

Semantic Technology for Online, Broadcast and Print Media

- Jem Rayfield: Head of Solution Architecture
- Financial Times: www.ft.com



Outline

BBC: Dynamic Semantic Publishing and the World Cup 2010

BBC: Sport 2012 + Olympics

Financial Times: Semantic Re-platform

Financial Times: Semantic Prototype

Financial Times: Behavioral Recommendations

BBC World Cup 2010



<http://bbc.co.uk/worldcup>

World Cup 2010

1. 32 teams, 8 groups, 736 players → 776 pages
2. Fixtures & Results, Groups & Teams pages
3. Too many web pages for too few journalists
4. Improve the publishing system to help achieve all of this

Page Per Player

http://news.bbc.co.uk/sport/football/world_cup_2010/groups_and_teams/team/england/wayne_rooney

BBC Home News Sport Weather iPlayer TV Radio More... Search

SPORT WORLD CUP 2010

SPORT FOOTBALL WORLD CUP 2010 GROUPS & TEAMS FIXTURES & RESULTS VIDEO BBC COVERAGE

Wayne Rooney

Position: **Striker**
Squad number: **10**
Date of birth: **24 October, 1985 (24 years old)**
Height: **5'10" (178cm)**

Tournament totals

Games played	Shots on target off target
 1	 2 2
Wayne Rooney	Wayne Rooney
 1	 9 7
Total England	Total England

Goals	Assists
 0	 0
Wayne Rooney	Wayne Rooney
 1	 1
Total England	Total England

Fouls by on	Cards yellow red
 0 2	 0 0
Wayne Rooney	Wayne Rooney
 8 10	 3 0
Total England	Total England

England games played

- ▶ [England 1-1 United States](#) Saturday, 12 June [Match report](#)
- ▶ [England v Algeria](#) Friday, 18 June, 19:30 [Preview](#)

Latest matches

- NED 2-0 DEN**

[Highlights & report](#)
- JPN 1-0 CMR**

[Highlights & report](#)
- ITA 1-1 PAR**

[Highlights & report](#)
- NZL v SVK**

LIVE BUILD-UP

Features

- Who will win the Golden Boot?**
The players with the Midas touch hoping to scoop the award in South Africa
[World Cup scouting: strikers](#)

Top 5 World Cup stories

- ▶ [BBC gets 545 vuvuzela complaints](#)
- ▶ [Drogba cleared to wear arm cast](#)
- ▶ [Rooney back in England training](#)
- ▶ [Beckenbauer attacks England style](#)
- ▶ [Tuesday's World Cup 2010 round-up](#)

Top TV and radio **BBC iPlayer**

- ▶ [Match of the Day Live: 2010 FIFA World Cup: Italy v Paraguay](#)
- ▶ [Match of the Day: 2010 FIFA World Cup: 14/06/2010](#)
- ▶ [Match of the Day: 2010 FIFA World Cup: 13/06/2010](#)

[More football on BBC iPlayer](#)



Latest matches

NED 2-0 DEN



[Highlights & report](#)

JPN 1-0 CMR



[Highlights & report](#)

ITA 1-1 PAR



[Highlights & report](#)

NZL v SVK



LIVE BUILD-UP

Italy

Italy 1-1 Paraguay

Monday, 14 June

[Match report](#)

Italy v New Zealand

Sunday, 20 June, 15:00

[Preview](#)

Slovakia v Italy

Thursday, 24 June, 15:00

[Preview](#)

Latest stories



Buffon confident after back pain



Paraguay boss delighted with draw

- ▶ [Gattuso to retire after World Cup](#)
- ▶ [Italy's Pirlo to miss two matches](#)
- ▶ [Sunday's World Cup 2010 round-up](#)
- ▶ [Rossi left out of Italy Cup squad](#)
- ▶ [Tuesday's World Cup 2010 round-up](#)
- ▶ [Prandelli to be next Italy boss](#)
- ▶ [Lippi in post-World Cup exit hint](#)

Latest audio and video



World Cup 2010



Highlights - Italy



De Rossi equalises

	A	B	C	D	E	F	G	H		
Group F Teams										
Italy						W	D	L	GD	PTS
Paraguay						0	1	0	0	1
New Zealand						0	1	0	0	1
Slovakia						0	0	0	0	0

Features



World Cup 2010 performance analysis

All the facts and figures from the World Cup 2010 tournament

[tournament](#)

- ▶ [My World Cup - Noel Gallagher](#)
- ▶ [Guide to the teams at South Africa 2010](#)

Around the web

- ▶ [Italian FA site](#)
- ▶ [Italy Fifa Profile](#)
- ▶ [BBC Search+ country page](#)
- ▶ [Italy Wikipedia profile](#)

Top 5 World Cup stories

SPORT WORLD CUP 2010

[SPORT](#)
[FOOTBALL](#)
[WORLD CUP 2010](#)
[GROUPS & TEAMS](#)
[FIXTURES & RESULTS](#)
[VIDEO](#)
[BBC COVERAGE](#)



Latest matches

NED 2-0 DEN

[Highlights & report](#)

JPN 1-0 CMR

[Highlights & report](#)

ITA 1-1 PAR

[Highlights & report](#)

NZL v SVK

LIVE BUILD-UP

Group F

TEAMS	P	W	D	L	F	A	GD	PTS
Italy	1	0	1	0	1	1	0	1
Paraguay	1	0	1	0	1	1	0	1
New Zealand	0	0	0	0	0	0	0	0
Slovakia	0	0	0	0	0	0	0	0

Latest stories

- Buffon confident after back pain**
- Paraguay boss delighted with draw**
- ▶ Gattuso to retire after World Cup
- ▶ Italy's Pirlo to miss two matches
- ▶ Skrtel hopeful for opening game
- ▶ Sunday's World Cup 2010 round-up
- ▶ Rossi left out of Italy Cup squad
- ▶ Tuesday's World Cup 2010 round-up
- ▶ Skrtel makes final Slovakia squad
- ▶ Cameroon secure Slovakia draw

Latest audio and video

- World Cup 2010 extended highlights - Italy 1-1 Paraguay [Watch](#)
- Highlights - Italy 1-1 Paraguay [Watch](#)
- De Rossi equalises for Italy [Watch](#)

Matches

- Italy 1-1 Paraguay [Match report](#)
Monday, 14 June
- New Zealand - Slovakia** [LIVE](#)
Today 12:30
- Slovakia v Paraguay [Preview](#)
Sunday, 20 June, 12:30
- Italy v New Zealand [Preview](#)
Sunday, 20 June, 15:00
- Paraguay v New Zealand [Preview](#)
Thursday, 24 June, 15:00
- Slovakia v Italy [Preview](#)
Thursday, 24 June, 15:00

Features

World Cup 2010 performance analysis
All the facts and figures from the World Cup 2010 tournament

- ▶ Slovakia performance analysis
- ▶ Paraguay performance analysis
- ▶ New Zealand performance analysis
- ▶ My World Cup - Noel Gallagher
- ▶ Guide to the teams at South Africa 2010

Top 5 World Cup stories

BBC gets 545,000 complaints

Semantic publishing

BBC SPORT WORLD CUP 2010

Latest matches

World Cup 2010: Rooney back in training after knock

Wayne Rooney

Games played: 1

Shots on target | off target: 2 | 2

Goals: 0

Fouls by | on: 0 | 2

Assists: 1

Cards yellow | red: 0 | 0

Tournament totals

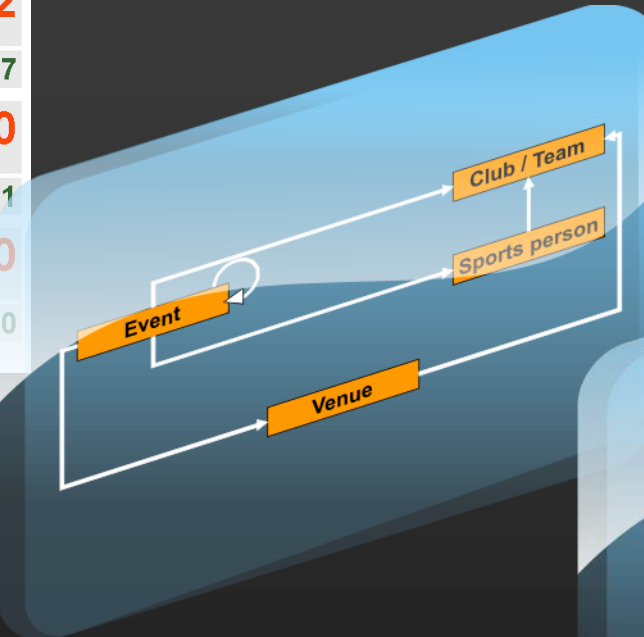
Games played	Shots on target off target
Wayne Rooney: 1	Wayne Rooney: 2 2
Total England: 1	Total England: 9 7

Goals	Assists
Wayne Rooney: 0	Wayne Rooney: 1
Total England: 1	Total England: 1

Fouls by on	Cards yellow red
Wayne Rooney: 0 2	Wayne Rooney: 0 0
Total England: 8 10	Total England: 3 0

Monday 7 June, Tuesday 8, Wednesday 9, Thursday 10, Friday 11, Saturday 12, Sunday 13, Monday 14, Tuesday 15, Wednesday 16, Thursday 17, Friday 18, Saturday 19, Sunday 20, Monday 21, Tuesday 22, Wednesday 23, Thursday 24, Friday 25, Saturday 26, Sunday 27, Monday 28, Tuesday 29, Wednesday 30, Thursday 1 July, Friday 2, Saturday 3, Sunday 4

TRIPLE STORE



ONTOLOGY

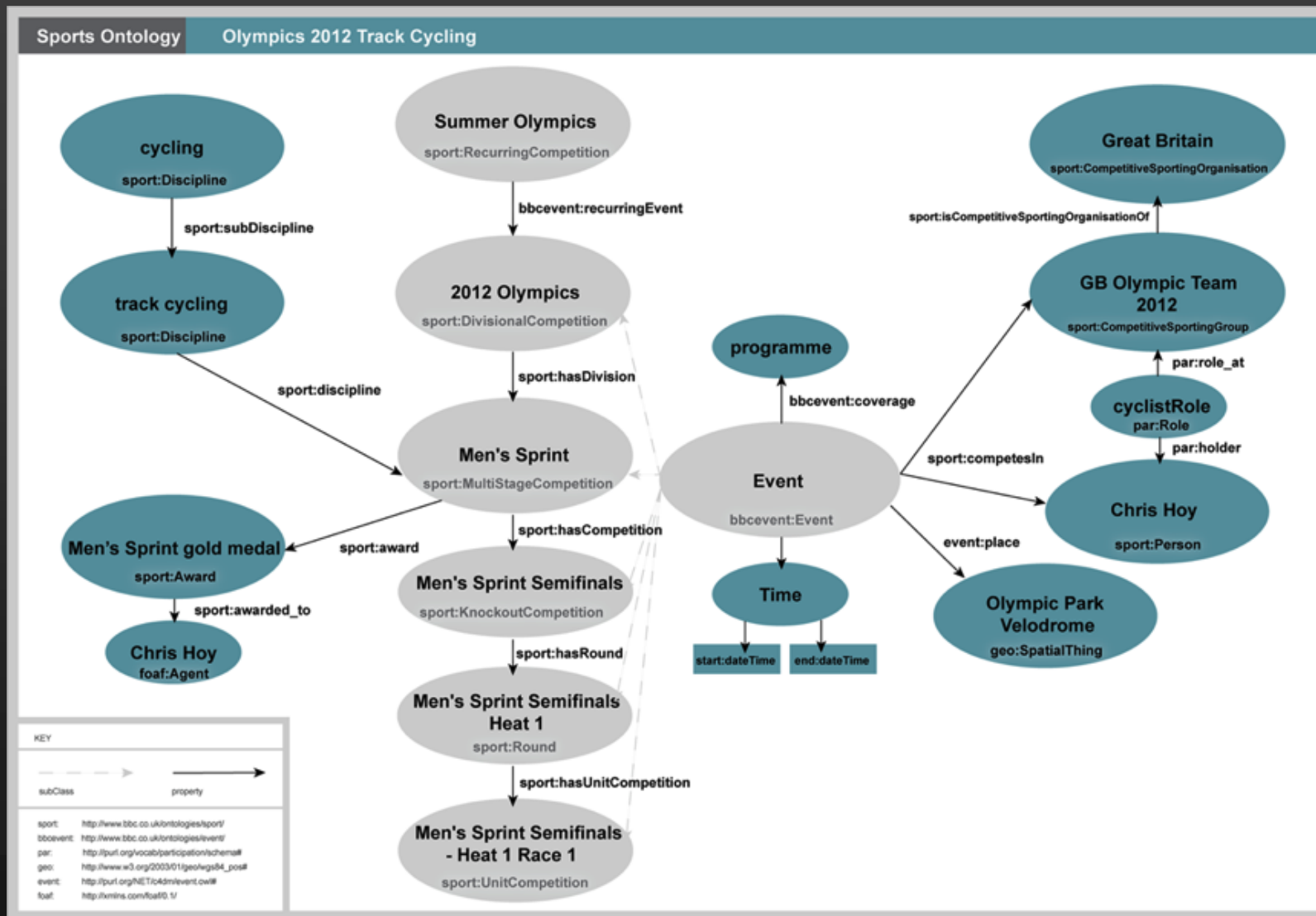
BBC SPORT VANCOUVER 2010

News, photos, and statistics for the Vancouver 2010 Winter Olympics.

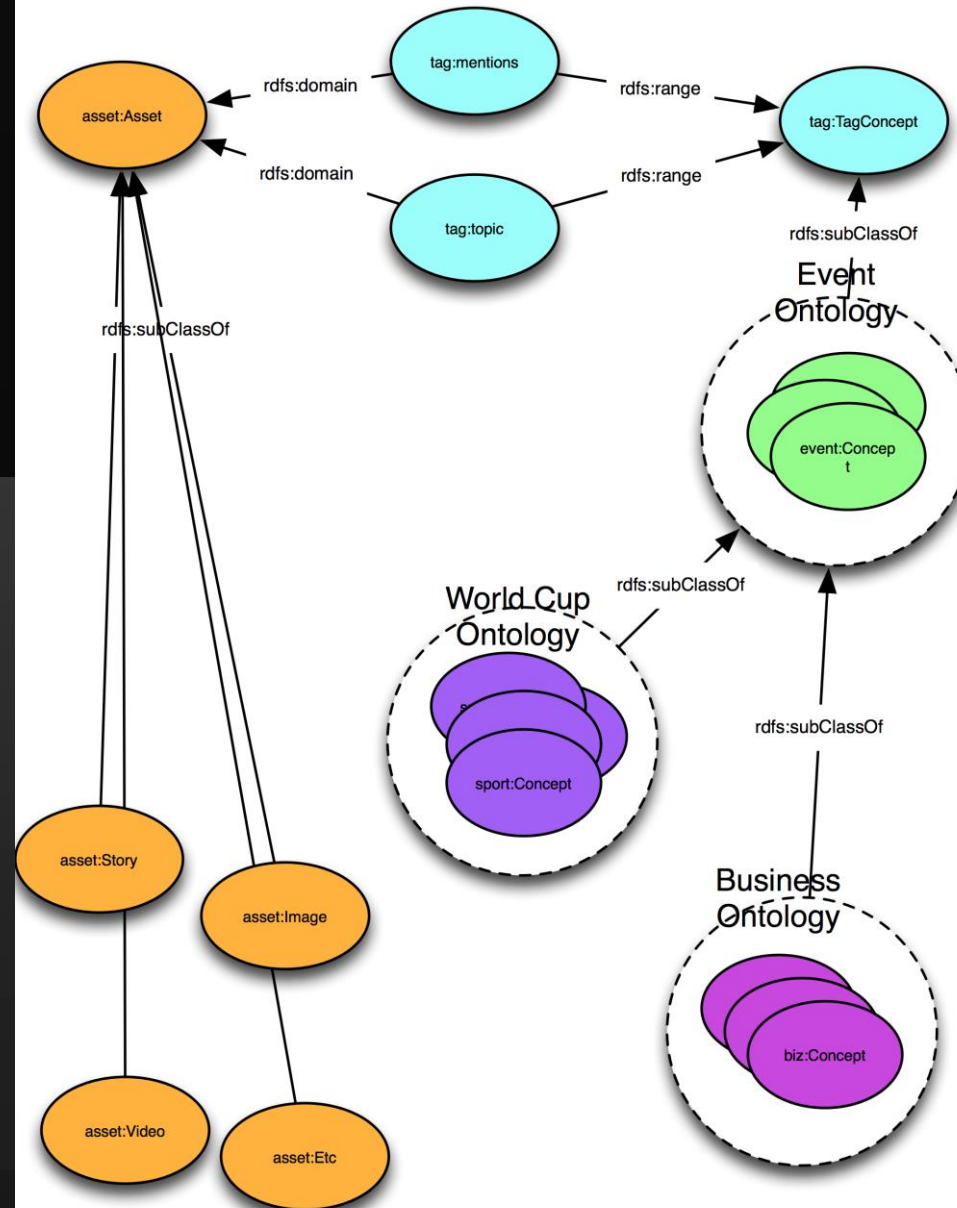
USER EXPERIENCE

Open Sport Ontology

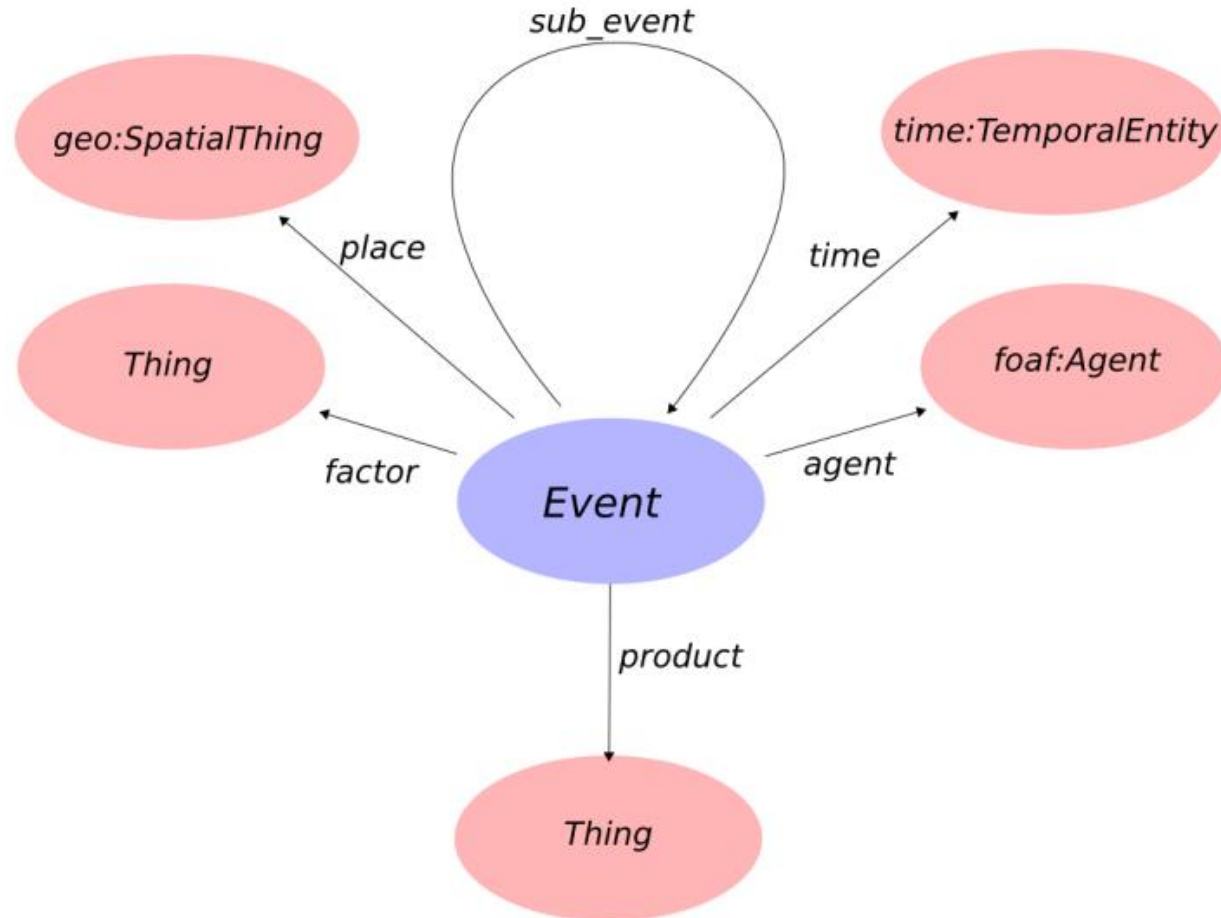
BBC Sport: <http://www.bbc.co.uk/ontologies/sport>



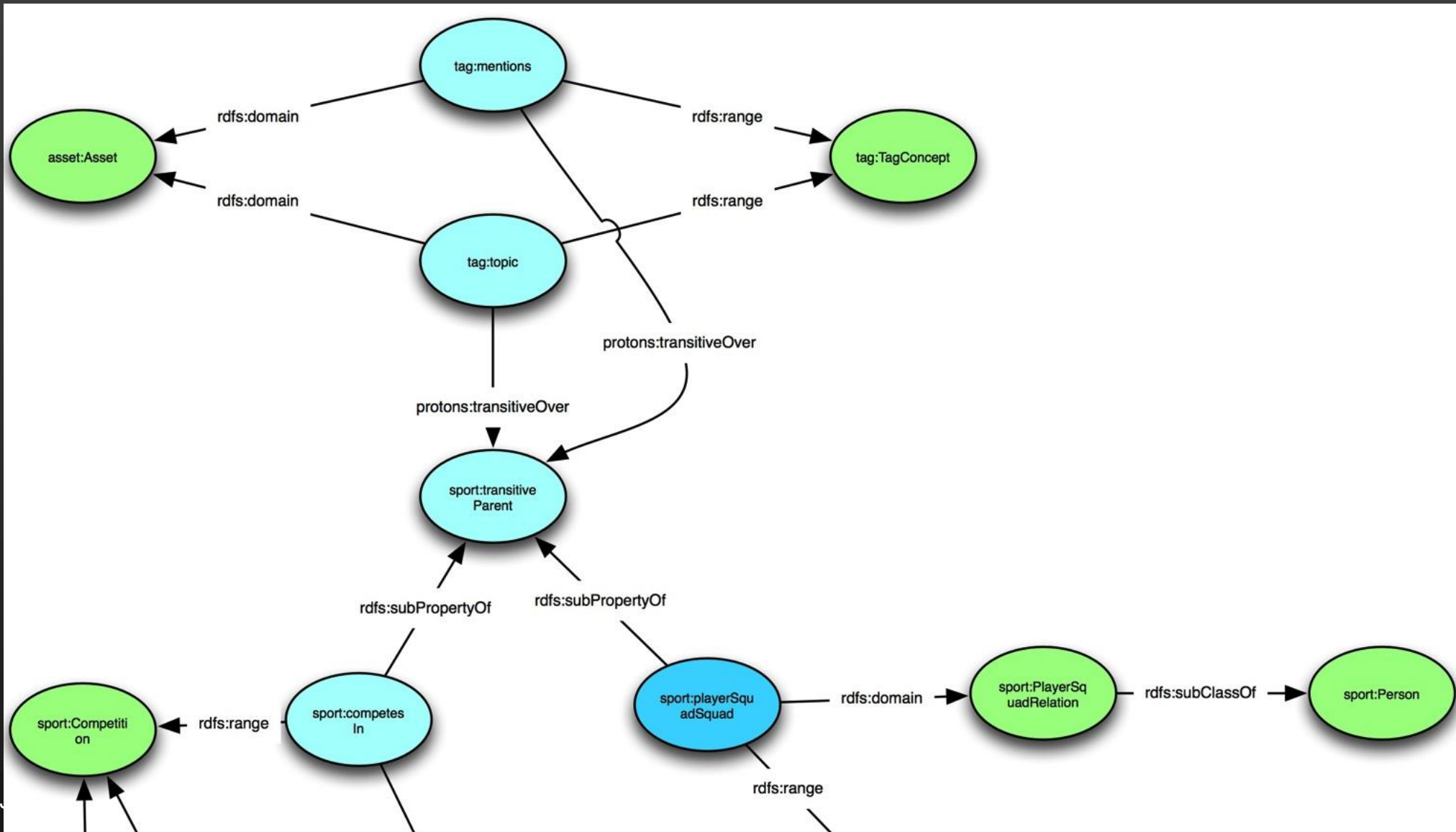
Extendable Domain Driven Asset Tagging



Open Ontology/Dataset reuse Event | Geonames | Foaf | Etc.



Infer... player->team->competition



Graffiti: Suggest -> Tag [Player]

Graffiti Version=1.0.0.0 **CPS** **Blogs** **Admin** **Help** **System status: OK** Logged in as national\isaact01

Currently viewing: Phil McNulty: Green and Barry on road to recovery (<http://www.bbc.co.uk/blogs/philmcnulty/201>)

Green and Barry on road to recovery

Posted **Mon 14 Jun 2010, 1:32 PM** by **Phil McNulty** in **Phil McNulty**

World Cup 2010: Rustenburg Robert Green's work was not being done under the icy gaze of an expectant nation - but he was literally the focus of attention as England got back to World Cup business at their Rustenburg base....

Tag story > Select main topics

Select the topics that this story is primarily focused on. Topics could be anything from a person or organization to a broad subject such as 'women in the workplace'.


Suggested topics

This story is mostly about:

- England
- Robert Green
- Gareth Barry

Tagging progress

Gareth Barry



Personal information

Full name	Gareth Barry
Date of birth	23 February 1981 (age 29)
Place of birth	Hastings , England
Height	1.83 m (6 ft 0 in) [1]
Playing position	Midfielder

Club information

Current club	Manchester City
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Graffiti: Suggest -> Tag [Location] (Geonames)

Graffiti Version=1.0.0.0 **CPS** **Blogs** **Admin** **Help** **System status: OK** Logged in as national\isaact01

Currently viewing:

[Man killed as four lorries crash](#)

Posted **Wed 18 Aug 2010, 11:31 AM** by **unknown author** in **BBC News - England**

A man dies in a crash between four lorries, leading to the closure of the M1 and 12-mile tailbacks.

Tag story > Select locations

Select the locations that appear in this story.

Suggested locations

- Milton Keynes, Borough of Milton Keynes, GB
- Milton Ernest, GB
- Milton Regis, County of Kent, GB
- Milton Damerel, County of Devon, GB
- Milton, County of Oxfordshire, GB
- Milton of Murtle, Aberdeen City, GB

These locations appear in the story:

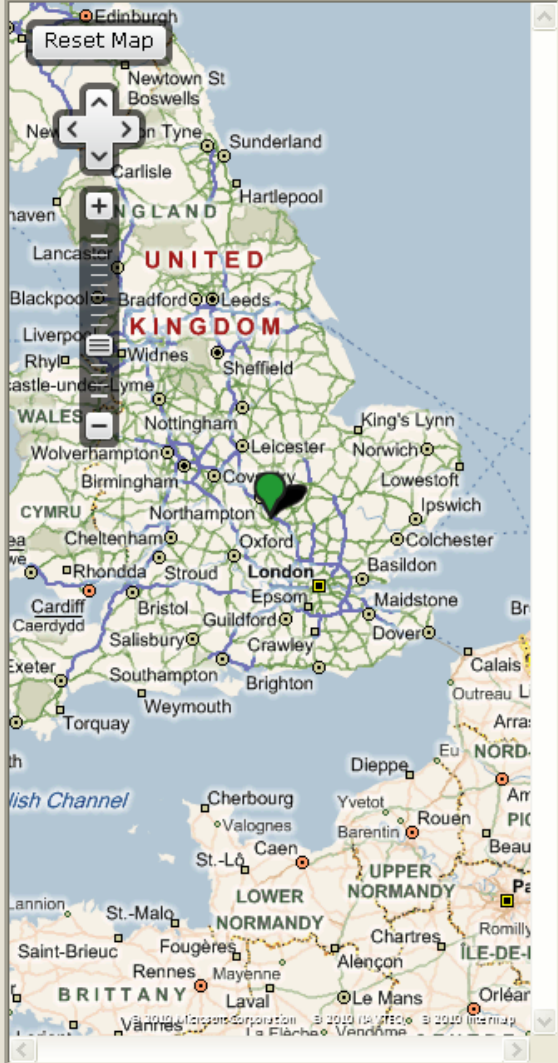
- Milton Keynes, Borough of Milton Keynes, GB

<< Back Next >>

Tagging progress

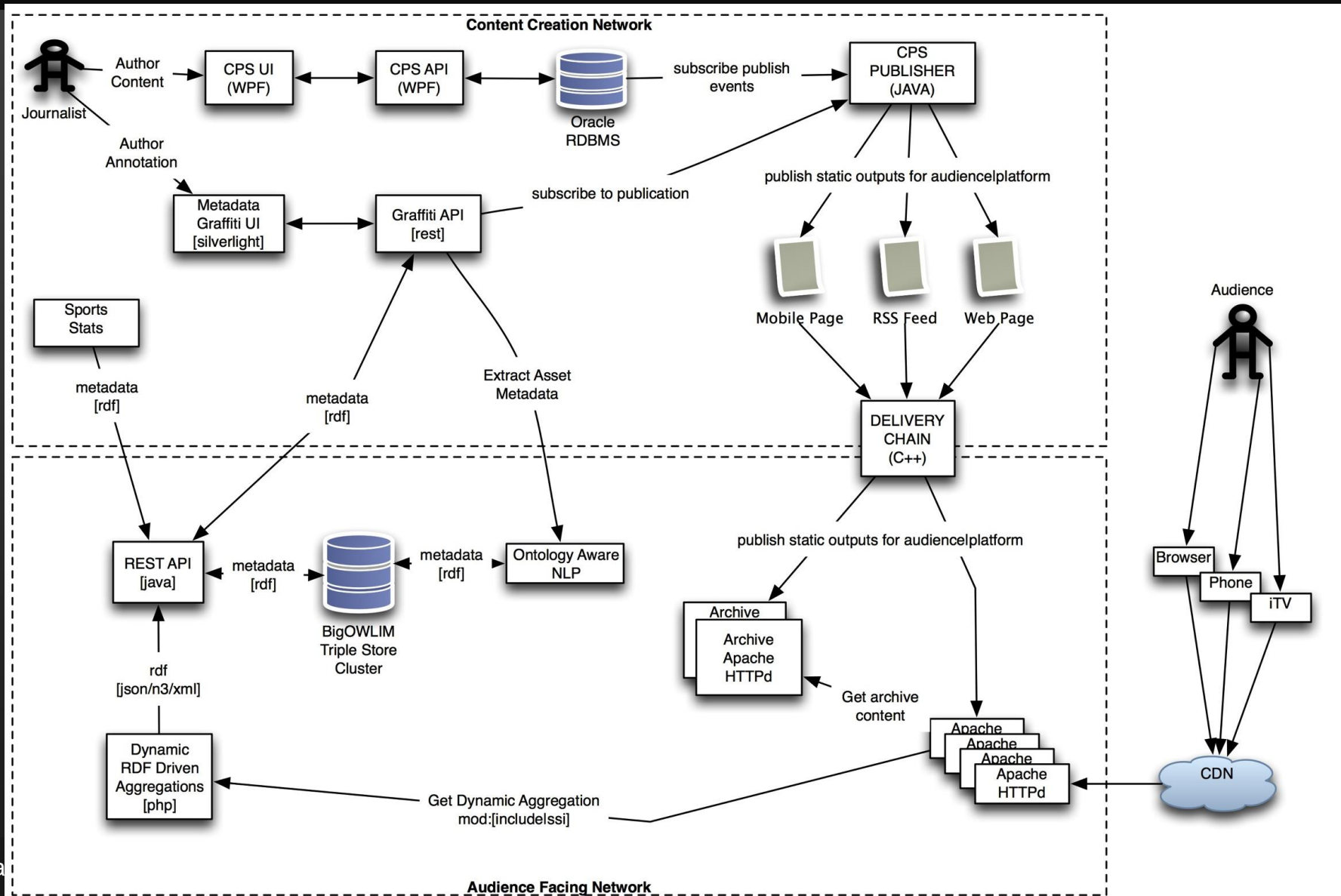
Find a blog entry or add a new blog

View and/or tag the blog entry

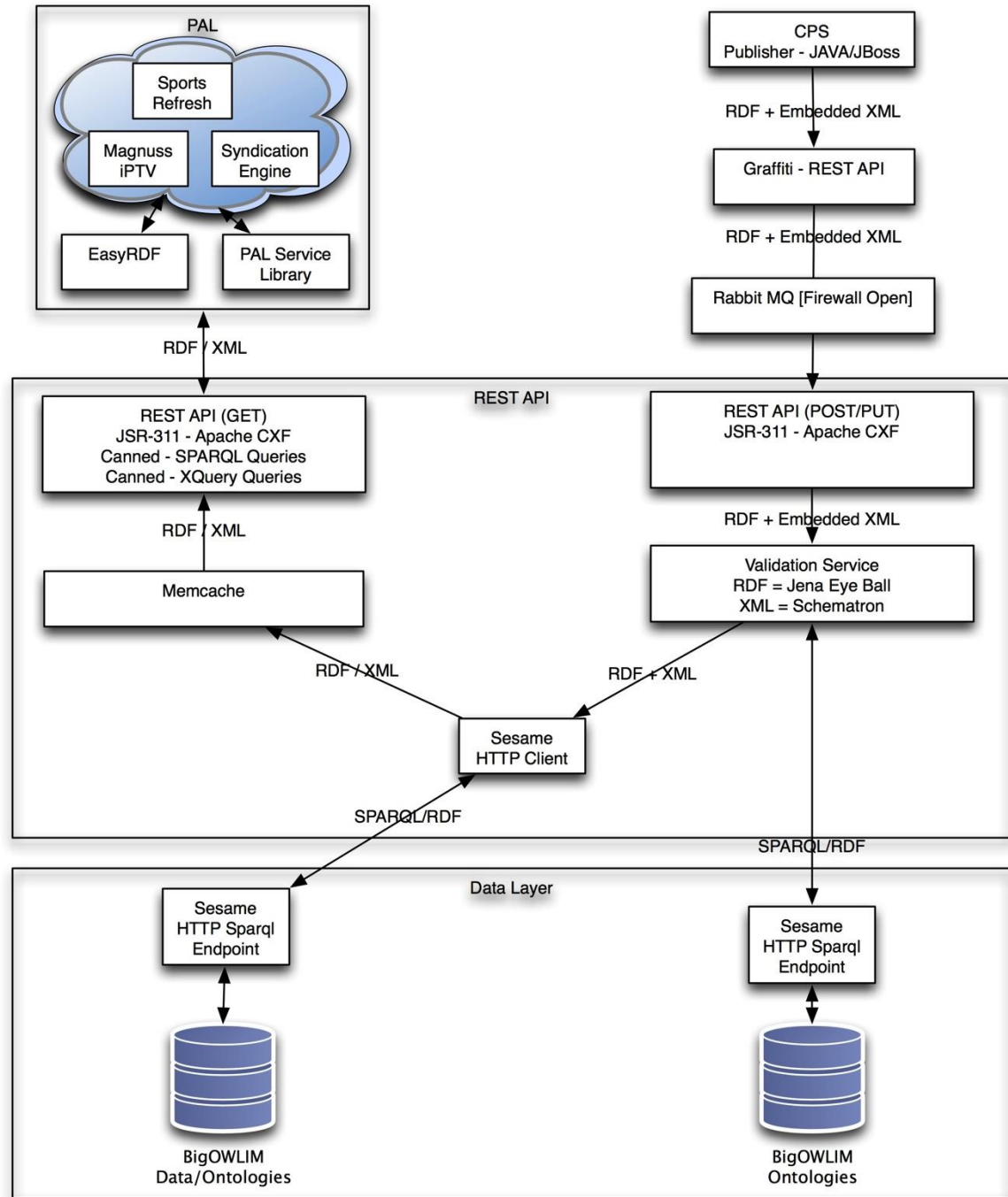


The map shows the United Kingdom and parts of Europe. A green location pin is placed on Milton Keynes in the Midlands region. Major cities like London, Birmingham, and Manchester are visible. The map includes a 'Reset Map' button and navigation controls.

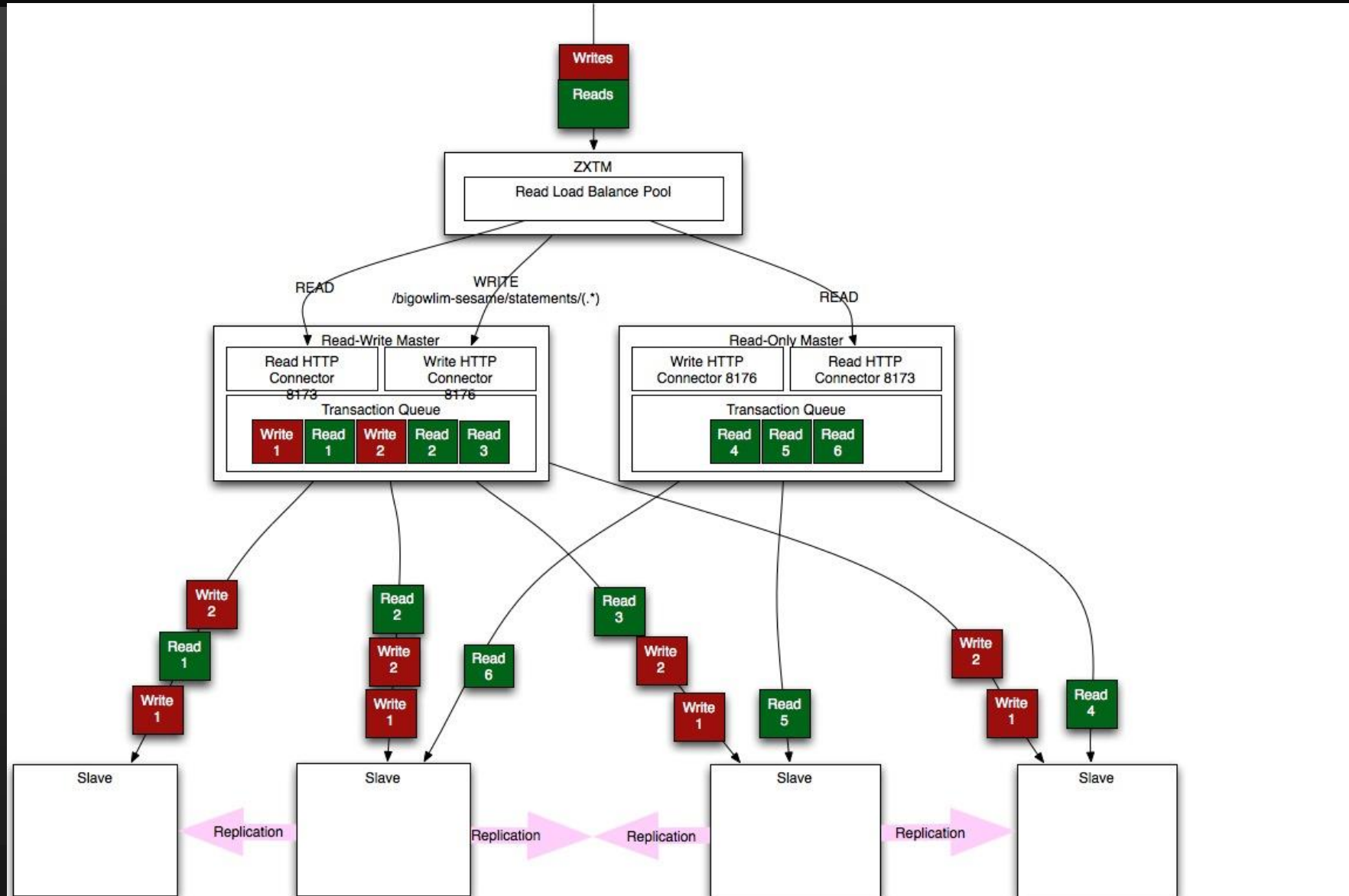
World Cup DSP Architecture



API Stack



Highly Scalable Clustered BigOWLIM



GET Accept text/rdf+n3

https://api.live.bbc.co.uk/dsp/sport/football/teams/chelsea

```
<http://www.chelseafc.com/>
  domain:documentType <http://www.bbc.co.uk/things/document-types/homepage> , <http://www.bbc.co.uk/things/document-types/external> .

<http://www.bbc.co.uk/sport/football/teams/chelsea>
  domain:documentType <http://www.bbc.co.uk/things/document-types/bbc-document> , <http://www.bbc.co.uk/things/document-types/homepage> .

<http://www.bbc.co.uk/things/2acacd19-6609-1840-9c2b-b0820c50d281#id>
  a sport:CompetitiveSportingOrganisation ;
  domain:canonicalName
    "Chelsea"^^<xsd:string> ;
  domain:document <http://www.chelseafc.com/> , <http://www.bbc.co.uk/sport/football/teams/chelsea> ;
  domain:externalId <http://dbpedia.org/resource/Chelsea_F.C.> , <urn:sports-stats:137316635> ;
  domain:name "Chelsea" ;
  domain:shortName "Chelsea"^^<xsd:string> ;
  sport:competesIn <http://www.bbc.co.uk/things/5cd4682a-7643-f445-8b1f-bcbaf450bc89#id> .

<http://dbpedia.org/resource/Chelsea_F.C.>
  domain:externalIdType
    <http://www.bbc.co.uk/things/external-id-types/dbpedia> .

<urn:sports-stats:137316635>
  domain:externalIdType
    <http://www.bbc.co.uk/things/external-id-types/bbc-sport-stats> .

<http://www.bbc.co.uk/things/5cd4682a-7643-f445-8b1f-bcbaf450bc89#id>
  domain:canonicalName
    "Premier League"^^<xsd:string> ;
  domain:externalId <urn:sports-stats:118996114> ;
  sport:competitionType
    <http://www.bbc.co.uk/things/competition-types/domestic-league> .
```

Rationale

- Automated content publishing
- Huge increase in content breadth (number of manageable pages)
- Content re-use and re-purposing, increasing reach
- Simplified content management
- Journalist headcount reduction
- Multi-dimensional entry points and semantic navigation
- Improved user experience with high levels of user engagement
- Dynamic, state (time|event) and semantic driven page layout
- Personalized content aggregations
- Open data and API's

World Cup statistics the GOOD

The background of the slide is a photograph of a soccer goal. A goalkeeper in a purple uniform is diving on the grass in front of the goal. The goal net is visible, and the scene is set on a green soccer field.

- 750+ Dynamic aggregations/pages (Player, Squad, Group, etc..)
- Average unique page requests a day : 2 million +
- Average OWLIM SPARQL queries a day : 1 million
- 100s RDF statement updates/inserts per minute with full OWL reasoning and associated inference.
- Multi data center fully resilient, clustered 6 node triple store
- RDF graph model ideally suited to model domain representations such as sport

World Cup statistics the BAD

The background of the slide is a photograph of a soccer goal. A goalkeeper in a purple uniform is diving on the grass in front of the goal. The goal net is white and the goalposts are white. The scene is set on a green soccer field.

- Sports stories and indices static
- Sport content not responsive or personalized
- RDF Store unable to handle thousands of statistic updates a second
- RDF Store forward-chained closures expensive increase write latency
- RDF graph model and SPARQL not ideally suited to the BBC's News and Sport document publication model

BBC Sport 2012; Online Refresh



<http://bbc.co.uk/sport>

Sport Refresh 2012

- Page per Athlete [10,000+], Page per country [200+], Page per Discipline [400-500], Page per venue, Page per team
→ A lot of output...
- Almost real time statistics and live event pages
- Time coded, metadata annotated, on demand video, 58,000 hours of content
- Far too many web pages for far too few journalists
- DSP annotation architecture to automate content aggregation

10000+ Dynamic Aggregations


BBC News Sport Weather iPlayer TV Radio More - London 2012 Search

SPORT FOOTBALL

Home | Football | Formula 1 | Cricket | Rugby U | Rugby L | Tennis | Golf | Olympics

All Teams | Chelsea | Results | Fixtures | Live Scores | All Teams | L

Chelsea



Suspended Terry can lift trophy

Chelsea captain John Terry can lift the Champions League trophy if they win the final against Bayern Munich.

Last Match
Tue 24 April 2012
CHAMPIONS LEAGUE
vs Barcelona (Away)
Drawn 2 - 2 (Agg 2 - 3)

Next Match
Sun 29 April 2012
PREMIER LEAGUE
vs Queens Park Rangers (Home)
13:30

Latest Video & Audio

- Chelsea will not beat Bayern - Savage
- The story of Chelsea's triumph
- Chelsea win horrible to watch - Cahill

Comment & Analysis [Show all blogs](#)

Chelsea rediscover resolve to reach Champions League final

Pat Nevin and Danny Mills on how Chelsea managed to overcome Barcelona to reach...

Football Tactics
ALISTAIR MAGOWAN - BBC SPORT
Chelsea can prey on Barcelona's weaknesses
Chelsea midfielder Ramires was rightly lauded for his display in the first leg...

BBC SPORT BLOG EDITOR
Ranieri relishes return to England

Around the web
Anton Ferdinand advised to snub Terry hand
ESPN Soccernet


BBC News Sport Weather iPlayer TV Radio More - London 2012 Search

SPORT OLYMPICS

Home | Football | Formula 1 | Cricket | Rugby U | Rugby L | Tennis | Golf | Olympics

Countries | Team GB | Athletes

Team GB



Olympic Stadium test event in May

A test event at the Olympic Stadium is scheduled for early May, allowing athletes an opportunity to compete inside the arena.

Latest Football

PREVIOUS RESULT
SUN 29 APR 2012 - PRE
Chelsea v

UPCOMING FIXTURE
WED 2 MAY 2012 - PRE
Chelsea v

SAT 5 MAY 2012 - FA C
Chelsea v

TUE 8 MAY 2012 - PRE
Liverpool v

All times UK

League Table

Show me: Premier League

Pos	Team
1	Man Utd
2	Man City
3	Arsenal
4	Newcastle
5	Tottenham
6	Chelsea
7	Everton
8	Liverpool
9	Fulham
10	West Brom
11	Sunderland
12	Swansea
13	Norwich
14	Stoke
15	Aston Villa
16	QPR
17	Wigan
18	Bolton
19	Blackburn
20	Wolves

Latest Video & Audio

- A necessary sacrifice - Dempsey
- Archers do battle for Olympic places
- GB impress at synchro test event

Wiggins retains lead in Romandie

Medals demand sacrifice - Dempsey

3 hours ago

Athletes from Team GB

Show me: All sports

BBC News Sport Weather iPlayer TV Radio More - London 2012 Search

SPORT OLYMPICS

Home | Football | Formula 1 | Cricket | Rugby U | Rugby L | Tennis | Golf | Olympics

Countries | Team GB | Sir Chris Hoy

Sir Chris Hoy



Biography

Competes in: CYCLING - TRACK
Chris Hoy was knighted after becoming the first Briton for a century to win three gold medals at one Olympics
[View Sir Chris Hoy's profile](#)

Key Facts

- Country: Great Britain & N. Ireland
- Competes in: CYCLING - TRACK
- Men's Sprint
- Men's Keirin
- Men's Team Sprint
- Date of birth: 23 Mar 1976
- Height: 1.85m
- Weight: 92.0kg

Medals
Beijing 2008
3 0 0

Brailsford ponders sprint options

British Cycling performance director Dave Brailsford refuses to reveal his sprint selection strategy for Sir Chris Hoy and Jason Kenny.
9 Apr 12

Hoy's mum can't watch kieran win
MEN'S KEIRIN
8 Apr 12

Year ban hurt me - champion Bauge
MEN'S SPRINT
8 Apr 12

Olympics Countdown

92 days to go
Olympics starts: Friday, July 27
[View full Olympics schedule](#)

More Athletes in Cycling - Track

- Bradley Wiggins
Cycling - Track
- Ed Clancy
Cycling - Track
- Geraint Thomas
Cycling - Track

All Athletes from Team GB

Team GB

OUR GREATEST TEAM
500 ATHLETES
40 MILLION ENDORSING
TEAM GB

Learn more about the athletes representing Great Britain and Northern Ireland in the 2012 Olympic Games, and catch up on the latest news and gossip surrounding Team GB
[Meet Team GB](#)

Lots of Dynamic (Live) sports stats

As It Stands Table

Show me:

Pos	Team	P	GD	Pts
1	Man Utd	35	54	83
2	Man City	35	60	80
3	Arsenal	35	24	65
4	Newcastle	34	11	62
5	Tottenham	34	18	59
6	Chelsea	34	18	58
7	Everton	34	4	48
8	Liverpool	34	3	46
9	Fulham	34	1	46
10	West Brom	35	-6	45
11	Sunderland	35	1	44
12	Swansea	35	-6	43
13	Norwich	35	-13	43
14	Stoke	34	-16	42
15	Aston Villa	35	-14	36
16	QPR	35	-18	34
17	Wigan	35	-26	34
18	Bolton	34	-28	33
19	Blackburn	35	-26	31
20	Wolves	35	-41	23

[View full table](#)

Europa League Results

Thursday 26th April 2012

UEFA EUROPA LEAGUE

>	Athletic Bilbao	0-0	Sporting	Thu 26 Apr	5'	<input type="button" value="LIVE"/>
		(agg 1 - 2)				
>	Valencia	0-0	Atl Madrid	Thu 26 Apr	6'	<input type="button" value="LIVE"/>
		(agg 2 - 4)				

Last updated 5 minutes ago

MATCH STATS

Possession



Shots



Corners



Fouls



2012

4-2	Valencia	Thu 19 Apr	Full time
2-1	Athletic Bilbao	Thu 19 Apr	Full time

Last updated 7 days ago

012

2-2	Schalke 04	Thu 5 Apr	Full time
agg 6 - 4)			
1-1	Sporting	Thu 5 Apr	Full time
agg 2 - 3)			
1-2	Atl Madrid	Thu 5 Apr	Full time
agg 2 - 4)			
4-0	AZ Alkmaar	Thu 5 Apr	Full time
agg 5 - 2)			

Last updated 21 days ago

Latest Football

TODAY (2)

Athletic Bilbao	0 - 0	Sporting	<input type="button" value="L"/>
	(agg 1 - 2)		
Valencia	0 - 0	Atl Madrid	<input type="button" value="L"/>
	(agg 2 - 4)		

All times UK

[View Live Scores](#)

Europa League

Show me:

Group A

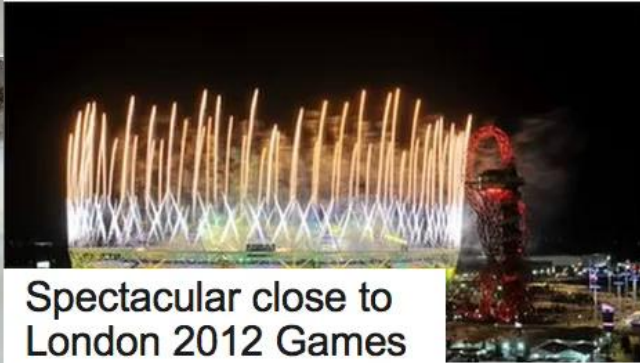
Pos	Team	P	GD	Pts
1	PAOK Salonika	6	4	12
2	Rubin Kazan	6	6	11
3	Tottenham	6	5	10
4	Shamrock	6	-15	0

[View full table](#)

More from Europa League

24 August 2012 Last updated at 10:37

London 2012



Spectacular close to London 2012 Games

The curtain closes on the London Olympics with a spectacular musical ceremony and the official handover to Rio de Janeiro.

Headlines

'Greatest ever' GB finish third

Broadcasting revolution of the digital Olympics

TECHNOLOGY

Record visits to BBC Sport online

MODERN PENTATHLON

Murray wins Britain's 65th & final medal

AFRICA

The effect of Mo Farah's success

Who will be in Britain's class of 2016?

How can Rio follow London?

SAILING

Ainslie wants fifth Olympic gold medal

ATHLETICS

Holmes wants female recognition

School-clubs link 'key to legacy'

UK

Home towns welcome GB heroes home

Cuts expected to some GB sports

Lighthouse named after

Medal Table

Show me: Countries

Rank	Country				Total
1	United States	46	29	29	104
2	China	38	27	23	88
3	Great Britain & N. Ireland	29	17	19	65

[View full Team GB table](#)

Relive every Olympics moment



Catch up on every session of every event from the London 2012 Olympics in our video player

Olympics: Key info

[London 2012 Results](#)

[Full medal table](#)

[Team GB medals roll of honour](#)

[In numbers: the 2012 Games](#)



Best moments of the Olympic Games

BBC Sport's pundits and commentators talk about their highlights of the London 2012 Olympic Games.



20 memories of the London 2012 Olympics

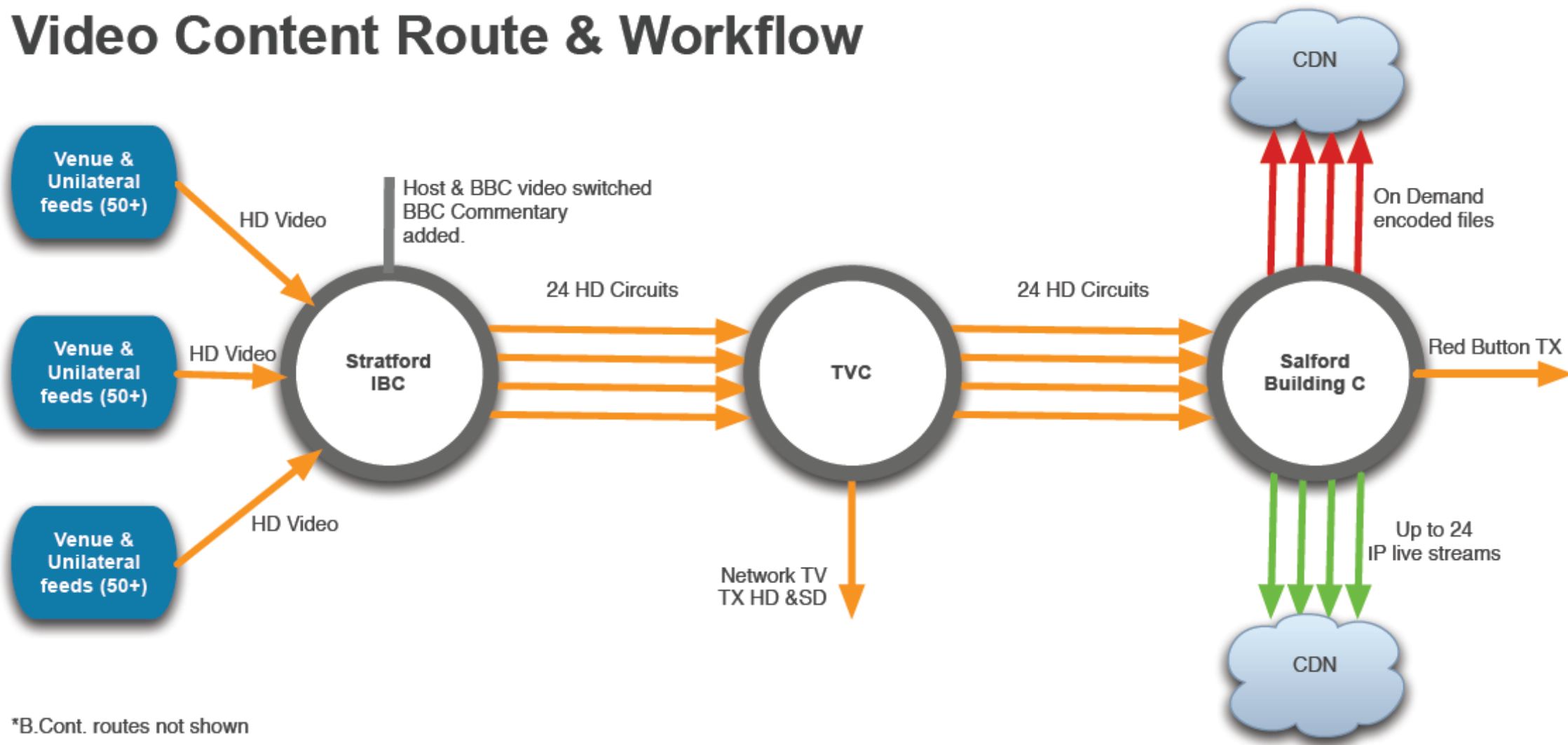
BBC Sport looks back at 20 of the most memorable moments of London 2012 - including Bolt, Ennis & Farah.

Great Britain Golds in Video



Video delivery

Video Content Route & Workflow



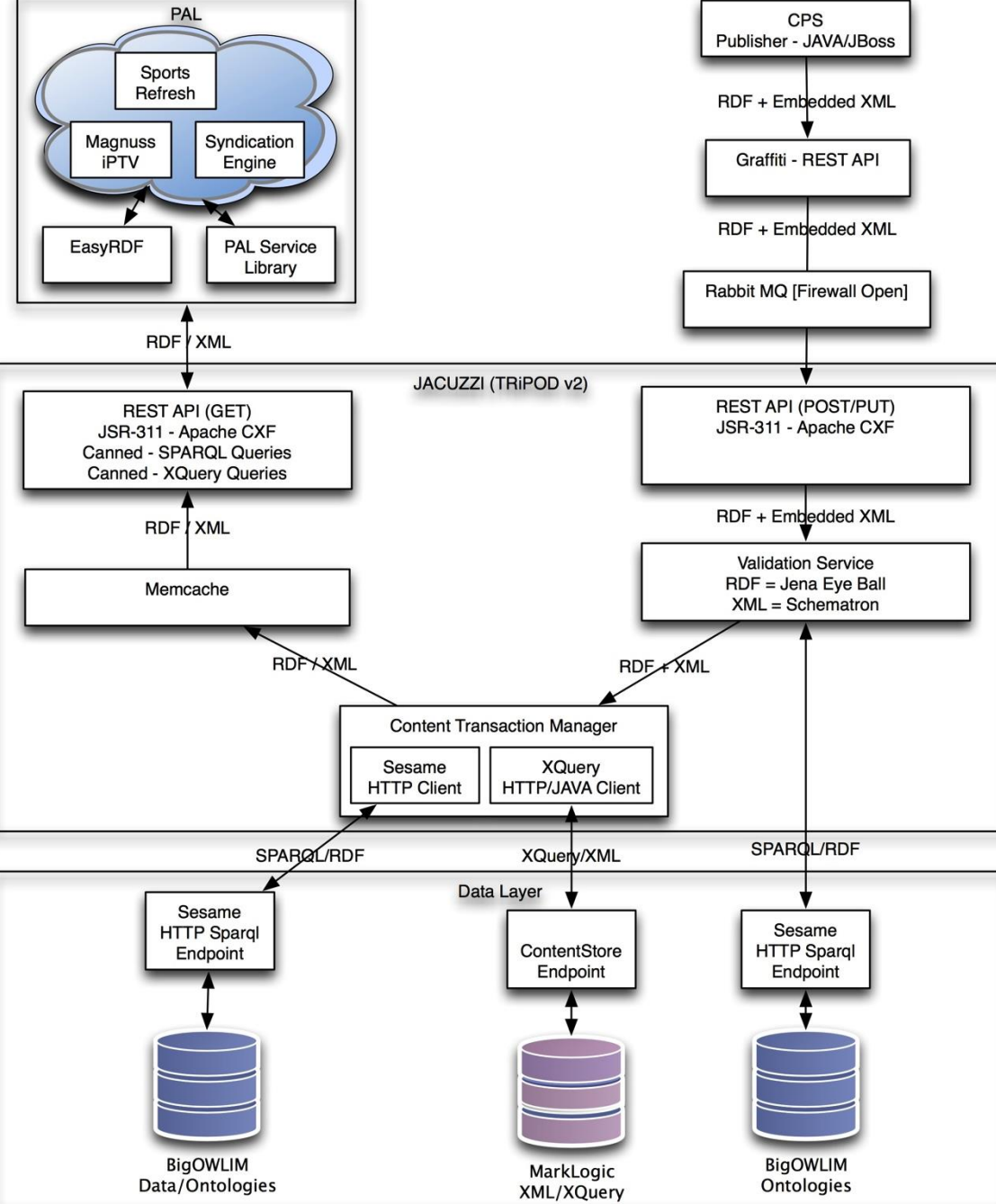
Augment architecture with a Content Store

1. Atomic content assets stored in MarkLogic XML store
2. XML content queryable via Xquery
3. Content Assets searchable
4. Sports statistics searchable/queryable via XQuery
5. Ontological SPARQL via BigOWLIM, assets Xquery via MarkLogic

API Stack

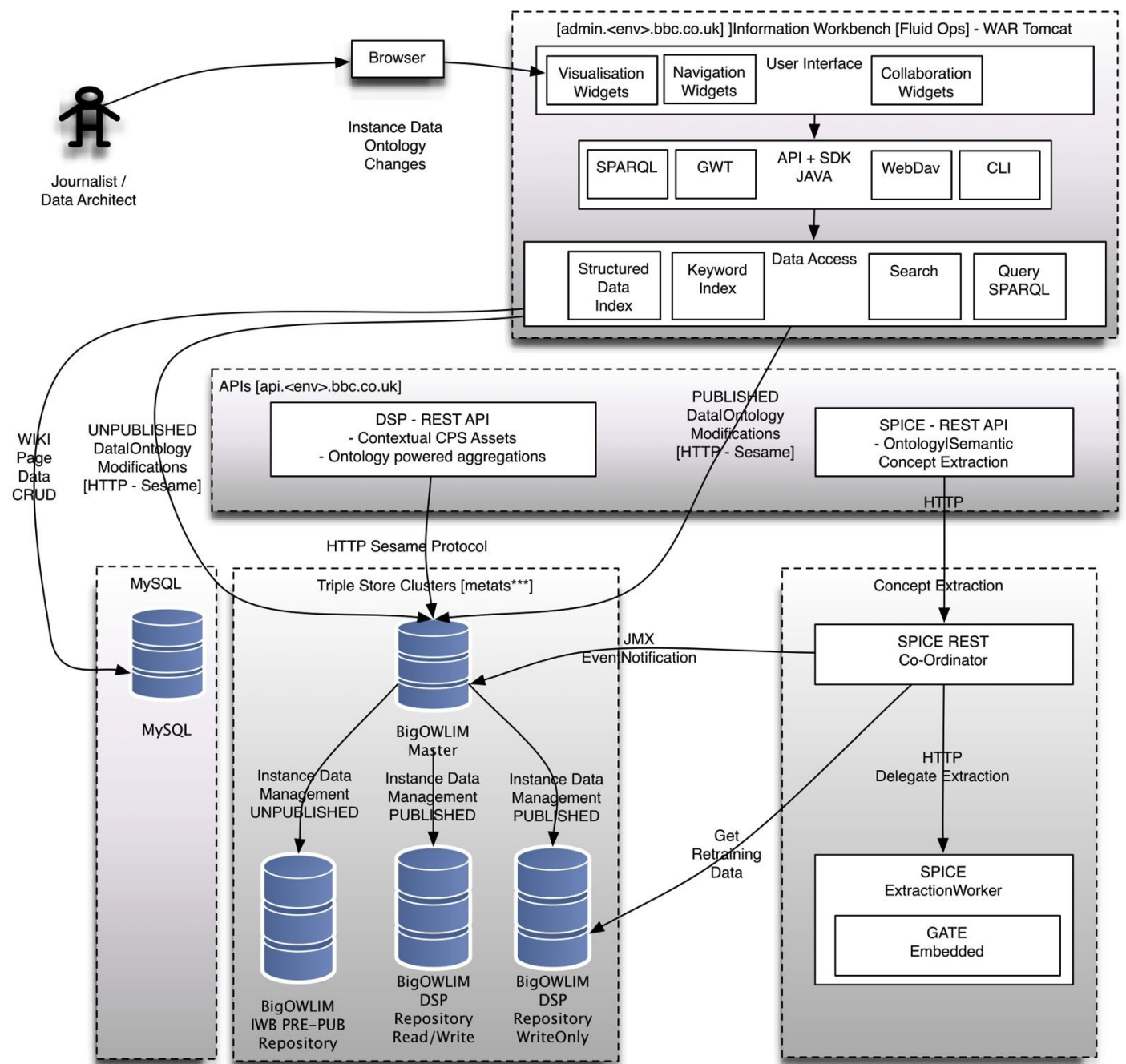
MarkLogic

OWLIM Enterprise

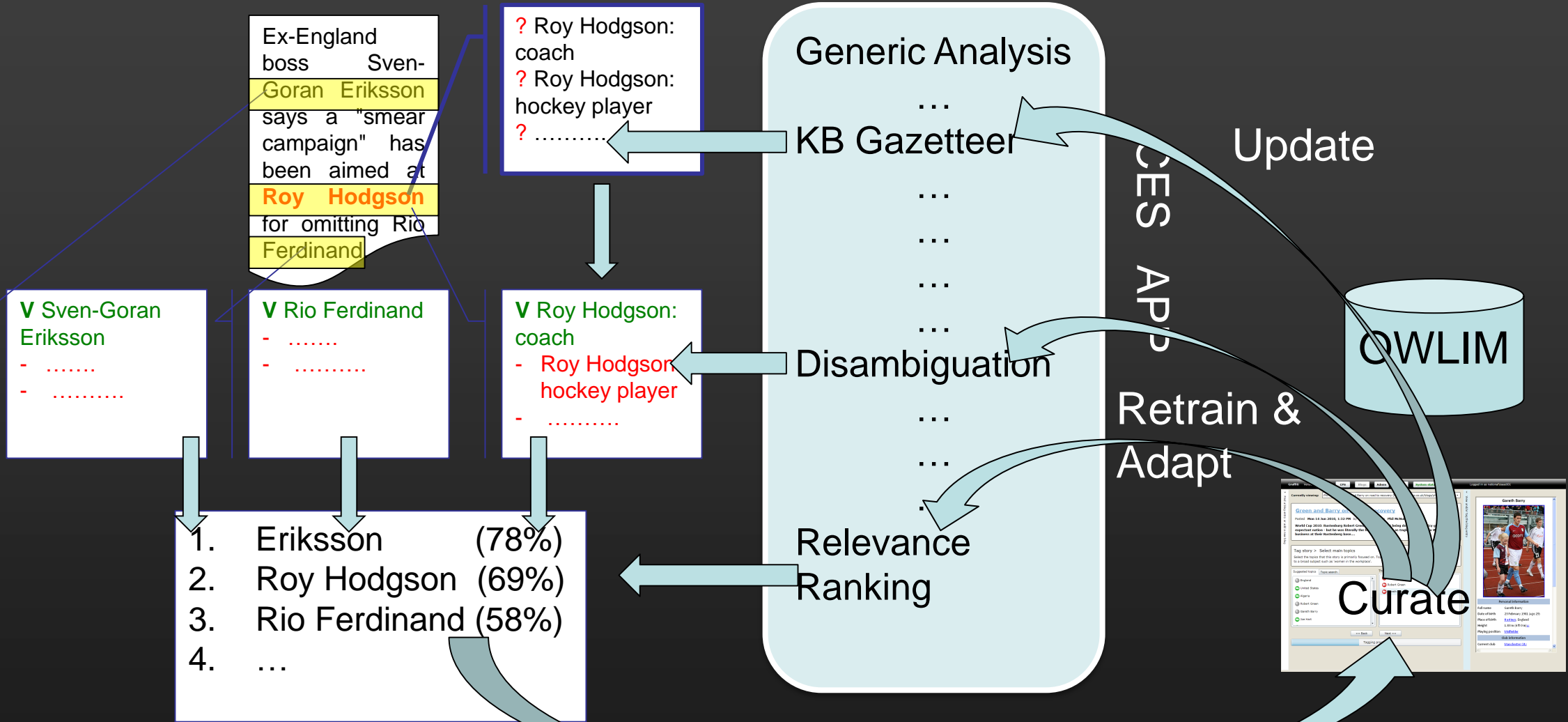


Ontology Aware NLP

- Information Workbench
- OWLIM
- (Spice) GATE+Ontotext



Ontology Aware NLP and Semantic Disambiguation



Entity Relevance: Objective

- Rank entities by their relatedness to the article
- Accuracy 75%
- We consider various frequencies of entity mentions in the article and in the entire set of articles
- Positions in the article fields or in the first paragraphs of the body boost the relevance

Confidence and Relevance

The relevance of an entity in arbitrary document may depend on:

Text context and the vicinity of an entity/concept within the text.
(Confidence)

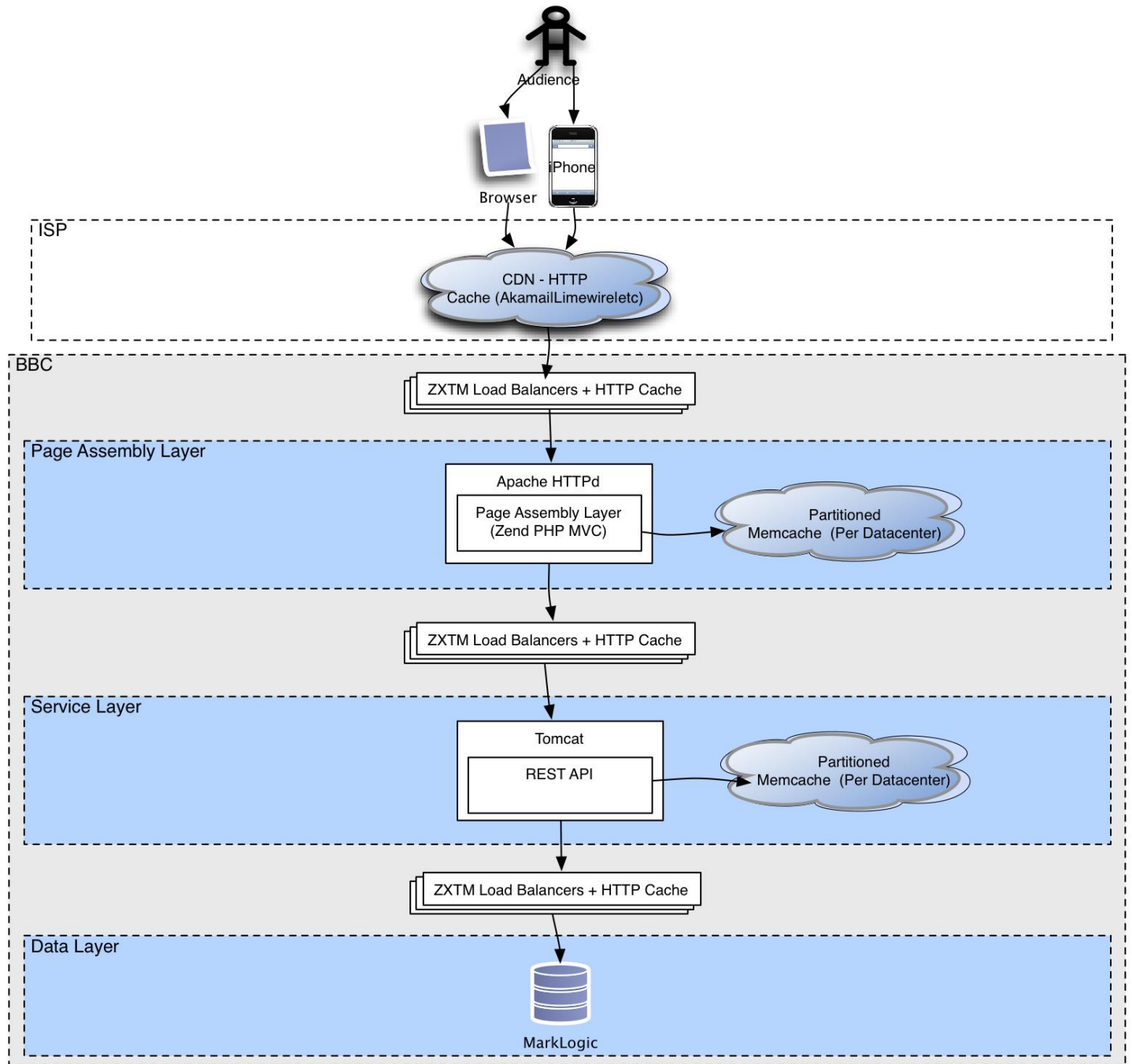
Ontological graph context and the vicinity of an entity/concept within the graphs knowledge model

The frequencies of entities in the corpus and document. (Relevance)

Disambiguation of Locations

- **Geospatial distance** - a feature of OWLIM (geosparql)
- **Super region** – GeoNames hierarchy and containment relations, e.g. parentFeature
- **RDF Rank** – Similar to Page Rank but RDF links
- **Human approval score** (on the basis of curated documents)

Plenty of Caching



Sport Stats REST API

REST Endpoint for all Sports Stats on BBC

- [/football/teamstats/team/{team}](#)
 - [/clubstats](#)
- [/football/table](#)
 - [/ais/competition/{comp}](#)
 - [/competition/{comp}](#)
 - [/positions/competition/{comp}/team/{team}](#)
 - [/snapshot/competition/{comp}](#)
 - [/structure/{structureid}/group/{groupid}](#)
- [/football/matches](#)
 - [/structure/{structureid}/group/{groupid}](#)
- [/football/match](#)
 - [/{matchid}](#)
- [/football/recentresults](#)
 - [/match/{matchid}](#)
- [/football/videprinter](#)
- [/football/config](#)
 - [/competition/structure/{structureid}](#)
 - [/competition/structure/{structureid}/groups](#)
 - [/competition/{competitionid}/structure/{structureid}/groups](#)
- [/football/stats](#)
 - [/competition/{comp}](#)
 - [/competition/{comp}/team/{team}](#)
- [/cricket/scorecard](#)
 - [/{matchid}](#)
- [/cricket/matches](#)
- [/cricket/table](#)
 - [/competition/{comp}](#)
 - [/positions/competition/{comp}/team/{team}](#)
- [/cricket/stats](#)

Olympics API (RDF)

@prefix oly: <http://www.bbc.co.uk/ontologies/2012olympics/> .

@prefix par: <http://purl.org/vocab/participation/schema#> .

@prefix dc: <http://purl.org/dc/elements/1.1/> .

```
<http://www.bbc.co.uk/things/82f5db84-0591-49ee-b6f4-a1d26e9381fb#id> a sport:Person ;
    rdfs:label "Usain Bolt"^^xsd:string , "Bolt Usain-athletics-jam-1986-08-21"^^xsd:string ;
    foaf:name "Usain Bolt"^^xsd:string , "Bolt Usain-athletics-jam-1986-08-21"^^xsd:string ;
    domain:canonicalName "Bolt Usain-athletics-jam-1986-08-21"^^xsd:string ;
    foaf:givenName "Usain"^^xsd:string ;
    foaf:familyName "Bolt"^^xsd:string ;
    domain:name "Usain Bolt"^^xsd:string ;
    oly:dateOfBirth "1986-08-21"^^xsd:date ;
    oly:gender "M"^^xsd:string ;
    oly:height "195.0"^^xsd:float ;
    oly:weight "94.0"^^xsd:float ;
    oly:worldOlympicDream "true"^^xsd:boolean ;
    sport:discipline <http://www.bbc.co.uk/things/b3a086df-ab42-2b44-be8b-76b600bfcfce#id> ;
    sport:competesIn <http://www.bbc.co.uk/things/1b499a08-4f02-4196-aa6c-c43ea353138b#id> .
```

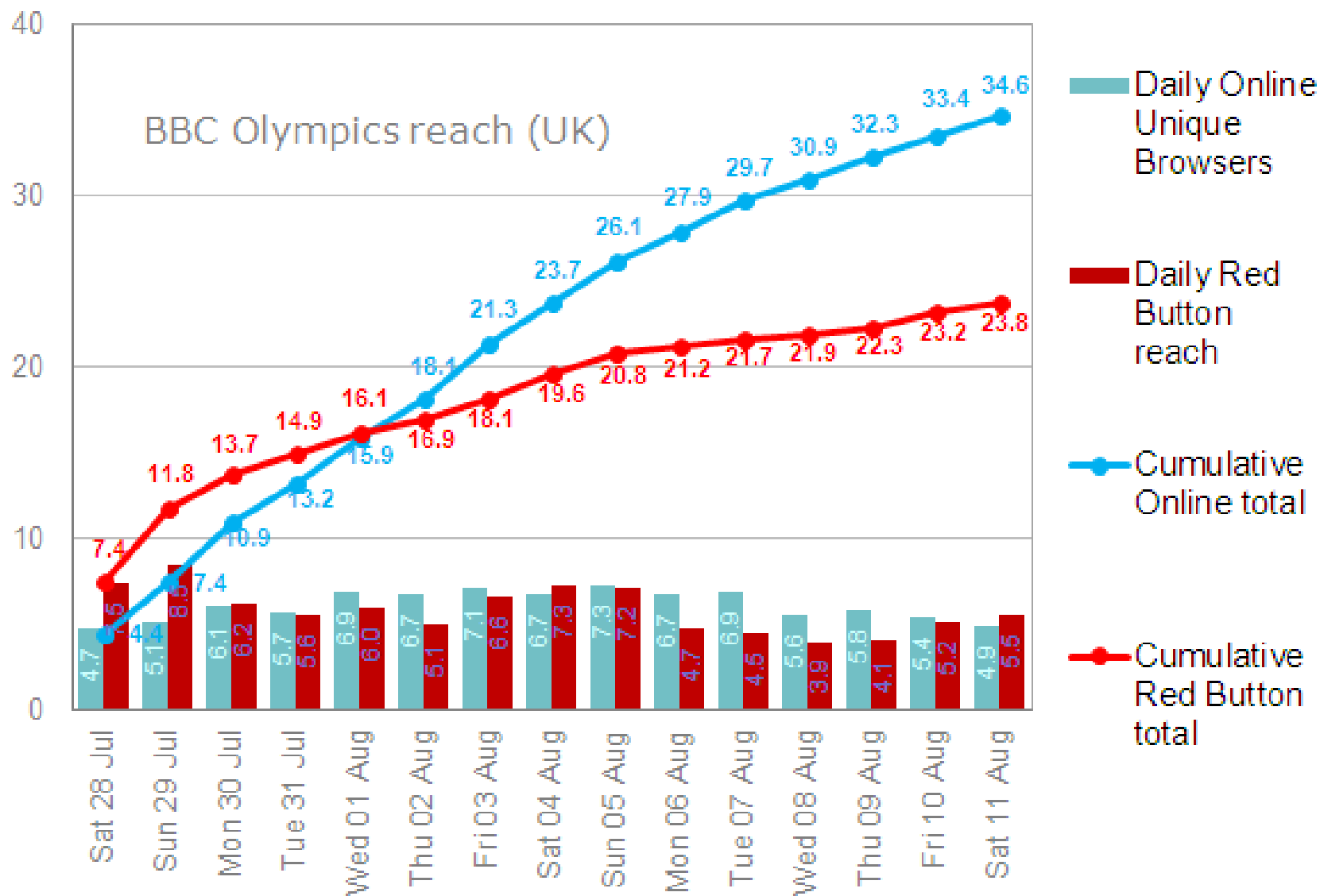
```
<http://www.bbc.co.uk/things/b3a086df-ab42-2b44-be8b-76b600bfcfce#id> a sport:SportsDiscipline ;
    domain:name "Athletics"^^xsd:string ;
    domain:document <http://www.bbc.co.uk/sport/olympics/2012/sports/athletics> .
```

```
<http://www.bbc.co.uk/things/1b499a08-4f02-4196-aa6c-c43ea353138b#id> a sport:MedalCompetition ;
    domain:name "Men's 100m"^^xsd:string ;
    domain:shortName "Men's 100m"^^xsd:string ;
    domain:document <http://www.bbc.co.uk/sport/olympics/2012/sports/athletics/events/mens-100m> ;
    oly:measurementType <http://www.bbc.co.uk/things/measurement-types/time> ;
    domain:externalId <urn:ioc2012:ATM001000> .
```

Olympic numbers

Unique Browser Requests per day Peaked at just over 8 million UK and 11 million Globally.

Cumulative Unique browsers online total 34.6 million

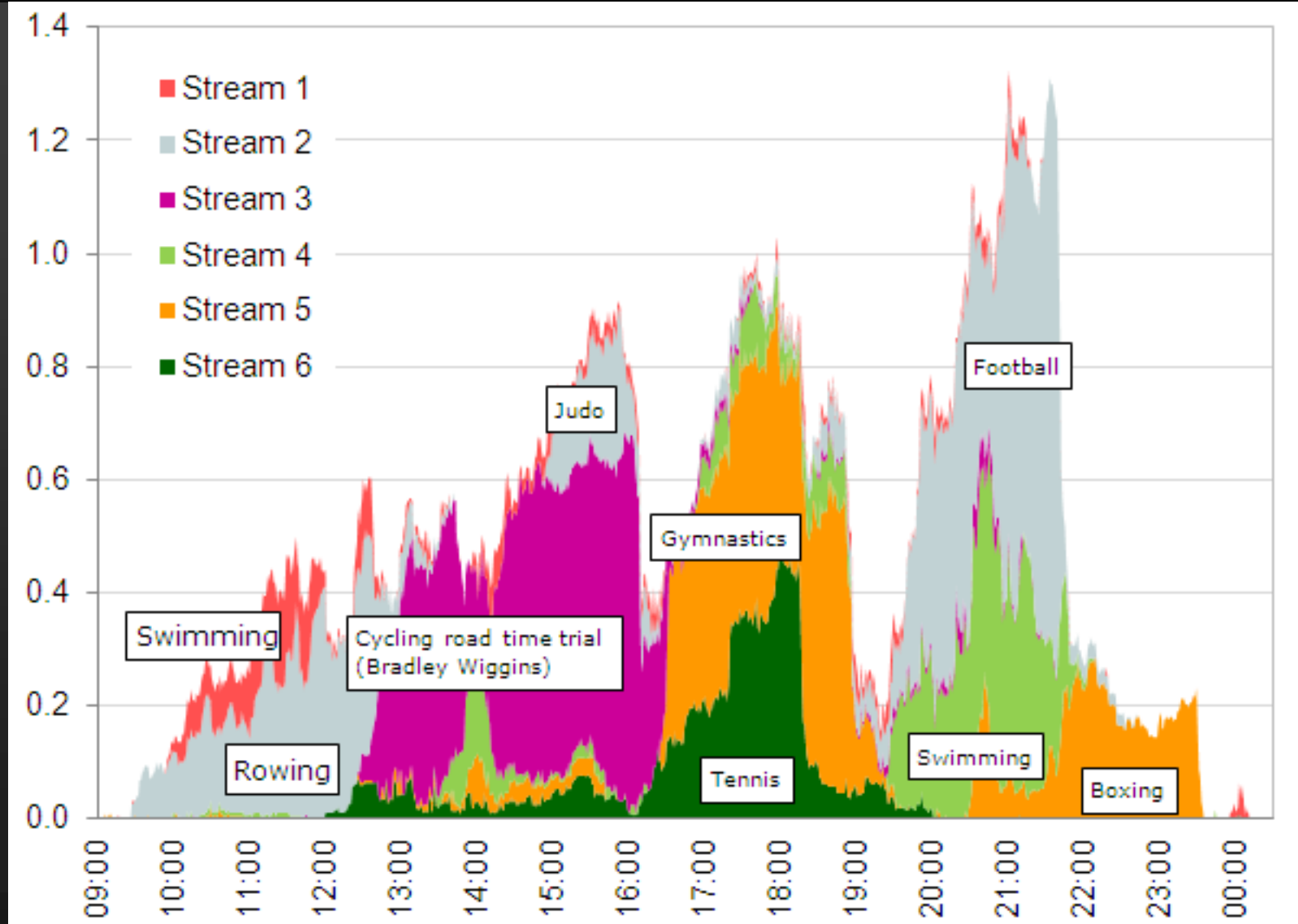


Olympic numbers

On the busiest day, the BBC delivered 2.8 petabytes, with the peak traffic moment occurring when Bradley Wiggins won Gold and we shifted 700 Gb/s.

106 million requests for BBC Olympic video content across all online platforms

Number of people watching individual Streams →



FT?

...some background about the Financial Times

World business.

In one place.

.....
We live in **FINANCIAL TIMES**



"Without fear and without favour"

FT
125
YEARS

Still guiding the way
for global business

The FT Audience: The world's most wealthy and powerful people



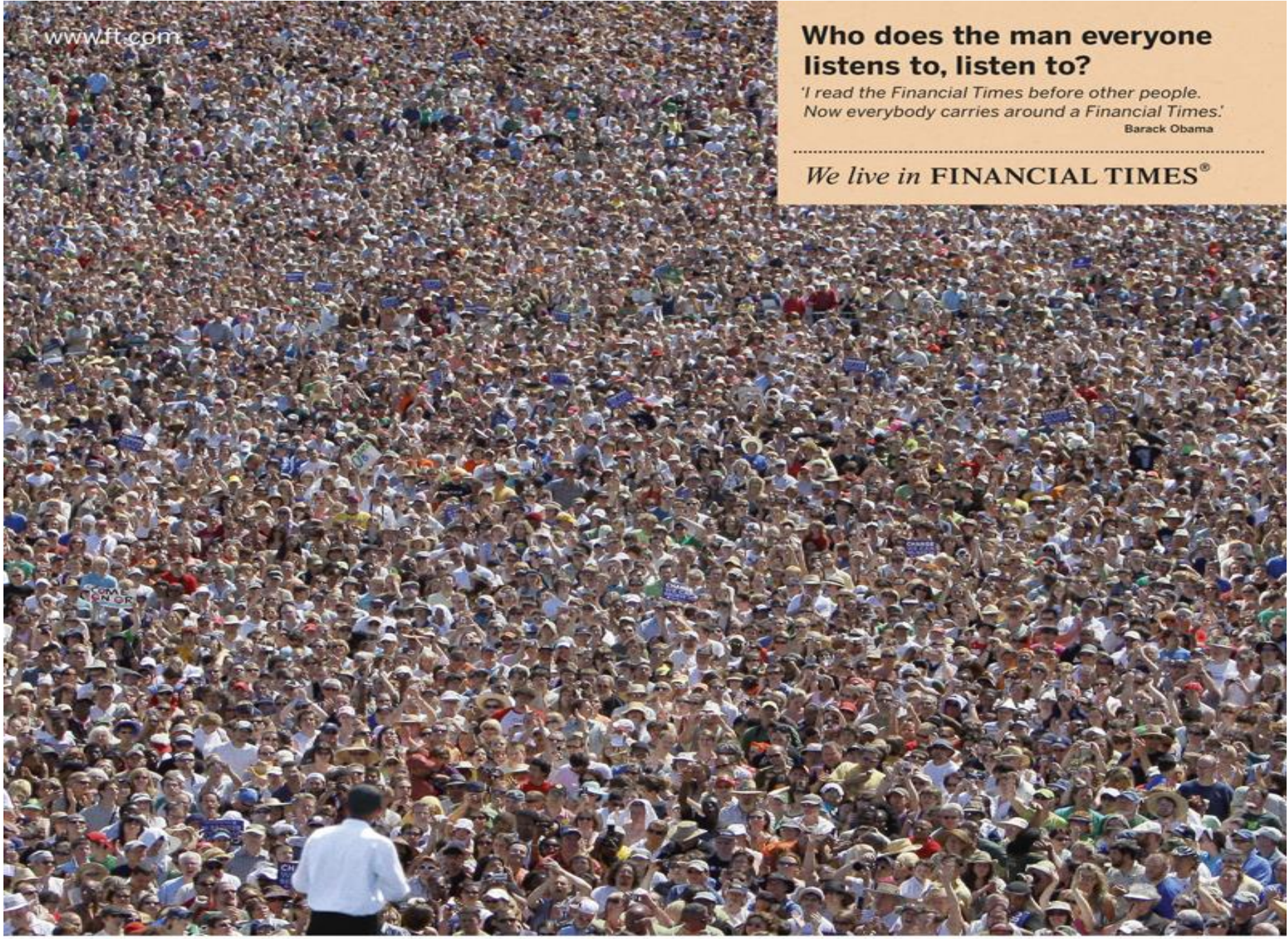
www.ft.com

**Who does the man everyone
listens to, listen to?**

*'I read the Financial Times before other people.
Now everybody carries around a Financial Times.'*

Barack Obama

We live in **FINANCIAL TIMES**®



Global network of over 500 journalists



“The old “page editor” is dead; long live today’s content editor”

The FT product portfolio



FT has been successfully charging for online content since 2002



- Subscriptions were launched in 2002
- The model was flexible and business rules were determined by various departments
- Customer experience wasn't great!
(Customer data wasn't been captured or used intelligently)

Digital subscriptions continue to grow

2002

FT.com
subscriptions first
introduced

2007

FT.com metered
model is launched

2012

Digital subs
overtake print
circulation

2013

FT has 443k
paying digital
subscribers

2 million

people worldwide read the FT in
print or online

600,000+

Combined Print & Digital
Circulation

14% in
past
year



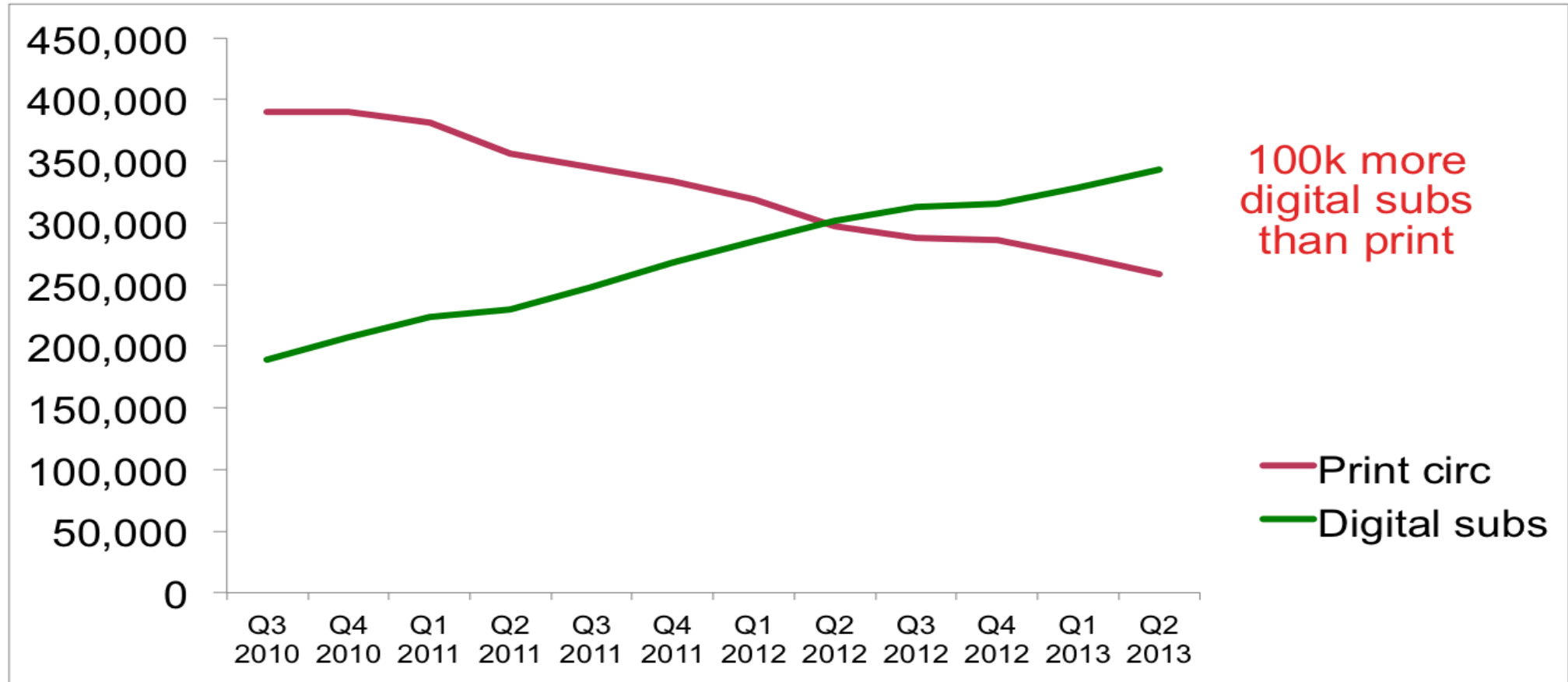
443,000

Digital Subscribers

51%+

Revenue expected to be
generated through content
sales/subscriptions by end of
2013

Digital is our future



The FT is where our readers wish to consume it

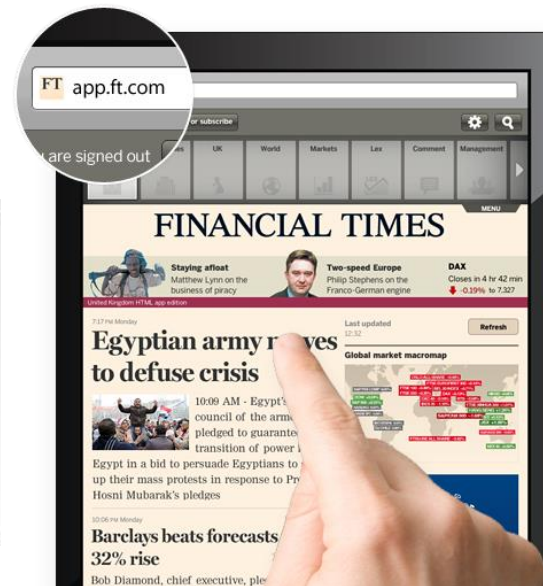
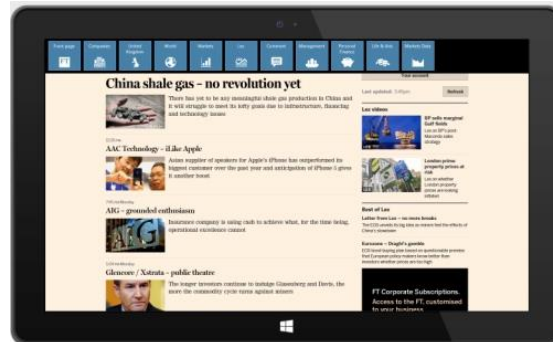
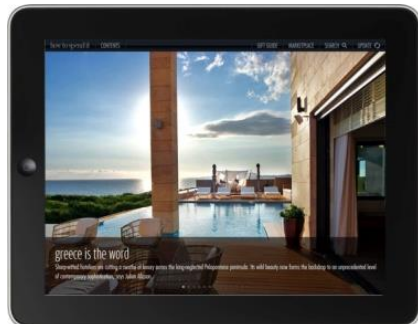


Precious Metals Prices and Rates									
Spot Silver (XAG) Prices					Currency vs USD				
CUR	Time	Last	Chg	%Chg	Last	Chg	%Chg		
USD	11:35	32.42	-0.05	-0.18					
AUD	11:35	31.99	-0.04	-0.14					
CAD	11:35	32.46	-0.11	-0.34					
CHF	11:35	30.65	-0.13	-0.43					
EUR	11:35	25.47	-0.11	-0.42					
GBP	11:35	26.45	-0.08	-0.31					
JPY	11:35	2598.80	+10.82	+0.76					
ZAR	11:35	286.80	+0.77	+0.27					
EUR	4:40	-0.75							
Spot Silver vs Other Precious Metals					Metal Spots (MEFL)				
TKK	Time	Last	Chg	%Chg	Last	Chg	%Chg		
MXL	11:35	02	-0.03	-0.34					
XPY	11:35	02	-0.04	-0.84					
XPZ	11:35	05	-0.05	-0.84					
Spot Daily Silver Fixings					Silver Futures (CEM)				
Exchange	Time	Last			Time	Last	Chg	%Chg	USD/0Z
London	12:00	USD	11/13	2258.00	1 Month	62000	20800	-0.41200	
London	12:00	EUR	11/13	2560.31	2 Month	61800	25800	-0.35700	
London	12:00	GBP	11/13	2047.77	3 Month	61800	21000	-0.29000	
Swiss Pool (CHF/KG) Spot Price				985.64	6 Month	61200	52400	-0.08800	
					1 Year	N.A.	86150	86150	

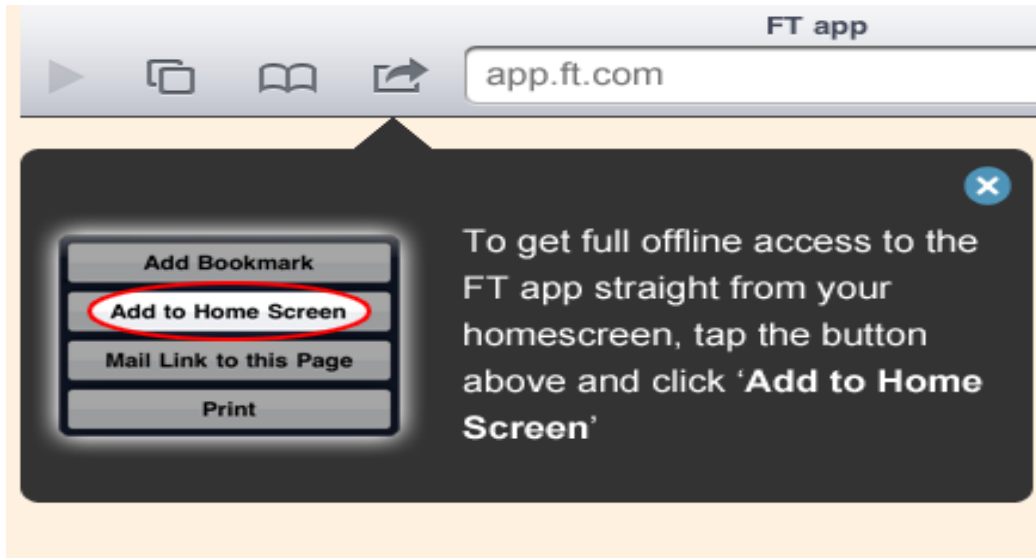


Meteoric rise of mobile

- Over 50% of subscriber consumption
- Third of FT.com traffic
- Driving 24% of new digital subs
- Mobile advertising up 26% yoy



First major publisher to launch an HTML5 web app

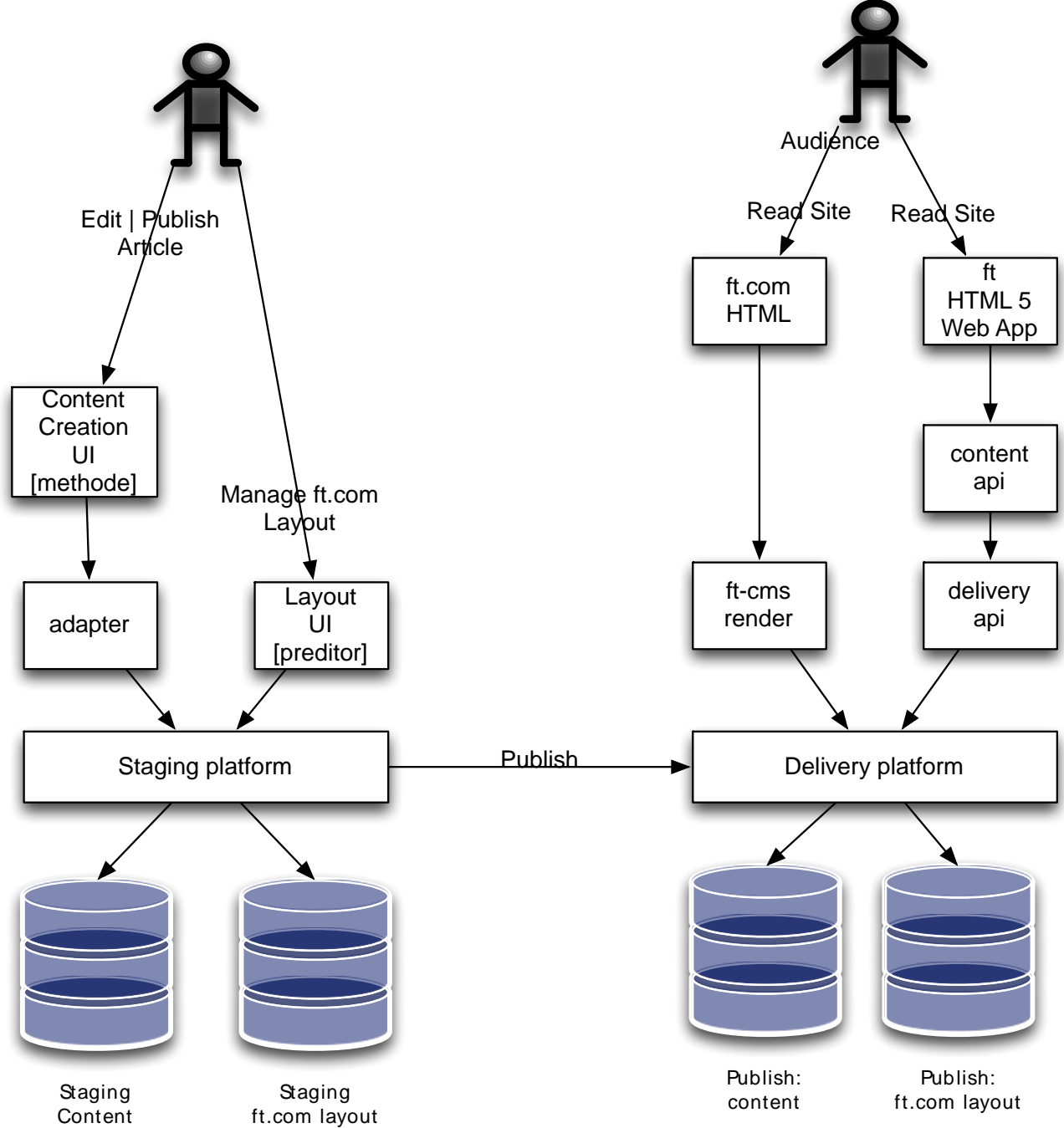


- Supporting offline content consumption



Existing Very complex Publishing Architecture.

Just to publish a content object.
No search no metadata?



Taxonomy based Search and Topic pages (Poor Quality)

Top story is about Samsung?

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All of FT 7.8K [Articles](#) 7.4K [Blogs](#) 388 [Multimedia](#) 13 Sort by [Relevance](#) [Date](#)


[x apple](#) [x Apple Inc](#) Showing results 1-10 of 7,785

AAPL:NSQ	USD	Today's change	1 year change
Apple Inc	498.69	10.11 / +2.07%	-26.12%

As of Sep 04 2013 21:00 BST. Data delayed by at least 15 minutes.


 9 hours ago
Only time will tell for Samsung smartwatch
...already launched a smartwatch, albeit to mixed reviews, and **Apple**, Google and LG are all working on devices of their own...for smartwatches that touchscreens were for smartphones. Both **Apple** and Samsung have already filed patents for putative devices with... By Tim Bradshaw in San Francisco


FT ALPHAVILLE 9 hours ago
The Closer
...launch: "Samsung Electronics has become the first global mobile computing company to launch a smartwatch, leaping ahead of rivals **Apple**, Google and Microsoft in the "wearable technology" market." (Financial Times) FT Alphaville

 13 hours ago
Apple event raises hopes of China Mobile deal
Apple plans to hold near-simultaneous product...latest iPhone is expected to make its debut at **Apple's** Cupertino headquarters. The event follows a barrage of negative publicity for **Apple** in China earlier this year, after it was accused

FT SEARCH SUGGESTIONS
Sections and special pages from FT.com that closely match your search
[In depth: Apple Companies Amazon](#) [Show more](#)

VIDEOS MATCHING YOUR SEARCH
Video clips that closely match your search

 [Large or mid-sized tablets?](#)
FT's Paul Taylor looks at mid-sized versus large tablets

 [China smartphone aims to rival Apple](#)
Leslie Hook talks to the founder of Xiaomi about innova...

Taxonomy Based Tagging & Event Based Story editing

QMI || Quick Metadata Interface

Tagged Find Metadata

Sections

- Companies 85
- Health 85
- Health Care 85

Authors

- Andrew Jack 86

Organisations

- Medtronic Inc 93
- NHS 62

Regions

- England 100
- United States of America 78

Genres

Media Type

Subjects

- General News 75
- Mergers & Acquisitions 75

IPTC

- 07003000 - health treatment 87
- 04016005 - merger, acquisition and takeover 70

COMPANIES DAILY NEWS LIST for 02/09/2013

FINANCIAL SERVICES

BHP Billiton shares crash as China results recede

BHP Billiton shares crash as China results recede

BHP Billiton shares crash as

BHP Billiton shares crash as.xml - Created: watkinsa_new - 22/08/2013 - 14:53 Modified: watkinsa_new - 22/08/2013 - 15:02

Shares lower ...

[Edit](#) [Properties](#) [Unlink](#) [Assign](#)

Correlations (Show Details)

1 FT Graphic



PB925192...

BHP Billiton shares crash as

BHP Billiton shares crash as

Picture of BHP make it good

BHP Billiton shares crash as

Interactive graphic

Great tax race: Ireland's policies aid business more than public

A few weeks before Ireland unveiled its 2012 budget, which heaped €3.5bn in tax rises and spending cuts on an austerity weary public, I the industry's wish list. It was the morning of 24 November 2011, just a year after Dublin was forced into an international bail-out due to under the auspices of the "Clearing House"- a secretive group of finan...

2 IrishTax WO xx

550W WATKINS 4PM SHARP

THE GREAT TAX RACE - IrishTax WO xx(1)

Master image by 4pm please

Apple is bitten by results

A new story for Jill to write about Apple

Correlations (Show Thumbnails)

UKDubai.dwc Story Package - Created: symonf - 01/05/2013 - 10:12 Modified: servlet-Archive - 30/08/2013 - 17:10

Sprint CO 24.xml Promo Box - Created: bonds - 24/04/2013 - 13:06 Modified: watkinsa_new - 01/05/2013 - 12:50

Thorntons CO 24.xml RELATED_OBJECT - Created: watkinsa - 24/04/2013 - 16:36 Modified: watkinsa_new - 01/05/2013 - 12:50

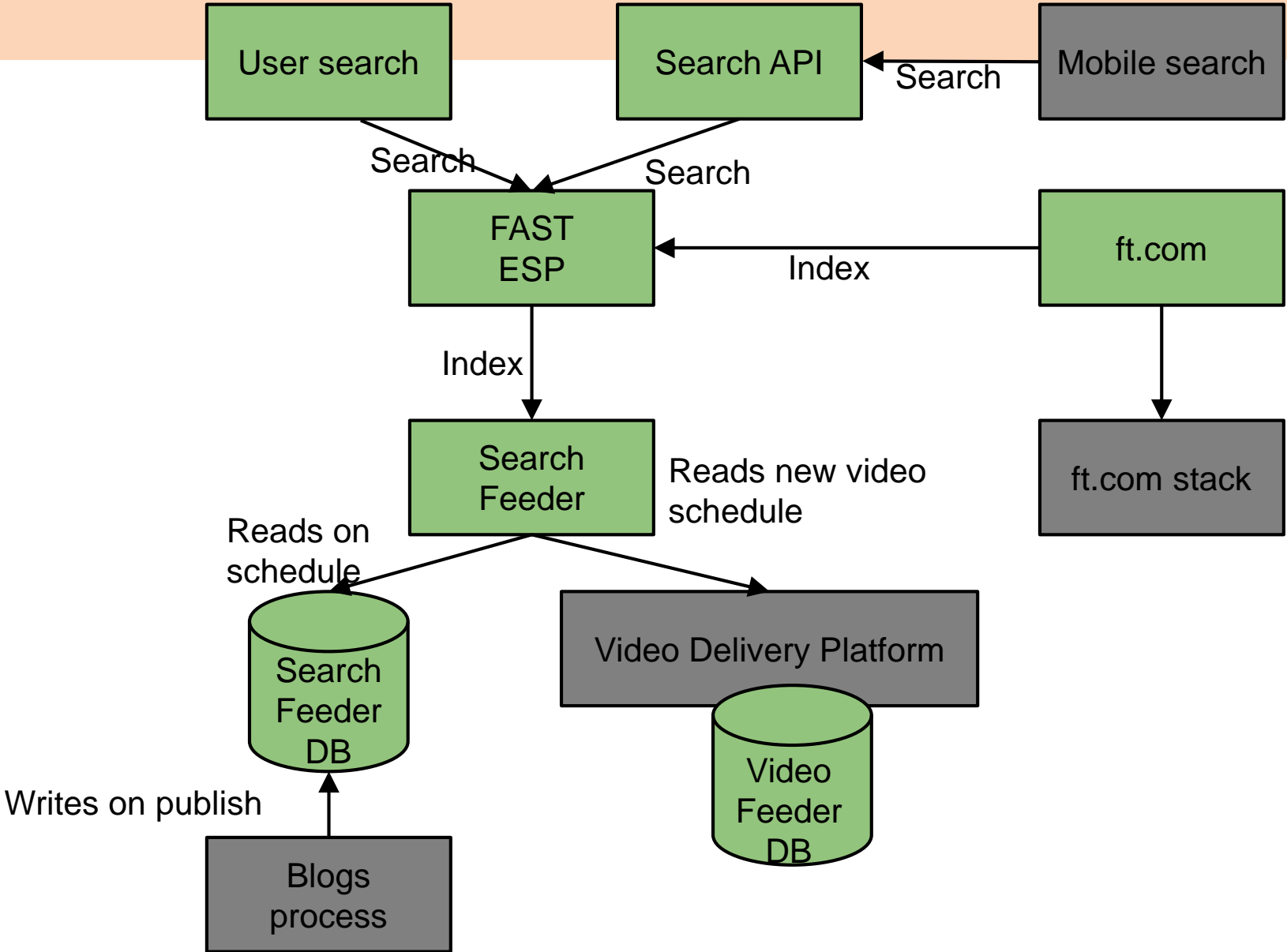
3 Further reading.html FT Blog - Created: watkinsa_new - 01/05/2013 - 12:19 Modified: watkinsa_new - 03/05/2013 - 15:14

How the Miliband reforms may give even more power to the unions-013.html FT Blog - Created: burnsr - 19/07/2013 - 10:03 Modif

The mobile operating system battle.html FT Video - Created: watkinsa_new - 01/05/2013 - 12:19 Modified: watkinsa_new - 03/05/

Companies_2608997786001_Talking-to-the-animals_Companies.xml Promo Box - Created: servlet-Import - 15/08/2013 - 20:37 Mo

Complex Taxonomy Based Search



Moving towards : Semantic Publishing Platform

Provide a Universal Publishing "UP" platform where all FT content is universally accessible across all of its channels:

RDF Store; semantically understand, interlink and store all FT content within a single pan FT Content Store

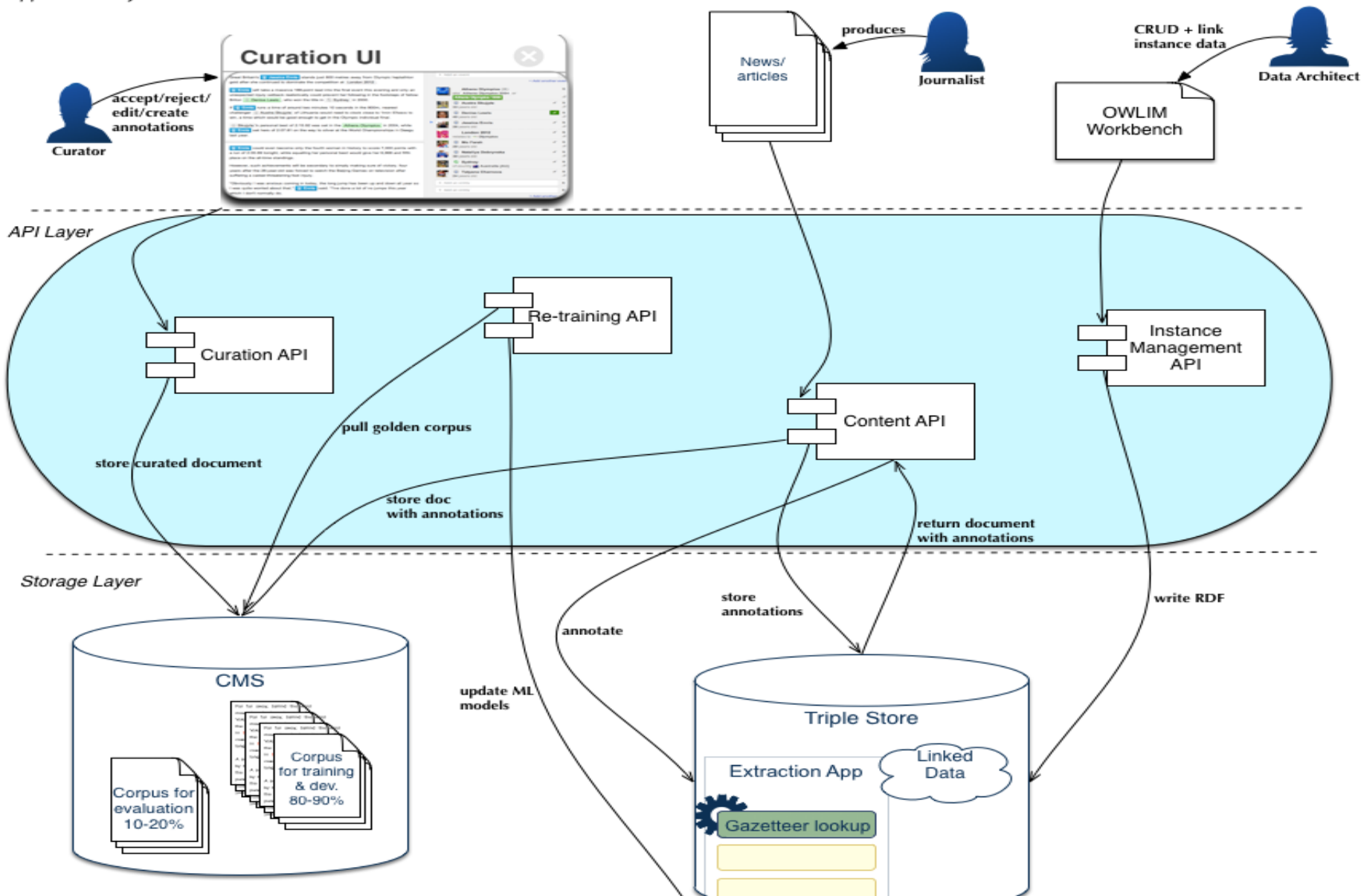
APIs; content, metadata and the links between will be exposed and made publicly available via APIs

Publishing tools; provide tooling which allows journalists, users, readers and contributors to publish to the Content Store via APIs.

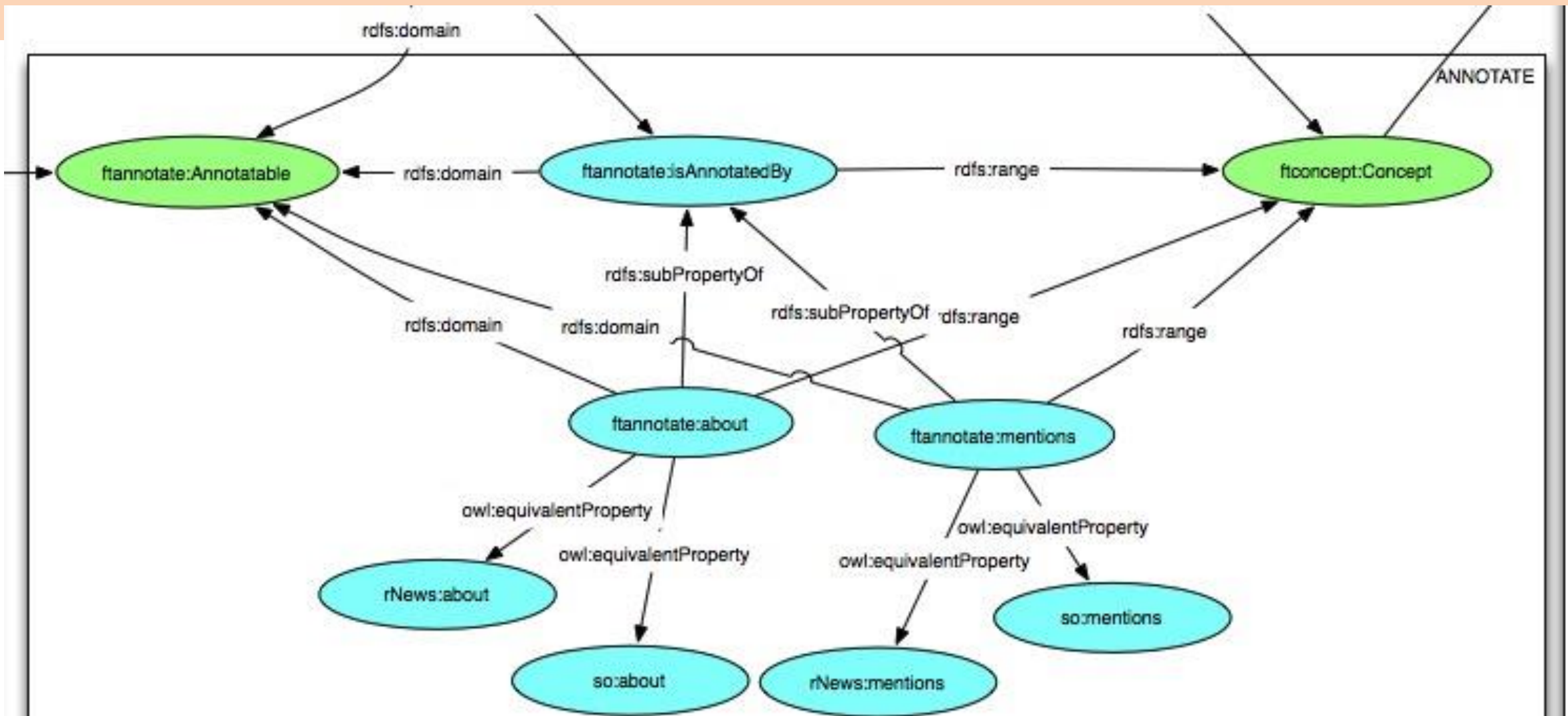
Metadata and Semantics; author content directly in addition publish data about the content - semantic metadata. Provide intelligent query and search capabilities empowering the next generation of FT products

Dynamic Semantic Publishing Architecture

Application Layer

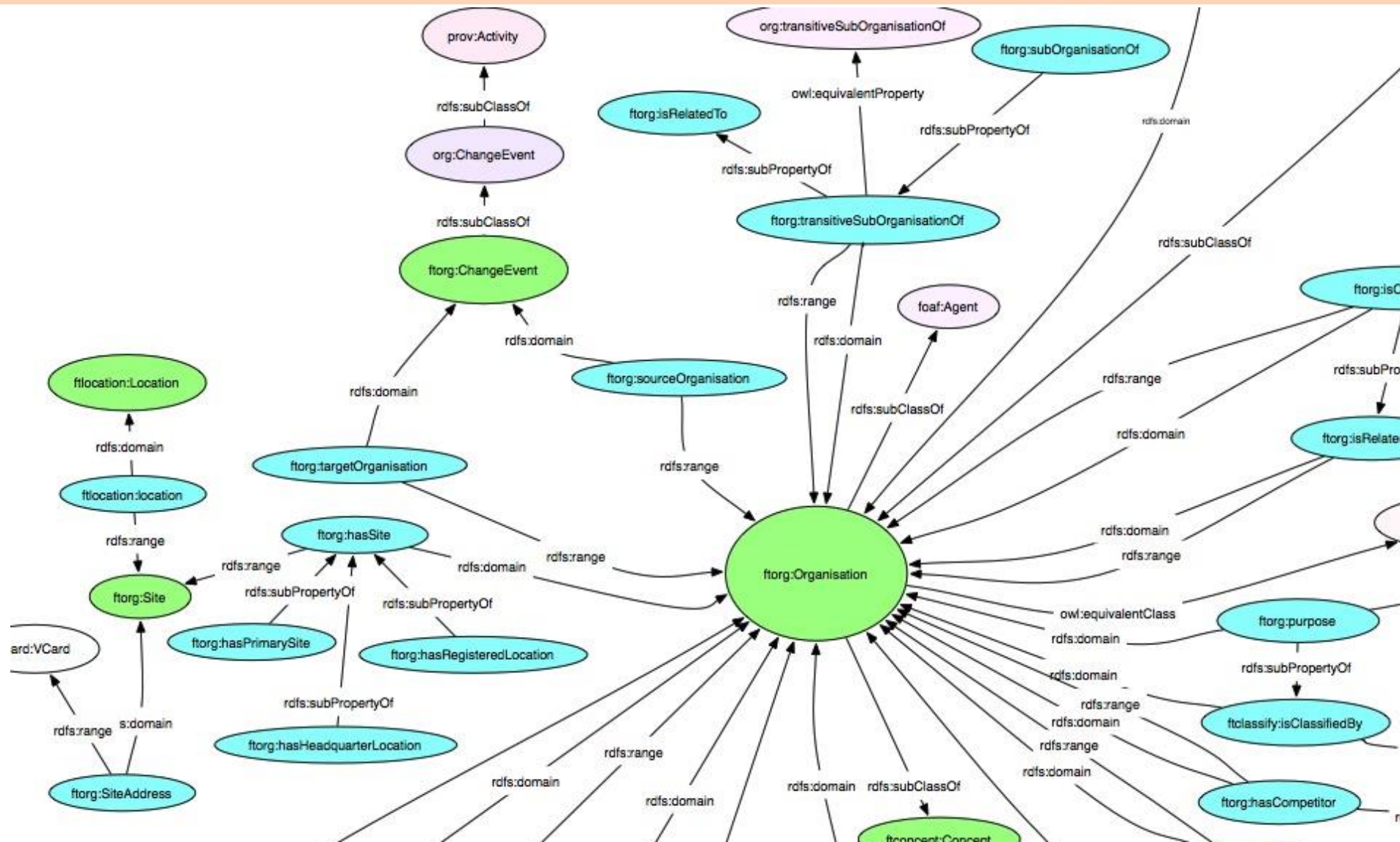


Annotation ontology - Semantic fingerprint

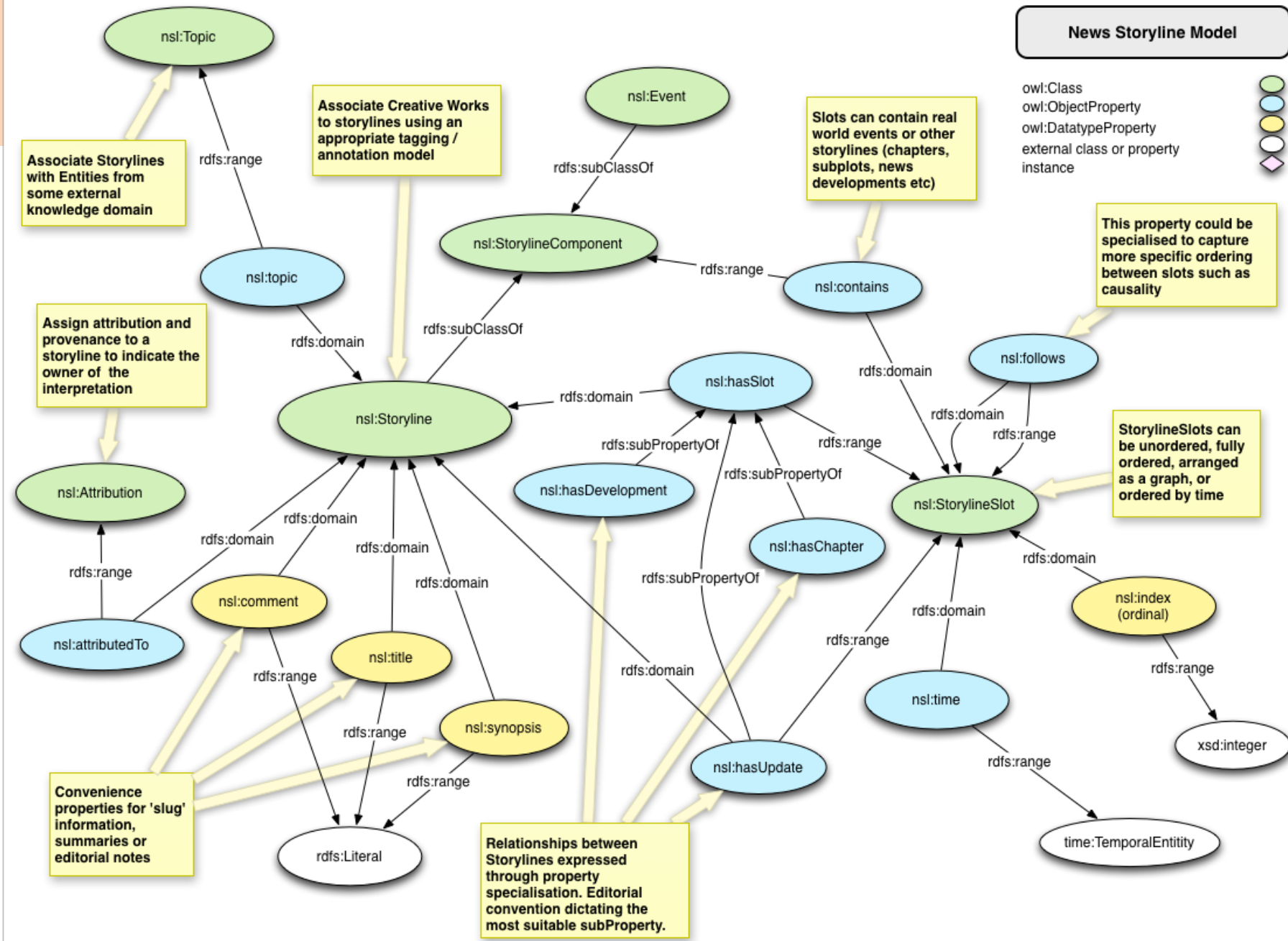


News Business ontology

Collaboration: (FT, BBC, Reuters, Bloomberg, EuroMoney)



Future: Storyline ontology



JSON+LD For all public (secure) endpoints (Demo)

The screenshot shows a web browser with several tabs: "Responsive articles", "INT - content-store", "FT Message Center", "FT Technology", "Apple", "iCloud", "Facebook", and "Twitter". The active tab is "INT - content-store". The browser's address bar shows the URL `http://api.ft.com/content/3b93caec-5db9-11e3-95bd-00144feabdc0`. The REST client interface shows a GET request with two headers: "Accept" with value "application/ld+json" and "X-API-Key" with value "RXIbwZ5arywzWK3SUf5y4Qc1031V0V". The response status is "200 OK" and the time taken is "187 ms". The response body is displayed in JSON format, showing a JSON+LD document with the following structure:

```
1 {
2   "@context": {
3     "ftcontent": "http://www.ft.com/ontology/content/",
4     "ftcontent:body": {
5       "@type": "http://www.w3.org/1999/02/22-rdf-syntax-ns#XMLLiteral"
6     },
7     "ftcontent:publishedDate": {
8       "@type": "http://www.w3.org/2001/XMLSchema#dateTime"
9     }
10  },
```

FT.com Semantic Prototype (Demo)...


Financial Times PoC

FINANCIAL TIMES

Facets Trending

HOME

May 31, 2014
Peter Mutharika wins Malawi presidential elections




President Banda tried to nullify election citing 'rampant irregularities' but was overruled by the high court and the counting and recounting of votes went on for days

May 29, 2014
Radoslaw Sikorski in the hot seat.

Poland's foreign minister is helping drive a hardline stance on the Ukraine crisis, propelling himself and his country into the first rank of European diplomacy

WORLD

Jun 1, 2014
It is time for the ECB to act, but more talk is needed too



A further bout of disinflationary pressures could force more troubled member states into a prolonged bout of Japanese-style deflation

Jun 1, 2014
World diary: June 2 – June 8


Nato defence ministers meet; war-torn Syria elects a new president; a G7 summit is held without Russia; Lithuania's progress on eurozone membership is outlined; Ukip's showing at Newark's by-election will be closely watched

COMPANIES

Jun 1, 2014
Companies diary: June 2 – June 8

Diary commentary from FT reporters; data and company announcements, unless otherwise stated, from Thomson Reuters. Company announcements are of information publicly available before last week.


Jun 1, 2014
Manchester airport's 21m passengers a year is busiest since 2008



Numbers are rising by 5.5 per cent year on year, compared with 3 per cent for the UK as a whole, according to Civil Aviation


MARKETS

Jun 1, 2014
China accuses US of 'provocative action'



Top Chinese general accused of staging 'provocative' manoeuvres against China, as maritime tensions flare into an Asian regional defence

May 31, 2014
China hits back after criticises maritime strategy



FT.com Semantic Prototype (Demo)...

Financial Times PoC

FINANCIAL TIMES

Bank of Greece

Facets Trending

Type	Label	parent feature	See also	Sub Region of	Located in	Part of	Contains a Location
ontology# Feature	Greece	Europe	Greece	Europe	Europe	Europe	Megara
	Grecia	Europa	Trikorfo, Grevena	Europa	Europa	Europa	Argos
	Hellas	Megara					Heraklion
	Hellenic Republic	Argos					
		Heraklion					
		Preveza					
		Melissia					
		Kavala					

SEARCH RESULTS | Capital Markets

Banks test market appetite for Greece

For the chief executive of Greece's biggest bank by assets, the nadir of the eurozone crisis arrived in autumn 2012 when a deteriorating balance sheet required an emergency fund raising. An investor conference was announced in London. No one came.

"The only people who would see me were the hedge fund guys," says Anthimos Thomopoulos, Piraeus Bank's chief executive. "[Anyone else] wouldn't touch Greece."

Top Concepts

Piraeus
Anthimos Thomopoulos
EuroBancshares
Paris Mantzavras
Bank of Greece
Alpha Bank
Hellenic Republic
York Capital
Nikhil Srinivasan

FT.com Semantic Prototype (Demo)...



CATEGORY | Banks

Credit Suisse hearing attacks Swiss secrecy



Top Concepts

- Senate committee
- Carl Levin
- Credit Suisse
- Federal government of the United States
- Swiss government
- United States Department of Justice

Related/Similar Content

Facebook buys WhatsApp in \$19bn deal

Facebook is buying WhatsApp in a cash-and-stock deal worth up to \$19bn, as the world's leading social network enters the fast-growing chat app market that is popular among younger generations and emerging markets.

The Menlo Park-based social network is acquiring an app which boasts more than 450m users who use it to message without paying high fees. Users of the app send almost as many messages as the number of text messages sent over the entire global telecoms network.

The purchase – far larger than Facebook's next largest deal of \$1bn – is designed to achieve Facebook's two main aims: to maintain its dominance in social networking as users move to mobile devices, and to grow its already massive userbase in less penetrated areas of the world.

WhatsApp is a leading player in the chat app world which has grown rapidly in the last couple of years. It is more dominant in countries outside the US, particularly in emerging markets.

The deal – which is 25 per cent in cash and the rest in stock – will see the app maintained as a

Top Concepts

Facebook Messenger

Apple Inc.

Jan Koum

chat app market

Benedict Evans

Sequoia Capital

one venture capital firm

Zuckerberg

Menlo Park

Mr Acton

Similar Articles

Feb 20, 2014

Facebook gets the message: the strategy for WhatsApp

Acquisition part of emerging tactic by social network to develop portfolio of apps to hang onto users adapting to mobile

Feb 21, 2014

Technology: Small company, big app

Facebook's \$19bn buyout of WhatsApp marks a moment for the mobile internet

Recommendations

Primary Objective

Serve **relevant** articles
to increase user **engagement**
and improve **usability**

Recommendations

Subject, Object and Action

Subject: **User**

Object: **Article**, Media Asset, Data, ...

Action: **Read**, Preview, Comment, ...

Contextual Recommendations

May 23, 2014

Barclays hit with £26m fine over gold fix



UK financial regulator has fined Barclays over poor controls that allowed trader to move the price of gold to avoid paying out on a client's order

Contextual
Similarity

Similar Articles

Feb 16, 2014

Forex in the spotlight

Banks are braced for a potential barrage of multibillion-dollar fines and litigation from the probe into alleged collusion in the foreign exchange market

Oct 31, 2013

Forex probes raise fears of a repeat of Libor scandal

Barclays becomes latest bank to launch probe into its foreign exchange trading, adding to a growing worries over an industry-wide investigation

Nov 18, 2013

UK probes private accounts of foreign exchange traders

FCA is probing the use of private accounts by foreign exchange traders amid allegations they traded their own money

Behavioural Recommendations



Behavioural Similarity

Similar Articles

Feb 16, 2014

Forex in the spotlight

Banks are braced for a potential barrage of multibillion-dollar fines and litigation from the probe into alleged collusion in the foreign exchange market

Oct 31, 2013

Forex probes raise fears of a repeat of Libor scandal

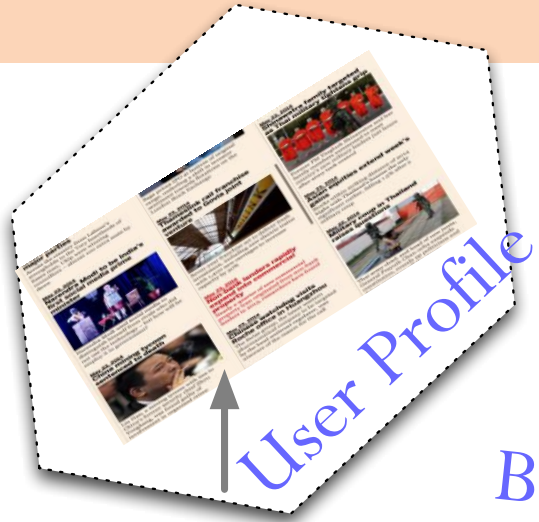
Barclays becomes latest bank to launch probe into its foreign exchange trading, adding to a growing worries over an industry-wide investigation

Nov 18, 2013

UK probes private accounts of foreign exchange traders

FCA is probing the use of private accounts by foreign exchange traders amid allegations they traded their own money

Combined Contextual + Behavioural Recommendations



User Profile

Behavioural
and
Contextual
Similarity

Reads

May 23, 2014
Barclays hit with £26m fine over gold fix



Similar Articles

Feb 16, 2014

Forex in the spotlight

Banks are braced for a potential barrage of multibillion-dollar fines and litigation from the probe into alleged collusion in the foreign exchange market

Oct 31, 2013

Forex probes raise fears of a repeat of Libor scandal

Barclays becomes latest bank to launch probe into its foreign exchange trading, adding to a growing worries over an industry-wide investigation

Nov 18, 2013

UK probes private accounts of foreign exchange traders

FCA is probing the use of private accounts by foreign exchange traders amid allegations they traded their own money ahead of clients orders

User Actions: Limited to User Reads Article

reads

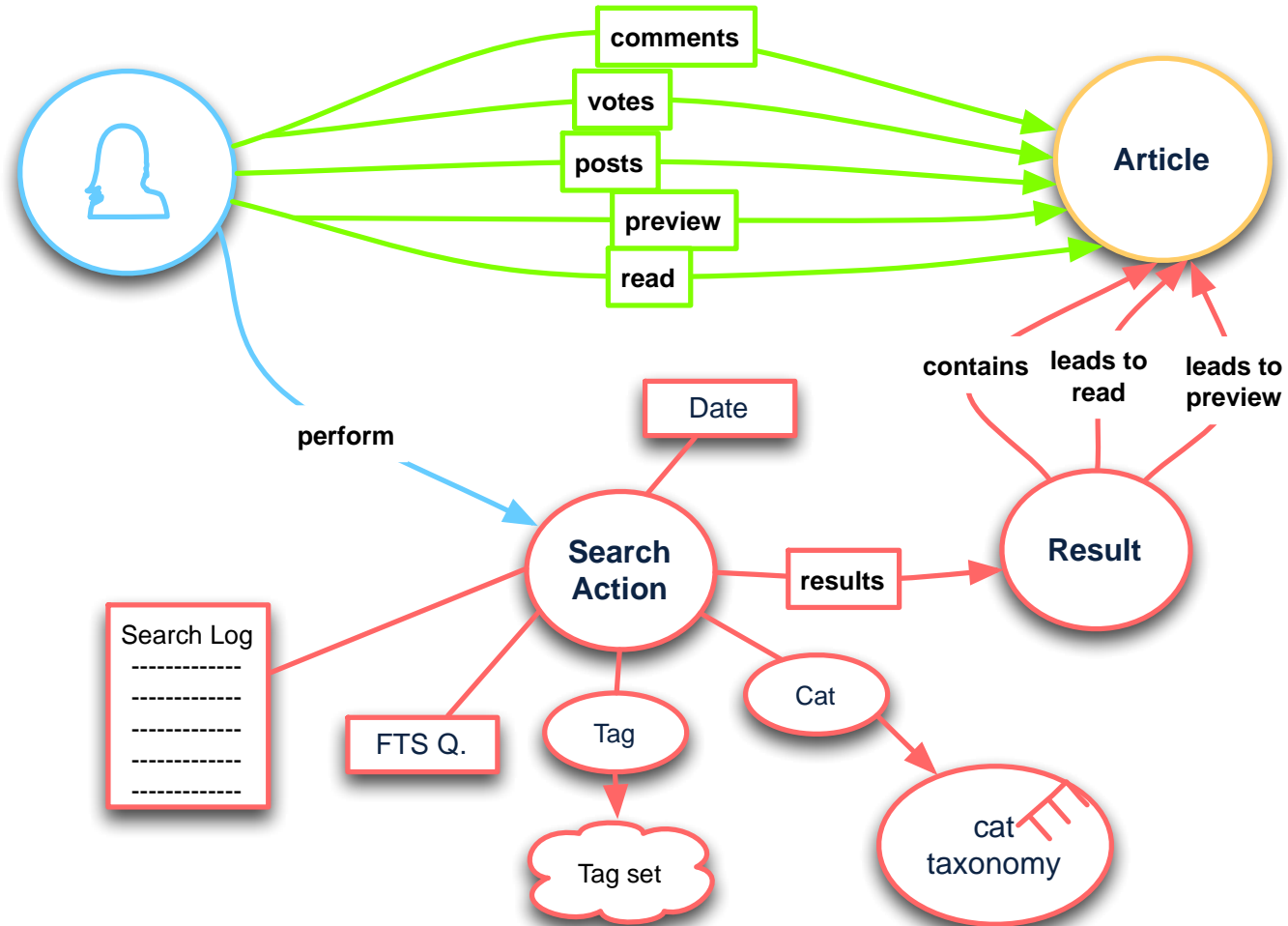


May 23, 2014
Barclays hit with £26m fine over gold fix



UK financial regulator has fined Barclays over poor controls that allowed trader to move the price of gold to avoid paying out on a client's order

User Actions: A wider behavioural perspective



“Content” Based Recommendations

- Results will be based on the similarity of content items. Similarity will be defined by the terms/entities within the content (content fingerprint)
- Results will be based on the past choices of an individual user (a user's *profile*). (Users content fingerprint)

Content based ranking

Two-fold scoring approach

1. Similarity to recently viewed articles (*context*)
2. Relevance to a long-term user profile,
 - Weights reflecting the relative importance of the individual terms (*static component*)
 - Transition likelihoods among any pair of terms (*dynamic component*)

Collaborative Ranking

- Results based on statistics that reflect the past choices of all users
- Results based on user ratings, and the similarity of users or items
- Content-agnostic
- Aware of the quality of content

Collaborative Ranking Mechanisms

User to Content
Similarity Score

May 23, 2014
Barclays hit with £26m fine over gold fix



UK financial regulator has fined Barclays over poor controls that allowed trader to move the price of gold to avoid paying out on a client's order

User to User Sim.
Score

May 23, 2014
Barclays hit with £26m fine over gold fix



UK financial regulator has fined Barclays over poor controls that allowed trader to

May 22, 2014
Credit Suisse sells \$5bn in bonds



Swiss bank's first significant senior debt

Content to Content
Sim. Score

API : Recommend for :

<http://www.ft.com/cms/s/0/398e6d5e-e858-11e3-9cb3-00144feabdc0.html>

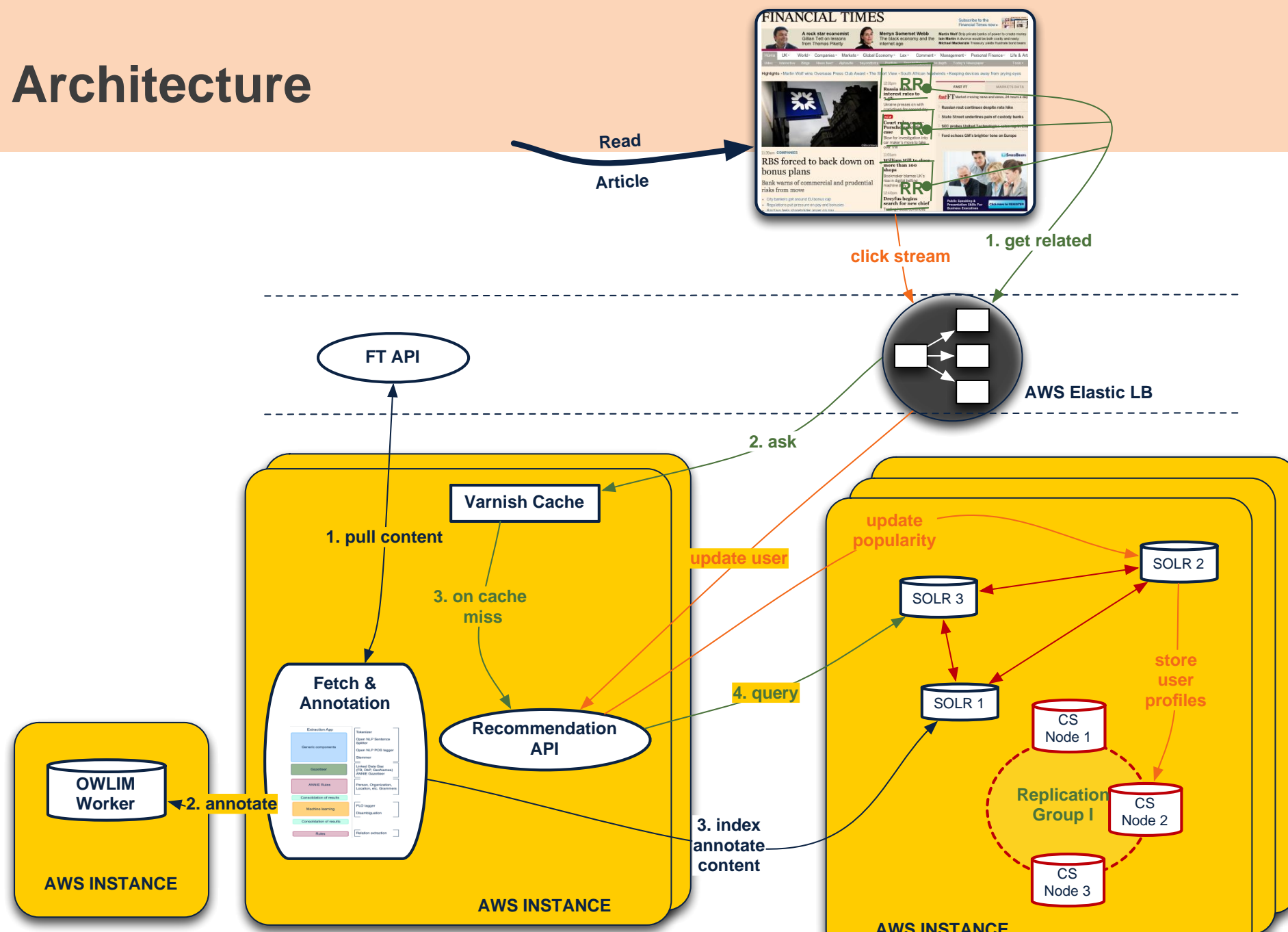
GET <http://ft-recommendations.ft.com/api/behavioural/getsmartcontent?>

userid=6753665&contentid=398e6d5e-e858-11e3-9cb3-00144feabdc0

```
{
  "SmartAPI": "Recommendations API v1.8",
  "type": "behavioural",
  "status": "ok",
  "method": "getsmartcontent",
  "response": {
    "result": [
      {
        "headline": "Apple seeks to work Jobs magic on the internet of things",
        "feedid": 21,
        "feed": "FT Mobile Content API",
        "rel": 1.331479549407959,
        "date": "Thu May 29 18:33:04 UTC 2014",
        "cid": "3c6e330a-e74b-11e3-8b4e-00144feabdc0",
        "url": "http://www.ft.com/cms/s/0/3c6e330a-e74b-11e3-8b4e-00144feabdc0.html",
        "popularity": 2452
      },

```

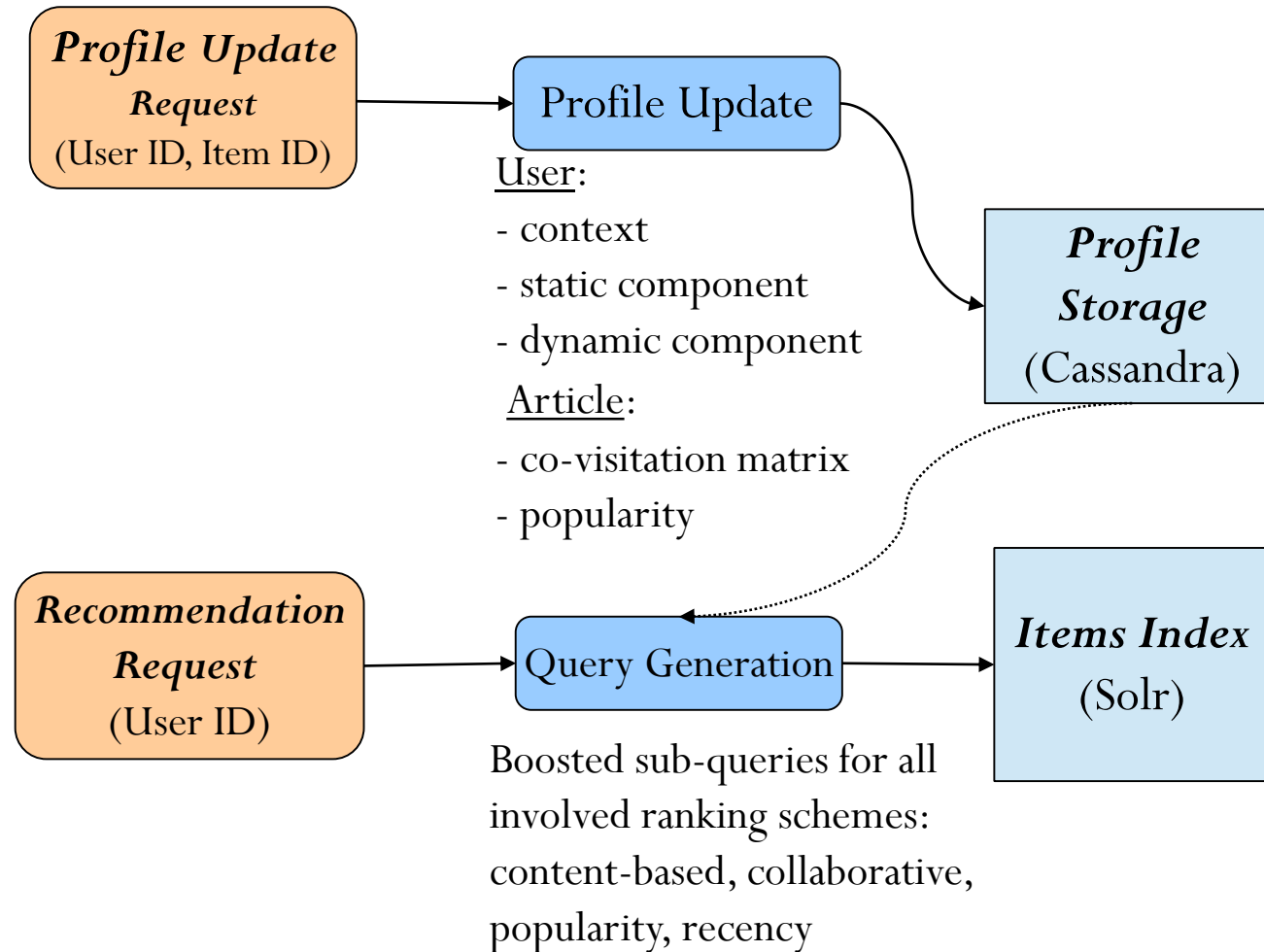
Architecture



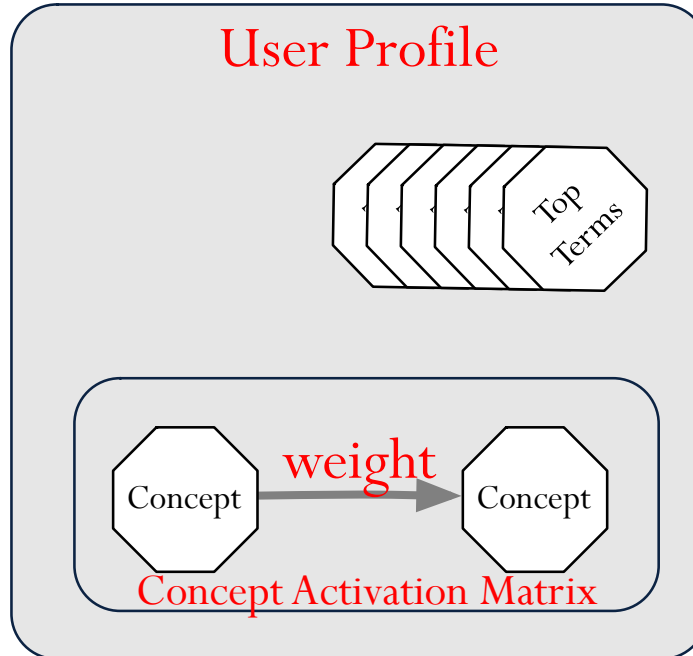
Main Actions

1. **Pull** content – annotate/enrich – index
2. **Accumulate**/update user profile
3. **Recommend**

Main Actions



Cassandra



Article Profile

Title

May 22, 2014
Credit Suisse sells \$5bn in bonds

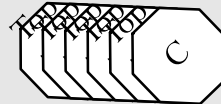
Summary



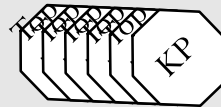
body

Swiss bank's first significant senior debt sale came only days after it agreed to a \$2.6bn fine and admitted guilt in tax conspiracy case

concepts



keyphrases



Thank you. Questions?

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