portrayer :Bryan_Cranston .  
:Bryan_Cranston dbpp:birthDate "1956-03-07" .  
:Bryan_Cranston rdf:type dbpo:Actor .  
:Bryan_Cranston rdf:type dbpo:Person .  
...
```



RDF Resource Description Framework



RDF Tripel

:Brian_Cranston



RDF Subject

rdf:type



RDF Property

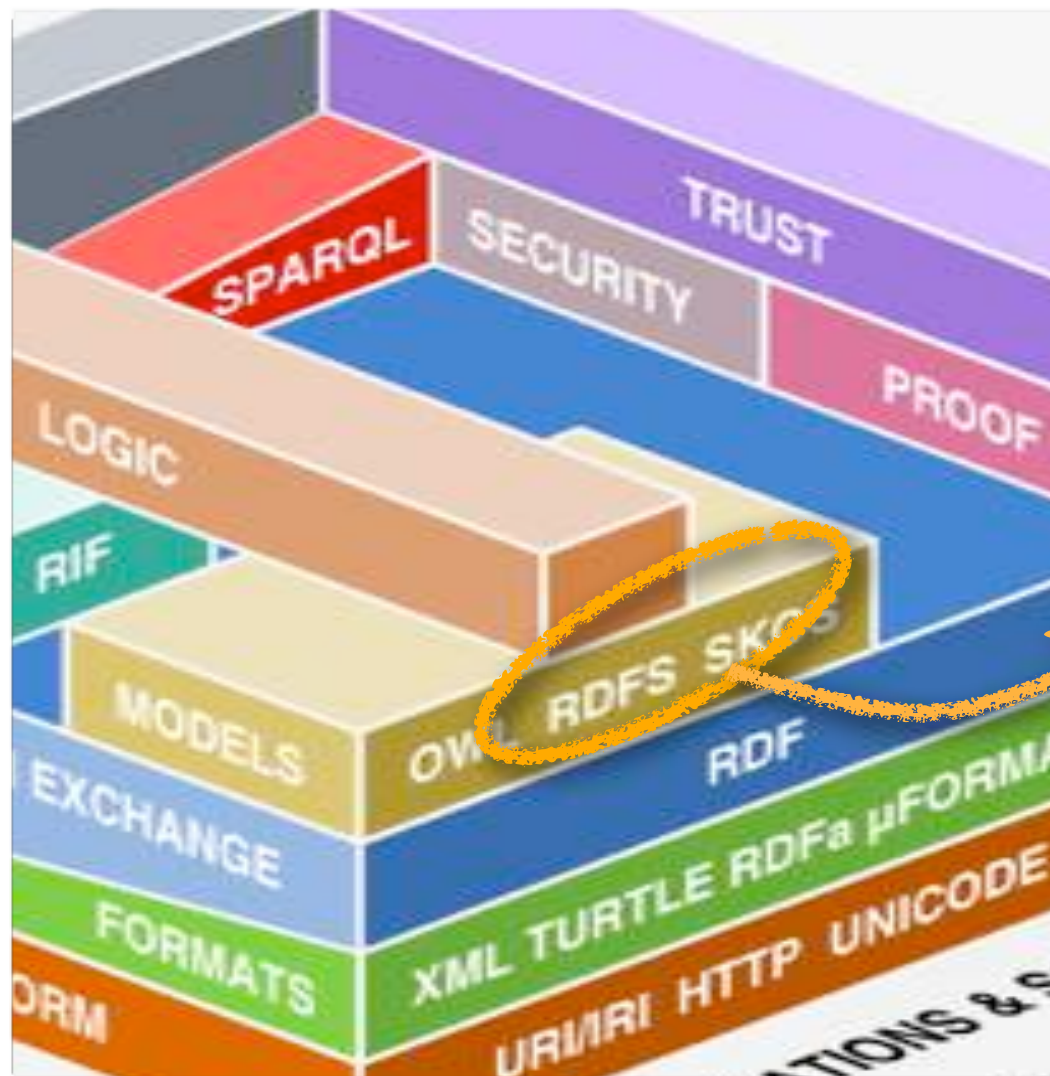
dbpo:Actor .



RDF Object

Semantic Web

...towards an „intelligent“ Web

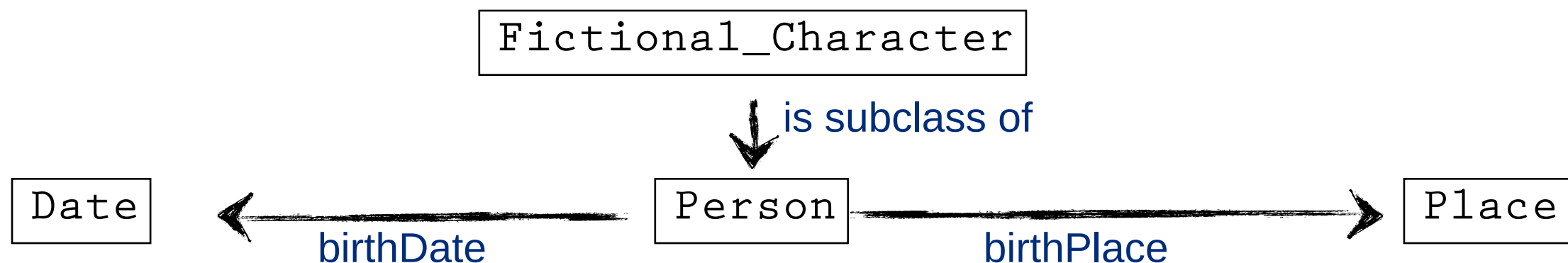


<http://dbpedia.org/ontology/FictionalCharacter>

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dbpo:FictionalCharacter rdfs:label "Fictional Character" .
dbpp:birthPlace rdf:type rdf:Property .
dbpp:birthPlace rdfs:domain dbpo:Person .
dbpp:birthPlace rdfs:range dbpo:Place .
dbpp:birthDate rdf:type rdf:Property .
dbpp:birthDate rdfs:domain :Person .
dbpp:birthDate rdfs:range xsd:date .
...
```

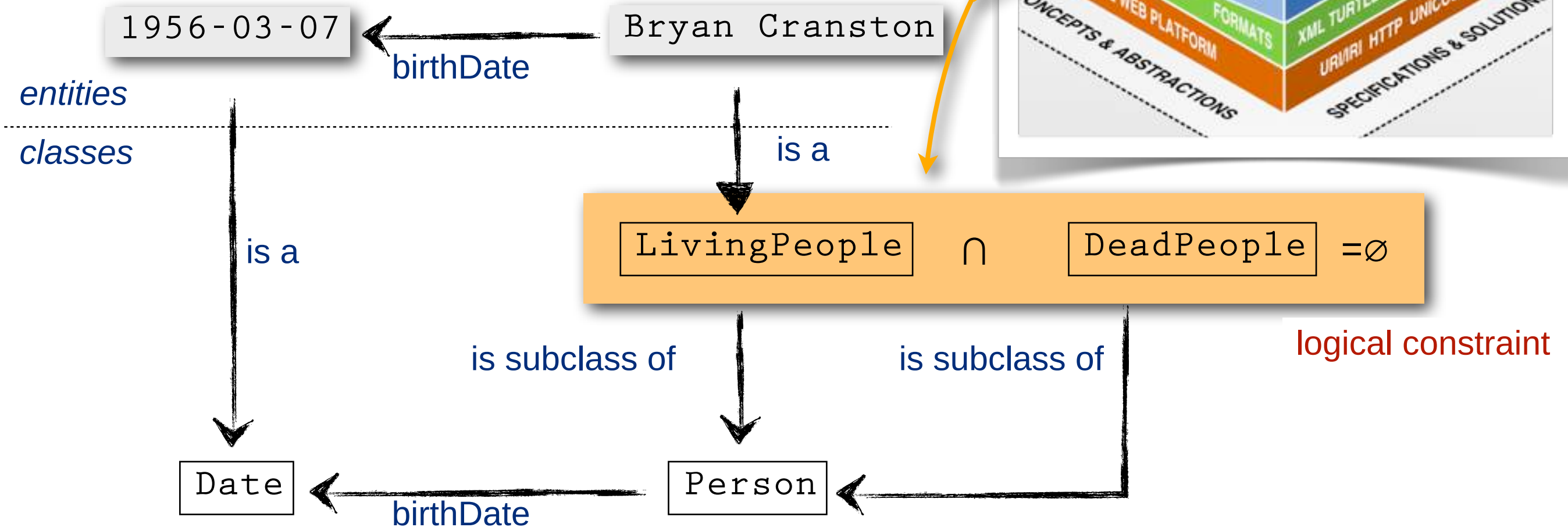
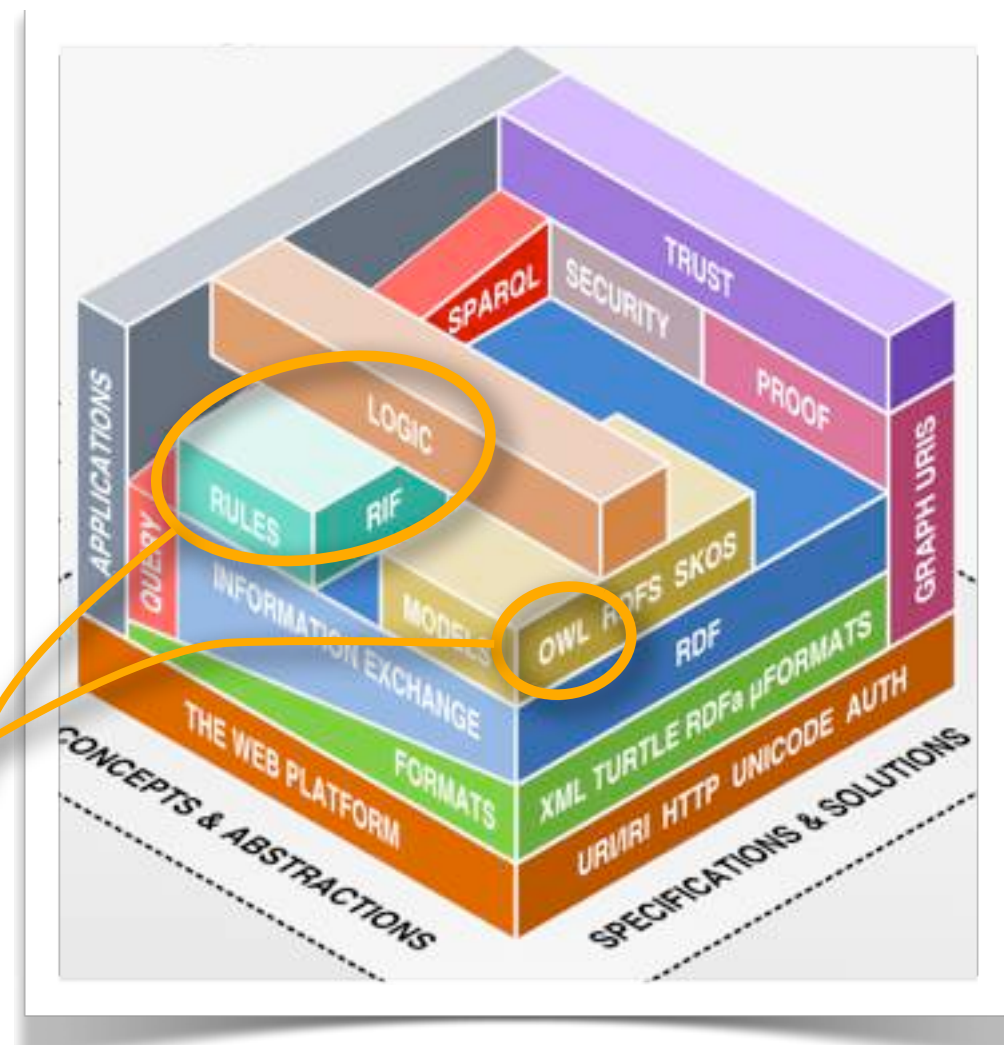


RDF Schema



Semantic Web

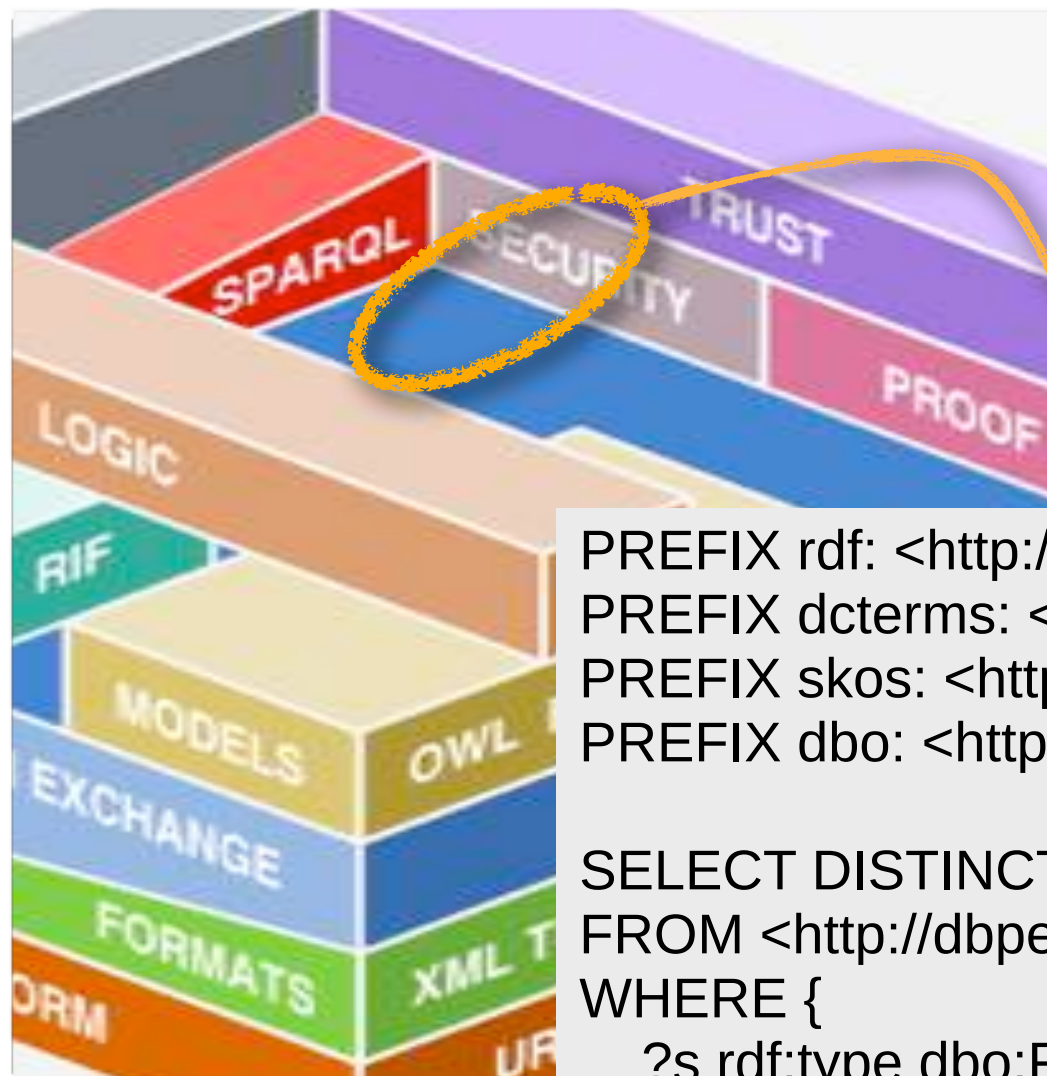
...towards an „intelligent“ Web



$\forall x.\exists y.\text{hasDeathDate}(x,y) \wedge \text{Person}(x) \wedge \text{Date}(y) \rightarrow \text{DeadPeople}(x)$ + Rules
(Description Logics)

Semantic Web

...towards an „intelligent“ Web



*Look for all Fictional
Characters whose portrayer
have won an Oscar .*

PREFIX rdf: <<http://www.w3.org/1999/02/22-rdf-syntax-ns#>>

PREFIX dcterms: <<http://purl.org/dc/terms/>>

PREFIX skos: <<http://www.w3.org/2004/02/skos/core#>>

PREFIX dbo: <<http://dbpedia.org/ontology/>>

SELECT DISTINCT ?s ?p

FROM <<http://dbpedia.org>>

WHERE {

 ?s rdf:type dbo:FictionalCharacter .

 ?s dbo:portrayer ?p .

 ?p rdf:type dbo:Person .

 ?p dcterms:subject/skos:broader*

 <http://dbpedia.org/resource/Category:Academy_Award_winners> .

}

ORDER BY ?p

Semantic Web

...towards an „intelligent“ Web

Look for all Fictional Characters whose portrayer have won an Oscar .



s	p
http://dbpedia.org/resource/Tony_Montana	http://dbpedia.org/resource/Al_Pacino
http://dbpedia.org/resource/Michael_Corleone	http://dbpedia.org/resource/Al_Pacino
http://dbpedia.org/resource/Carlito_Brigante	http://dbpedia.org/resource/Al_Pacino
http://dbpedia.org/resource/Inspector_Clouseau	http://dbpedia.org/resource/Alan_Arkin
http://dbpedia.org/resource/Fagin	http://dbpedia.org/resource/Alec_Guinness
http://dbpedia.org/resource/George_Smiley	http://dbpedia.org/resource/Alec_Guinness
http://dbpedia.org/resource/Maleficent	http://dbpedia.org/resource/Angelina_Jolie
http://dbpedia.org/resource/Sookie_Stackhouse	http://dbpedia.org/resource/Anna_Paquin
http://dbpedia.org/resource/Mia_Thermopolis	http://dbpedia.org/resource/Anne_Hathaway
http://dbpedia.org/resource/White_Queen_(Through_the_Looking-Glass)	http://dbpedia.org/resource/Anne_Hathaway
http://dbpedia.org/resource/Hannibal_Lecter	http://dbpedia.org/resource/Anthony_Hopkins
http://dbpedia.org/resource/Abraham_Van_Helsing	http://dbpedia.org/resource/Anthony_Hopkins
http://dbpedia.org/resource/Stanley_Kowalski	http://dbpedia.org/resource/Anthony_Quinn
http://dbpedia.org/resource/Judith_Traherne	http://dbpedia.org/resource/Barbara_Stanwyck
http://dbpedia.org/resource/List_of_View_Askewniverse_characters	http://dbpedia.org/resource/Ben_Affleck
http://dbpedia.org/resource/Sweeney_Todd	http://dbpedia.org/resource/Ben_Kingsley
http://dbpedia.org/resource/Fagin	http://dbpedia.org/resource/Ben_Kingsley
http://dbpedia.org/resource/Hood_(Thunderbirds)	http://dbpedia.org/resource/Ben_Kingsley
http://dbpedia.org/resource/Jack_Rafferty	http://dbpedia.org/resource/Benicio_del_Toro
http://dbpedia.org/resource/Larry_Talbot	http://dbpedia.org/resource/Benicio_del_Toro
http://dbpedia.org/resource/Baby_Jane_Hudson	http://dbpedia.org/resource/Bette_Davis
http://dbpedia.org/resource/Judith_Traherne	http://dbpedia.org/resource/Bette_Davis
http://dbpedia.org/resource/List_of_past_Casualty_characters	http://dbpedia.org/resource/Brenda_Fricker
http://dbpedia.org/resource/Blanche_DuBois	http://dbpedia.org/resource/Cate_Blanchett
http://dbpedia.org/resource/Scheherazade	http://dbpedia.org/resource/Catherine_Zeta-Jones
http://dbpedia.org/resource/Elena_Montero	http://dbpedia.org/resource/Catherine_Zeta-Jones

[Link to public DBpedia SPARQL endpoint including query](#)

Next section

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07: The Web of Data and how to make use of it

OpenHPI - Course Semantic Web Technologies - Lecture 1: The Web of Data