ACTIVE Bootcamp

AITI, Accra

Dr John Davies

Chief Researcher, Semantic Technology

Future Business Applications & Services,

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Project Structure –
EU “Framework Programme 7” (FP7)

- Timescale
  - Collaborative 3 year research project
  - But delivering results along the way
- By whom?
  - Research partners, technology partners, use case partners
  - 100% funding for research partners, typically 67% funding for BT
- Doing what?
  - Must have elements of fundamental research
  - Must also demonstrate application in the real world

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An EU *Integrating Project*

12 partners in 7 countries
Led by BT

$15 Million - $10 Million from EU

March 2008 – February 2011

3 case studies:

- telecoms
- consultancy
- electronics design

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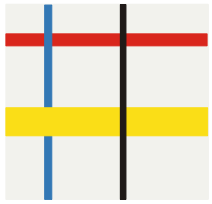

kea-pro

Project ACTIVE

- Improved knowledge management
- 2 key technology themes
  - Context management
    - context and task switching is a ‘productivity killer’
  - Knowledge sharing with semantic technology
    - Semantic wiki technology for more effective knowledge re-use

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Semantic Technology: Applications in Industry Status & Prospects

John Davies
Chief Researcher, Semantic Technology
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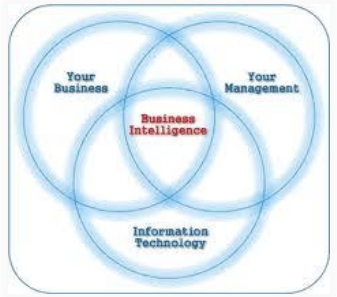
Overview

- **Brief introduction to semantic technology**
- Applications
  - Knowledge Management & the ACTIVE project
  - Linked Open Data
  - Business Intelligence
- Specific application in the health sector
- Semantic Technology uptake & resources



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Semantic Web

- Today's web
  - Machine-to-human – emphasis on presentation
- Semantic web vision
  - "an **extension** of the current web in which **information** is given well-defined **meaning**" (Tim Berners-Lee)
  - making web-based information **machine-processable**
  - <bold>**use bold font**</> → <product-code>1234-6/A</> (XML)
  - beyond XML - RDF, OWL
    - ontological languages
    - formal, supporting reasoning
    - *triples* to model *relationships*

XML is a first step

- Semantic markup
  - HTML ⇨ layout
    - use **bold** font
    - Insert an image here
  - XML ⇨ content
    - this part of the document is the product price
    - this document describes a telecommunications service

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XML example

```
<play>
   <title>The Life and Death of King John</title>
   <Dramatis Personae>
     <persona>The Earl of PEMBROKE</persona>
     <persona>The Earl of ESSEX</persona>
       ……
   </Dramatis Personae>
   <Stagedir>SCENE  England, the Court.</Stagedir>
   <act>Act 1
     <scene>Scene I.
       <speech>
         <speaker>John</speaker>
         <line>Now, Chatillon, what would France with us?</line>
       </speech>
    …
```


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XML

- Semantic markup
  - HTML ⇨ layout
  - XML ⇨ content
- Metadata (with limitations)
  - within documents, not across documents
  - no modelling of relationships between data items

```
<vehicle>
    <car>ford
      <engine>xyz123-4</engine>
      <model>mondeo</model>
    </car>
</vehicle>
```

Next step:

RDF and ontologies

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Resource Description Framework (RDF)

- A standard of W3C
- Relationships between documents
- Consisting of triples or sentences:
  - <subject, property, verb>
  - <Tolkien, wrote, The Lord of the Rings>
- RDFS extends RDF with standard “ontology vocabulary”:
  - Class, Property
  - Type, subClassOf
  - domain, range

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RDF and RDFS

- W3C standards
- RDFS defines the *ontology*
  - what concepts do we want to reason about and how are they related
  - there are authors, and authors write books
  - classes and their properties and relationships
- RDF defines the instances of these classes and their properties
  - Mark Twain is an author
  - Mark Twain wrote “Adventures of Tom Sawyer”
  - “Adventures of Tom Sawyer” is a book
- Notation: RDF(S) = RDF + RDFS

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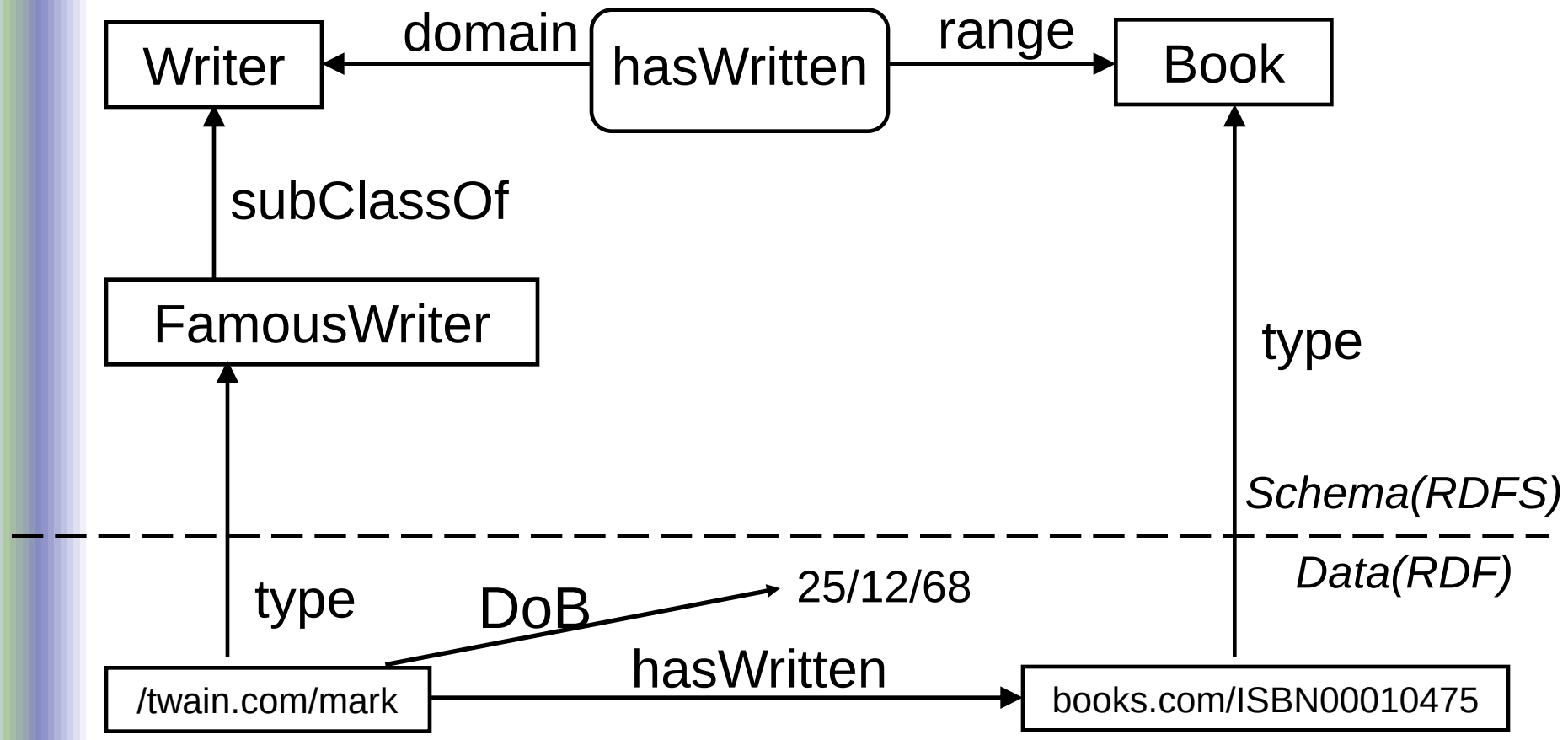
An example of RDF Schema

Annotation of WWW resources and *semantic* links



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RDF Example

hasName

(‘http://www.famouswriters.org/twain/mark’, “Mark Twain”)

hasWritten

(‘http://www.famouswriters.org/twain/mark’,
‘http://www.books.org/ISBN00001047582’)

title

(‘http://www.books.org/ISBN00001047582’,
“The Adventures of Tom Sawyer”)

XML version:

<rdf:Description rdf:about=http://www.famouswriters.org/twain/mark>

<s:hasName>Mark Twain**</s:hasName>**

<s:hasWritten rdf:resource=http://www.books.org/ISBN0001047/>

</rdf:Description>

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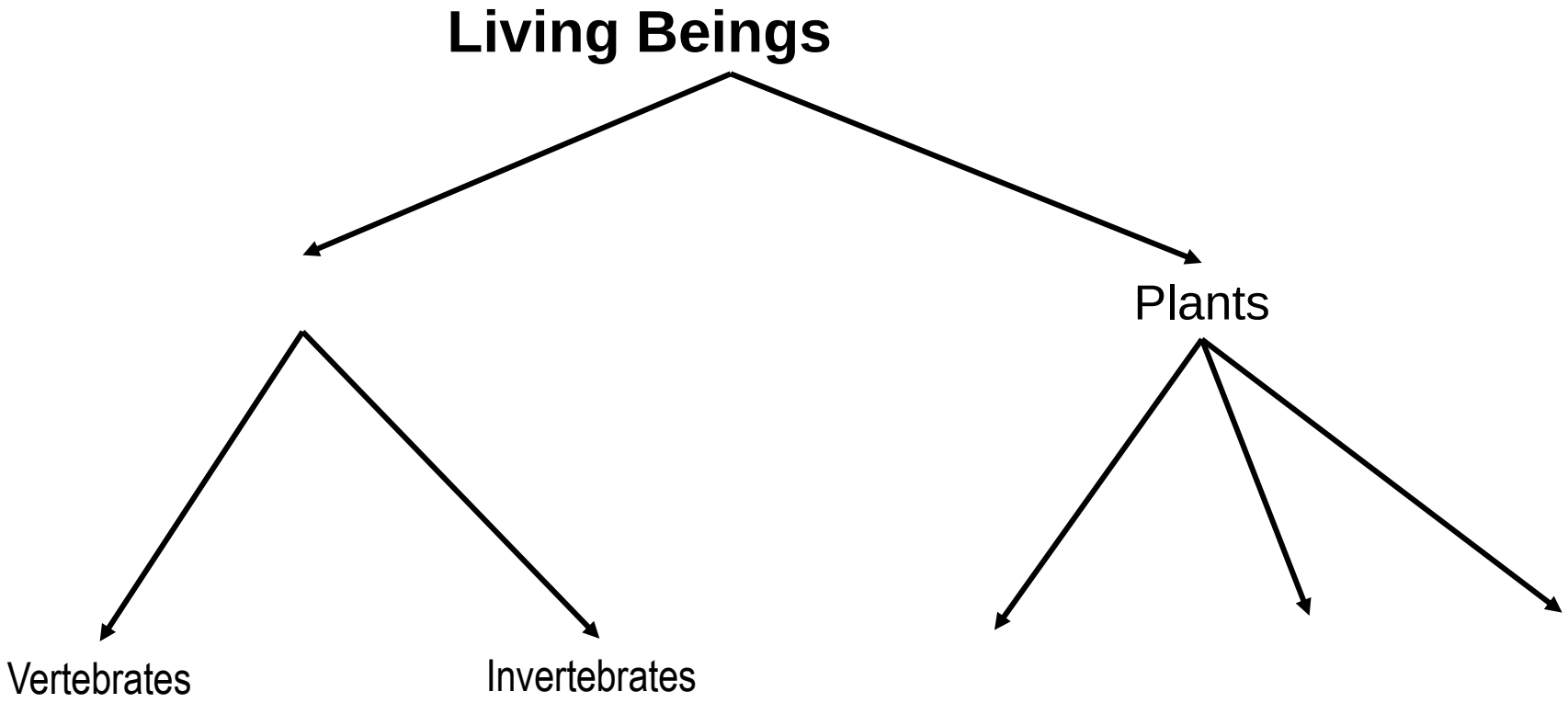
Ontologies & Taxonomies



- Taxonomy is a classification system where each node has only one parent and the single relationship between concepts is “ako” – simple ontology

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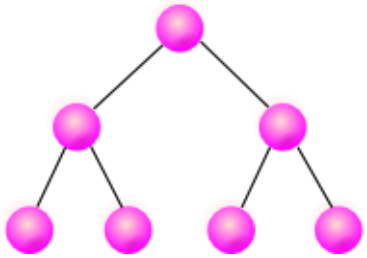
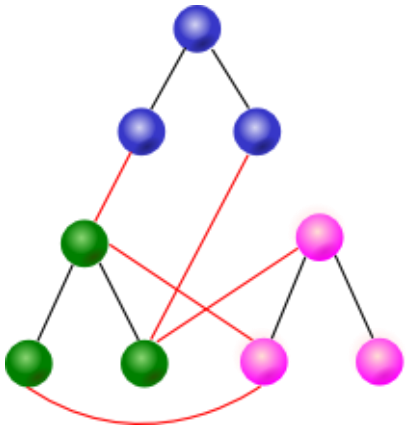
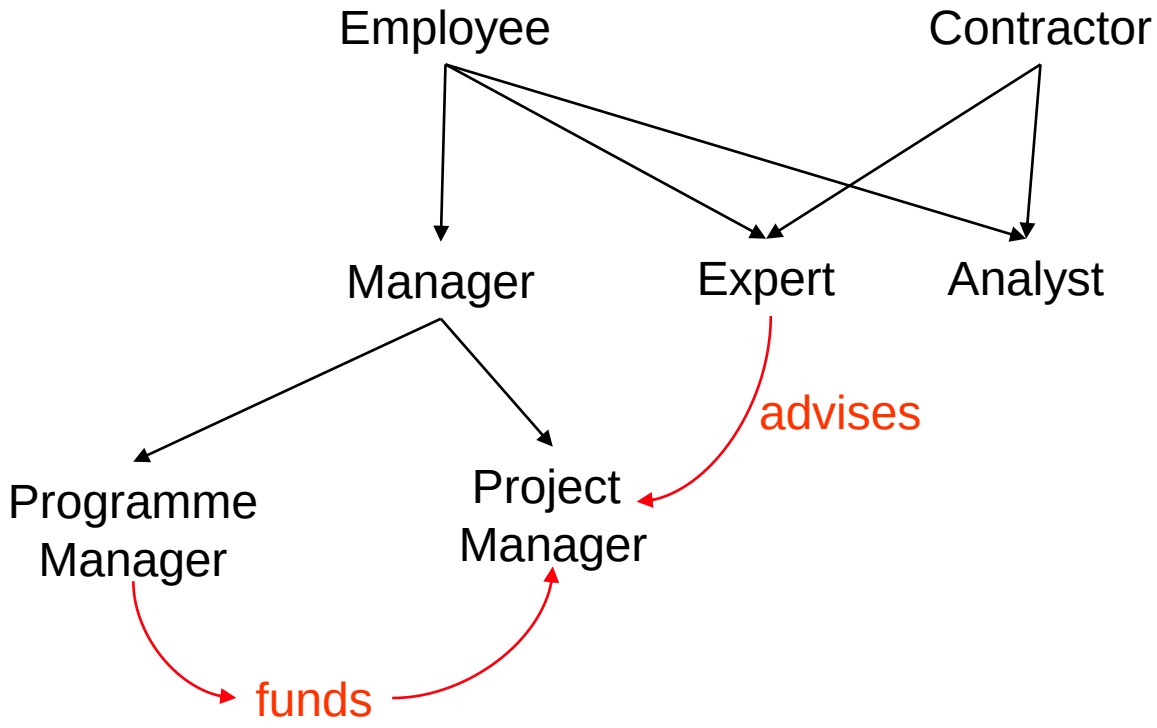
Example: Ontology of People and their Roles



Taxonomy



Ontology



- Ontologies offer richer representation - relationships between concepts

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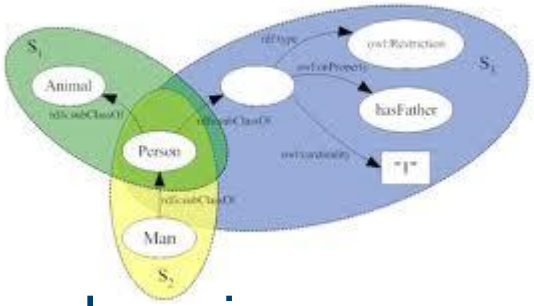
Semantic Web requires Ontologies



- Shared and common understanding of a domain
  - formal specification e.g. telecoms systems, public services
- Resources are more amenable to machine processing
  - programs can gather, analyse and search information
  - ontology management techniques and tools
- Define using ontological languages “RDF” and “OWL”
  - Standardised logic-based languages
  - Support for rules and reasoning
  - Knowledge discovery - infer new information from that explicitly stored

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Why develop an ontology?

- **To define information (e.g. web-based) more precisely and make it more amenable to machine processing**
  - by linking data to a formal ontology
- To make domain assumptions explicit
  - Easier to change domain assumptions
  - Easier to understand and update legacy data
- To separate domain knowledge from operational knowledge
  - Re-use domain and operational knowledge separately
- To share a consistent understanding of what information means
- To allow reasoning about data

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Ontologies and Description Logic

- Reasoning over ontologies
- Inferencing capabilities

X co-wrote D; Y co-wrote D ⇨
X and Y collaborate

Allergy(X) & triggered_by(almonds, X) ⇨
Nut-allergy(X)

Supplies(X,Y) & Supplies (Y,Z) ⇨
Supply-chain-partners(X,Z)

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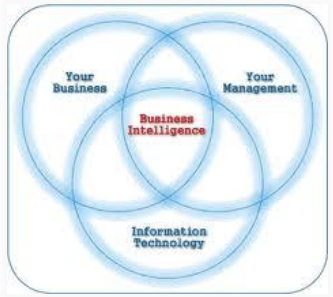

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Semantic knowledge management

Semantic knowledge management classifies, finds, distributes, shares and uses knowledge based on meaning not the particular words used to represent meaning.

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Semantic knowledge management

In three words

Semantic knowledge management classifies, finds, distributes, shares and uses knowledge based on meaning not the particular words used to represent meaning.

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Words and meanings

- same word, different meanings

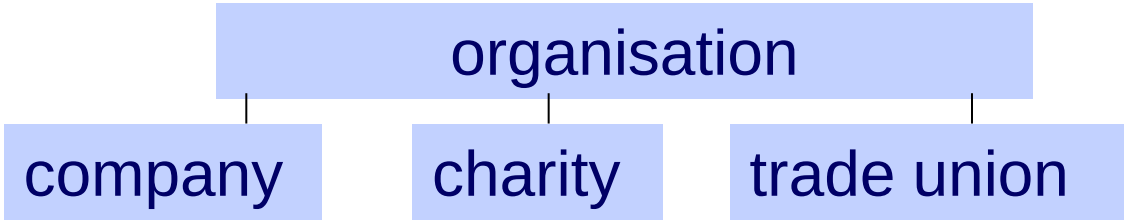
Jaguar

- different words, same meaning

disability legislation

equal opportunity laws

- different words, related meaning
  - leading to inheritance (and other) reasoning



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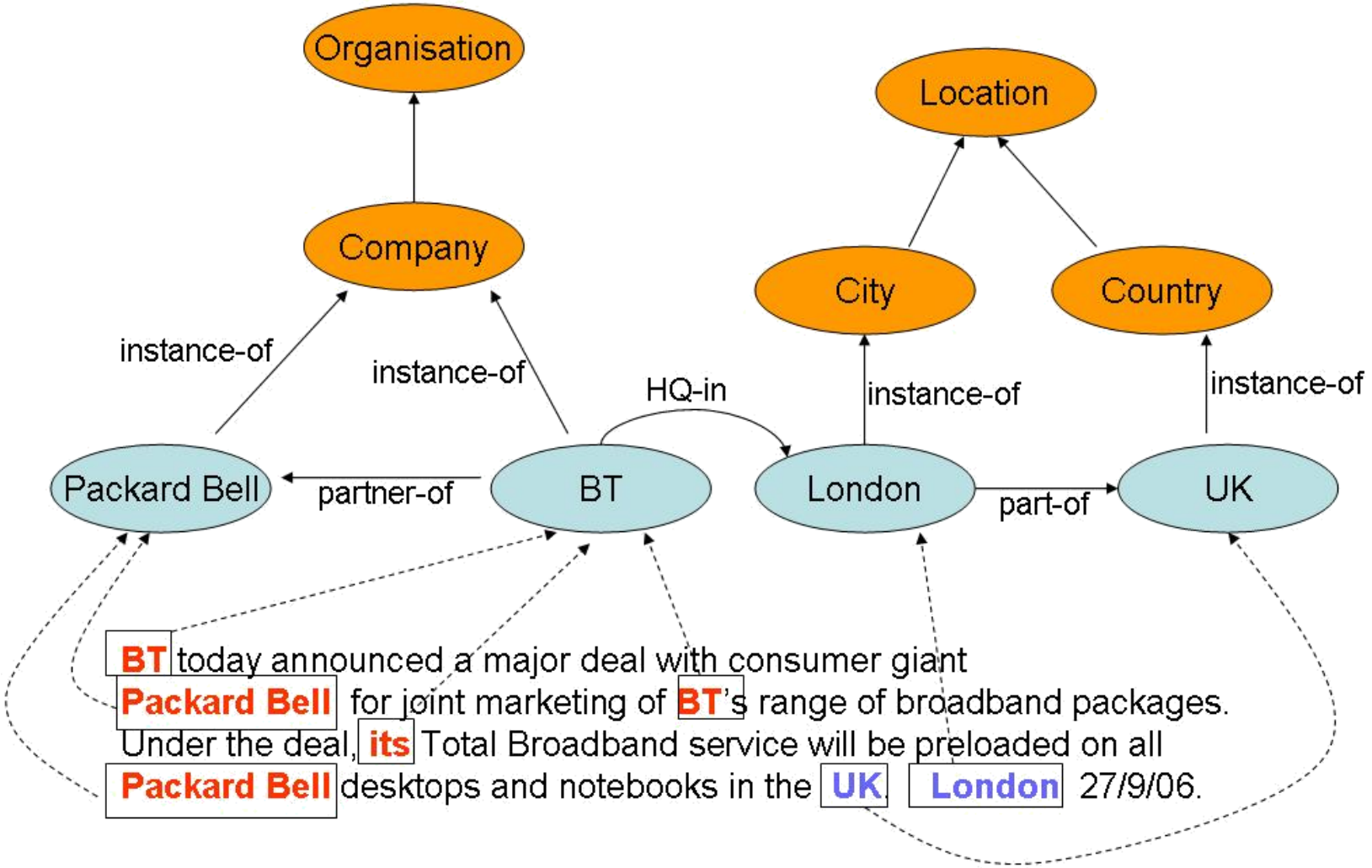
Semantic Annotation

key to semantic knowledge management



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Semantic Browsing (KIM)

Microsoft Corporation is a Public Company located in United States and Worldwide. Designs, develops, manufactures, licenses, sells and supports a wide range of software products. Its webpage is www.microsoft.com. It is traded on NASDAQ with the index MSFT. Key people include:
Bill Gates - Chairman, Founder
Steve Balmer - CEO
John Conners - Chief Financial Officer
Last year its revenues were $36.8bn and its net income was $8.2bn.

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Precision in Semantic Web Search

- Semantic Search could match
  - a query: *Documents concerning a telecom company in Europe with a new director*
  - With a document containing: *“At its meeting on the 10th of May, the board of the UK company Vodafone appointed John Smith as Chairman"*
- Ontology-based search engines can do the required reasoning:
  - Vodafone is a mobile operator, which is a kind of telecom company;
  - Vodafone is in the UK, which is a part of Europe;
  - Chairman is a type of director

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Project ACTIVE

- Improved knowledge management
- 2 key technology themes
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    - context and task switching is a ‘productivity killer’
  - Knowledge sharing with semantic technology
    - Semantic wiki technology for more effective knowledge re-use

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Context Management - Motivation

Context as key to effective information delivery

User	Context
Salesperson	Customer
Lawyer	Case
Project manager	Project, task, project phase
Marketer	Product, marketing campaign
Researcher	Paper, particular experiment

But not prescriptive – user chooses what context is right for his situation

Guiding presentation of emails, files, search results …

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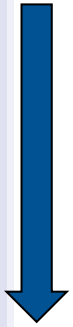
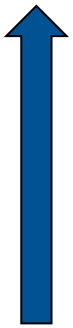
Top-down and bottom-up



User creates contexts, selects current context and associates information objects with contexts



Machine learning techniques discover contexts, detect current context and associates objects with contexts
- but the user is always in control

context = that set of information objects which a user finds it convenient to cluster for carrying out their work

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Knowledge sharing with Semantic Media Wiki

- Creating informal semantics
  - London is capital of the [[is capital of :: U.K.]]
- Defining equivalences
  - e.g. ‘knows about’ equated to ‘is expert in’
- Informally creating a knowledgebase
  - facts, people …

Developments in ACTIVE include:
- lightweight ontology editor
- query creation & editing

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ACTIVE technology & its application in BT
The customer: BT Business

- BT Business
  - Provide Information & Communications Technology (ICT) services, infrastructure and solutions
  - Market: Small to Medium Enterprises (UK)
  - single site to large multi-outlet retail chains
- BT Business sales force
  - Account managers: desk-based and mobile
  - Sales specialists
  - Technical/solutions consultants
  - Typically working with multiple customers, products & services

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Requirements: key findings

- Job shadowing, semi-structured interviews

Key requirements:

- easier context switching
  - 10's of customers, 100's products & services
  - contexts usually map to customers
  - (semi-)automatic approach
- finding right information easily & quickly
  - as context changes (e.g. by external interrupts)
- improve speed & quality of solution design
  - analysis reveals speed of response critical to win rate
  - knowledge re-use and avoidance of duplicated effort

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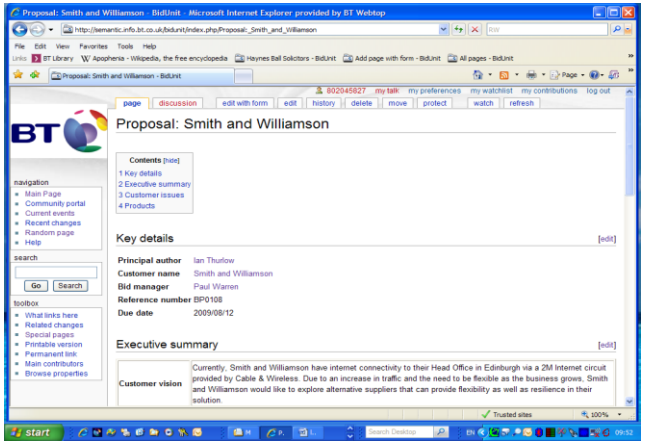
ACTIVE in BT

Semantic Wiki for Solution Design



ACTIVE Knowledge Workspace for personal productivity

Solution Design

- For larger customers, BT often needs to combine multiple products and services into complex solution designs
- Currently stored in a variety of formats and locations => hard to locate and re-use

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Didn’t we just create a proposal just like the one I’m working on?

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Solution Design

- Challenges
  - How to publish information in a useful (re-usable) way
  - How to find previous relevant designs
  - How to find people with experience relevant to the current design
  - How to extract management information

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Wikis

- Wikis today - powerful collaborative tools
- Good for informal knowledge sharing
- Inconsistencies
  - Price of Cisco CX312 router: £29999.00, £37000.00, …
- No constraints
  - “John Smith manages Project Cadence”
  - “Tom Evans manages Project Cadence”
- Limited keyword search

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What Wikipedia knows

- Wikipedia has articles about…
  - … cities
  - … their populations
  - … their mayors

So can I ask for a list of the world's ten largest cities with a female mayor?

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Let’s see what happens…

Search

From Wikipedia, the free encyclopedia

For more information about searching Wikipedia, see Wikipedia:Searching.

MediaWiki search Search

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Search

From Wikipedia, the free encyclopedia

You searched for **What are the ten largest cities with a female mayor?** [Index]

For more information about searching Wikipedia, see Wikipedia:Searching.

What are the ten largest cities with a female mayor? MediaWiki search Search

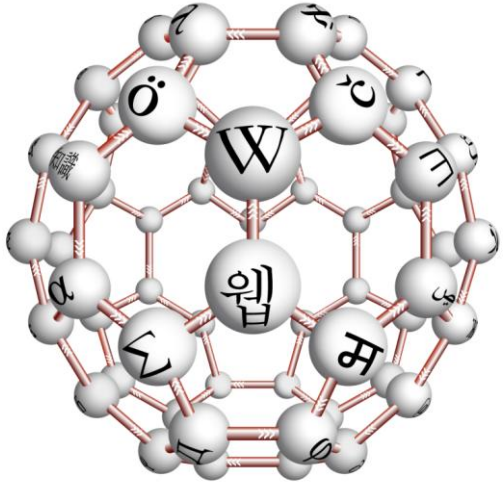
There is no page titled "What are the ten largest cities with a female mayor?".

Results 1-20 of 345

1 2 3 4 5 6 7 8 9 10 11 Next »

- Manhattan
  Relevance: 100.0% - -
- Chicago
  Relevance: 99.5% - -
- Washington, D.C.
  Relevance: 97.7% - -
- St. Louis, Missouri
  Relevance: 97.6% - -

Semantic Wikis



- Building on wiki benefits
- Adding structure
  - Typing pages & semantic links between pages
    - This page describes a person
    - The person described at this page manages the project described at this page
    - A project manager is a kind of person
    - ….
- Offering semantic search, reasoning, automatic report generation

SMW
Semantic MediaWiki

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Improving the Solutions Design process

- Enhanced **semantic** wiki developed to provide
  - semantic data modelling – ontology for BT Business sales
  - a forms facility for easy information entry (annotation)
  - a collaborative forum for document creation and sharing
- Ability to model relationships
  - John Smith is an expert in Wide Area Networks
  - Cisco-9000 is a kind of router

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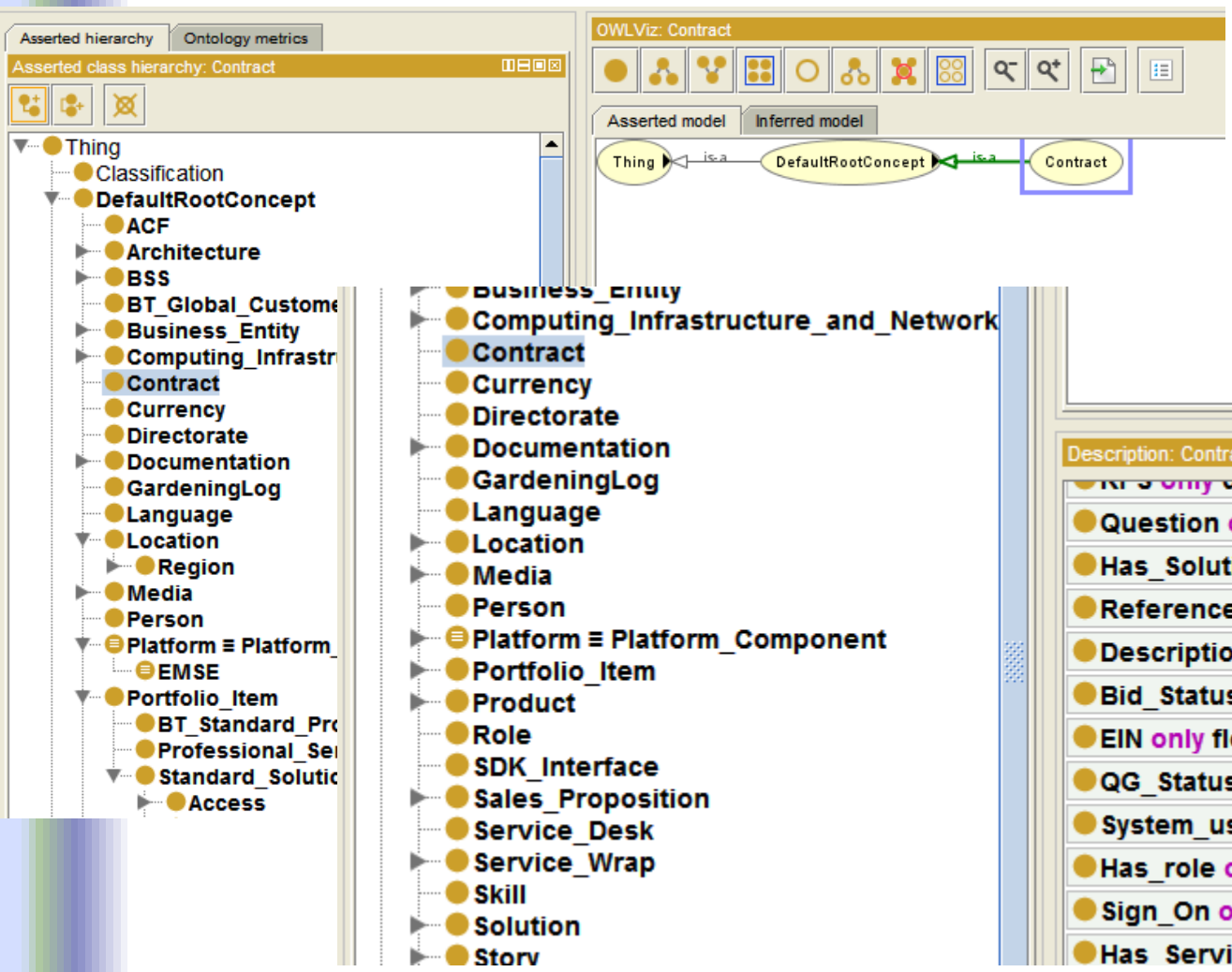
Ontology fragment



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Semantic Wiki:
Answering Questions

- Information entered in a structured form
- Allows answers to questions like find…
  - … all solutions involving IPX product
  - … all project managers based in US
  - … all service desks where Italian is spoken
  - … all solution designers who have worked with Nortel equipment

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Semantic Wiki: Reasoning & Maintenance

- Reasoning
  - France is in Europe; Paris is in France; John Norton has worked on a solution design in Paris

    → John Norton has worked on solution design in Europe
  - Inverse properties to automatically infer inverse relationship
- Maintenance
  - Does every bid have one bid manager?
  - Is there a service with more than one owner?
  - Does every project have a start date and end date and is the end date later than the start date?
  - Are all service bundles specified for Germany contain only services that can be deployed in Germany

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Client Solutions Repository - SolutionsCatalogue - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://semantic.info.bt.co.uk/SolutionsCatalogue/index.php/Client_Solutions_Repository

Client Solutions Repository - Solutio...

Administrator my talk my preferences my watchlist my contributions log out

BT Solutions Catalogue Prototype

UserLogin > Main Page > Main Page Proposal > MovePage > Client Solutions Repository >

page | discussion | annotate | edit | history | delete | move | protect | watch | refresh

Client Solutions Repository

repository menu

- Add ACF entry
- See all ACFs
- Add a Bid/Contract
- See all Bids/Contracts
- Bid pipeline (experimental)
- Add an SDK Interface
- See all SDKs
- Add a Service Desk
- See all Service Desks
- Service Desk Selector
- Add a Product
- See all Products
- Add a Solution
- See all Solutions (Design Notes)
- See where solutions are used.
- Add a System
- See all Systems
- See where Systems are used
- See all People
- Add a role

This **Client Solutions Repository** is being built as a proof of concept to support the development of a Contract Design Framework for Client Services. It provides a resource for the use of the entire client services community and enables a number of key perspectives on our activities to be provided for. See the menu on the left hand side of this page.

The fundamental capability is that of a Wiki whereby users can create, maintain and publish information on-line. However, this implementation makes extensive use of semantics, page templates and entry forms to ensure consitency of information capture, meta data tagging of key information and reuse of data (through the extensive use of in-line queries in the templated pages).

The repository is currently divided into 4 main areas:

People – Skills – Roles
Solutions – Stories – Products
Platforms – Systems – Interfaces
Contract and Bid pipeline

News

RSS

- 11 September 2009: Roles now associated with entries in the Person Category

Browse

- See all Bids/Contracts
- Bid pipeline (experimental)
- Service Desk Selector
- See where Solutions are used
- See where Systems are used

View

- ACFs
- Customer Service Desks
- SDKs
- Solutions (Design Notes)
- Products
- Systems
- People
- Roles

Add

- Add ACF entry
- Add a Bid/Contract
- Add an SDK Interface
- Add a Service Desk
- Add a Product
- Add a Solution
- Add a System
- Add a Role

Done

BT

page | discussion | edit with form | edit | history | delete | move | protect | watch | refresh

Edit ContractAndBid: Test Contract

Contract

Customer:	MyCustomer
Tier:	4
Solution Architect:	Joe Smith
Network Designer:	Jane Doe
Service Designer:	A N Other
ICT Designer:	Charlie Brown
Siebel Bid ID:	1-12345AB
Siebel Opportunity ID:	
GS Booking Code:	AB12345
Estimated Value(£M):	55
BT Design Value(£M):	1.5
Umbrella ACF:	ACT21646
Contract ACF:	ACT21591
Livelink folder ref:	
Service Desk:	Test Customer Service Desk,
Uses Product:	BT MPLS, CLAN, Managed Internet A
Uses Solution:	Managed CLAN,

Bid

Type:	Firm		
Bid Manager:	Peter Parker		
Bid Status:	Won		
Quality Gate Status:	(QG6)Bid Sign-off Completed		
SA RAG Status:	GREEN		
Contract Start:	1	November	2009
RFS:	1	January	2010
Contract End:	1	October	2014
Sign On:	1	April	2009
MPR:	10	July	2009
Sign Off:	28	July	2009
Code Name:	Test		
Directorate:			
Region:	EMEA		

Free text:

page | discussion | edit with form | edit | history | delete | move | protect | watch | refresh

Edit Service Desk: Test Customer Service Desk

Country:	UK
City:	Test
Time Zone:	GMT
Working hours:	24 X 7
Disaster recovery desk:	
3rd Party management:	
Toll free access:	International
Secuirity cleared agents available:	Yes
Language:	English
System(s) in use:	Chameleon, CIVT, Clarify, Classic, E:

Free text:

Summary

This is a minor edit Watch this page

Save page | Show preview | Show changes | Cancel

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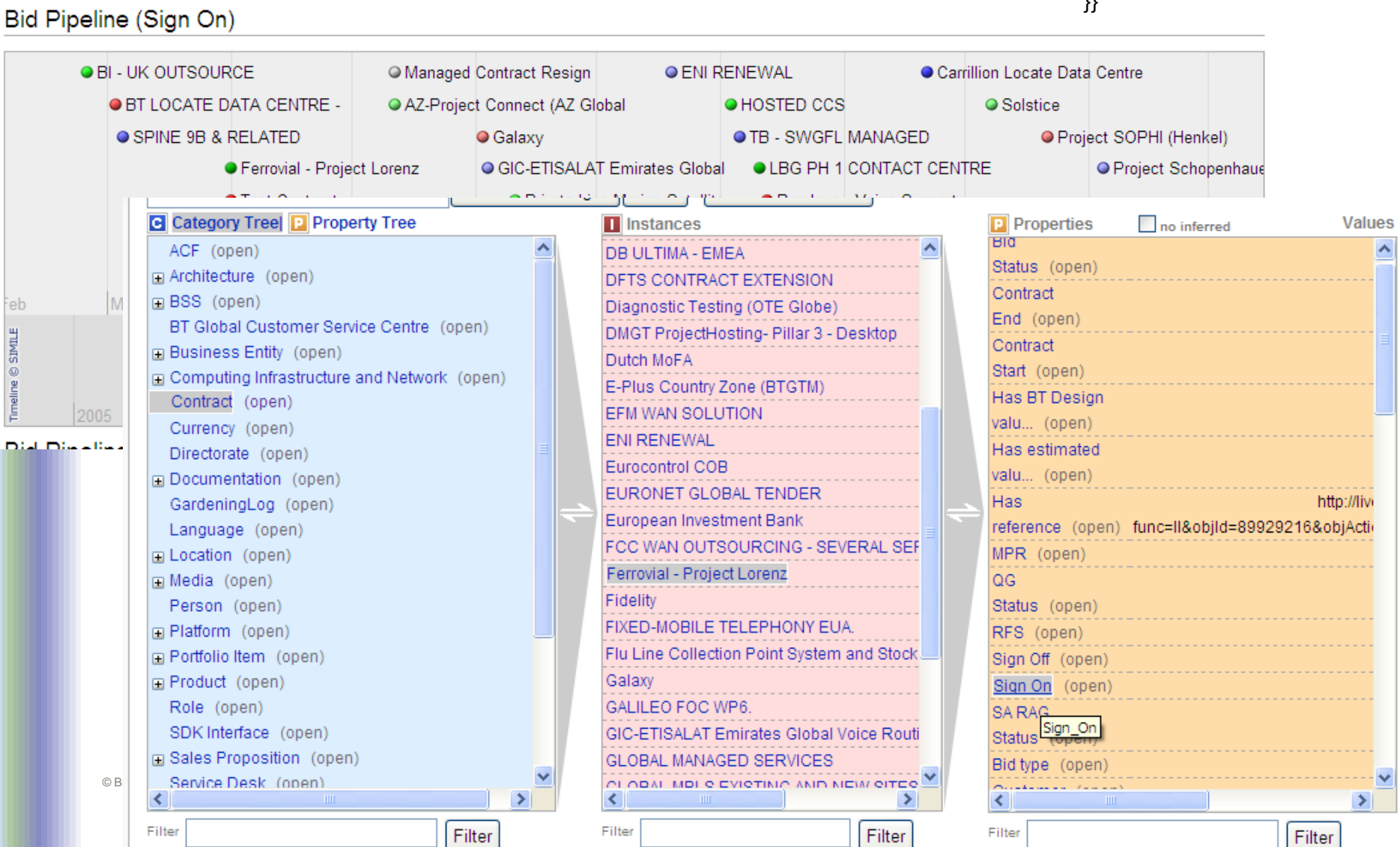
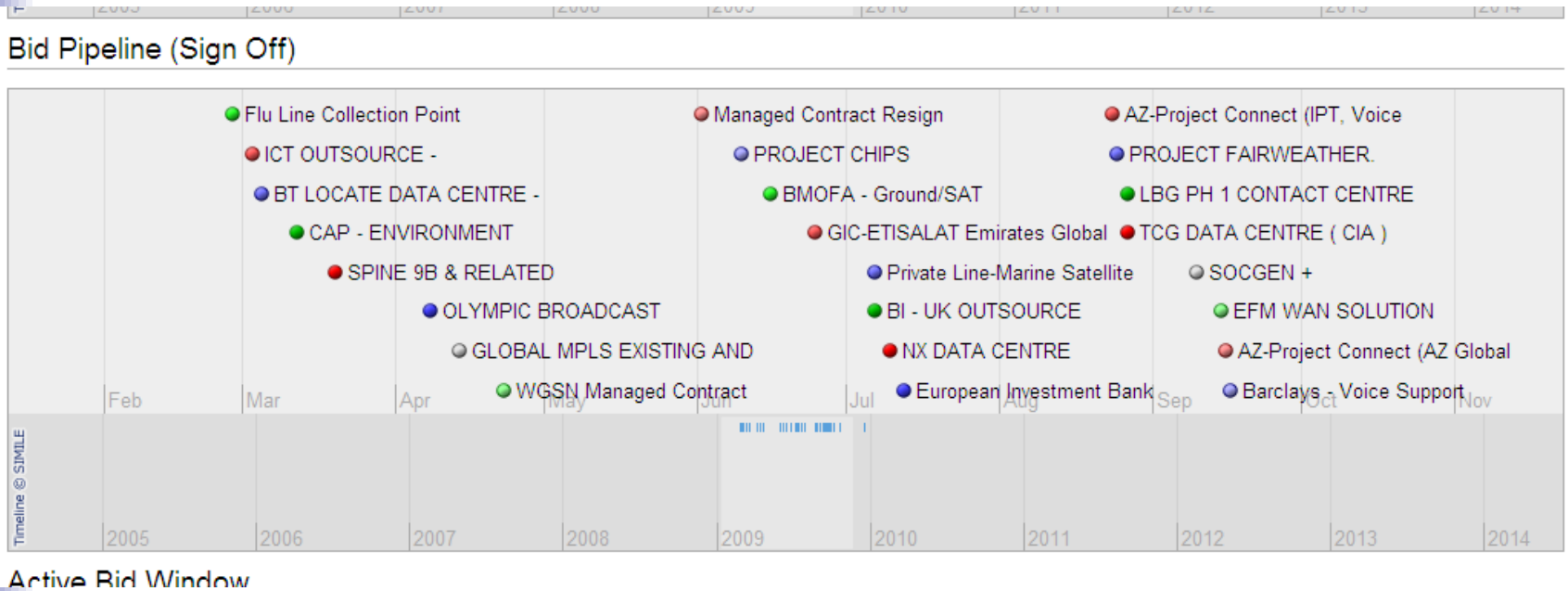
Bid Pipeline (Sign On)

```
{{#ask: [[Category:Contract]]
|?Sign On
| format=eventline
| sort=Sign On
|order=descending
|timelinebands=MONTH,YEAR
|timelineposition=today
|limit=40
}}
```



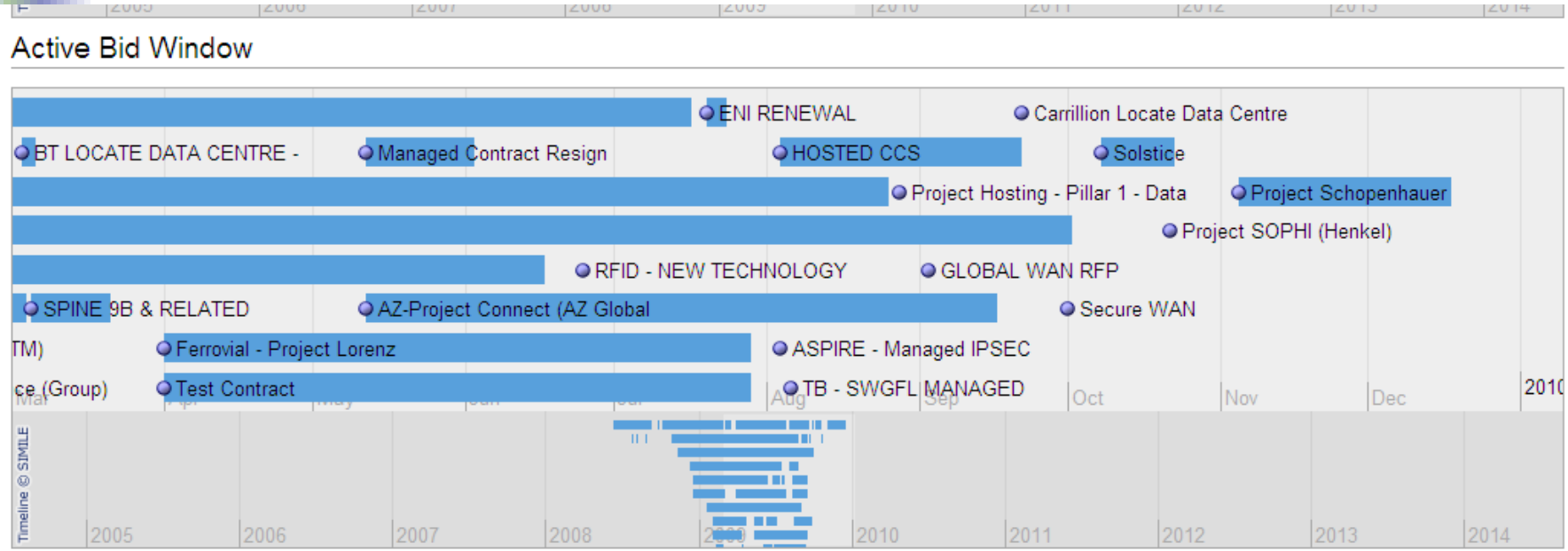
Bid Pipeline (Sign Off)

```
{{#ask: [[Category:Contract]]
|?Sign Off
| format=eventline
| sort=Sign Off
|order=descending
|timelinebands=MONTH,YEAR
|timelineposition=today
|limit=40
}}
```



Bid Pipeline (Active Bids)

```
{{#ask: [[Category:Contract]]
|?Sign On
|?Sign Off
| format=timeline
|sort=Sign On
|order=descending
|timelinebands=MONTH,YEAR
|timelineposition=today
|limit=60
}}
```



- Significant manual effort required previously

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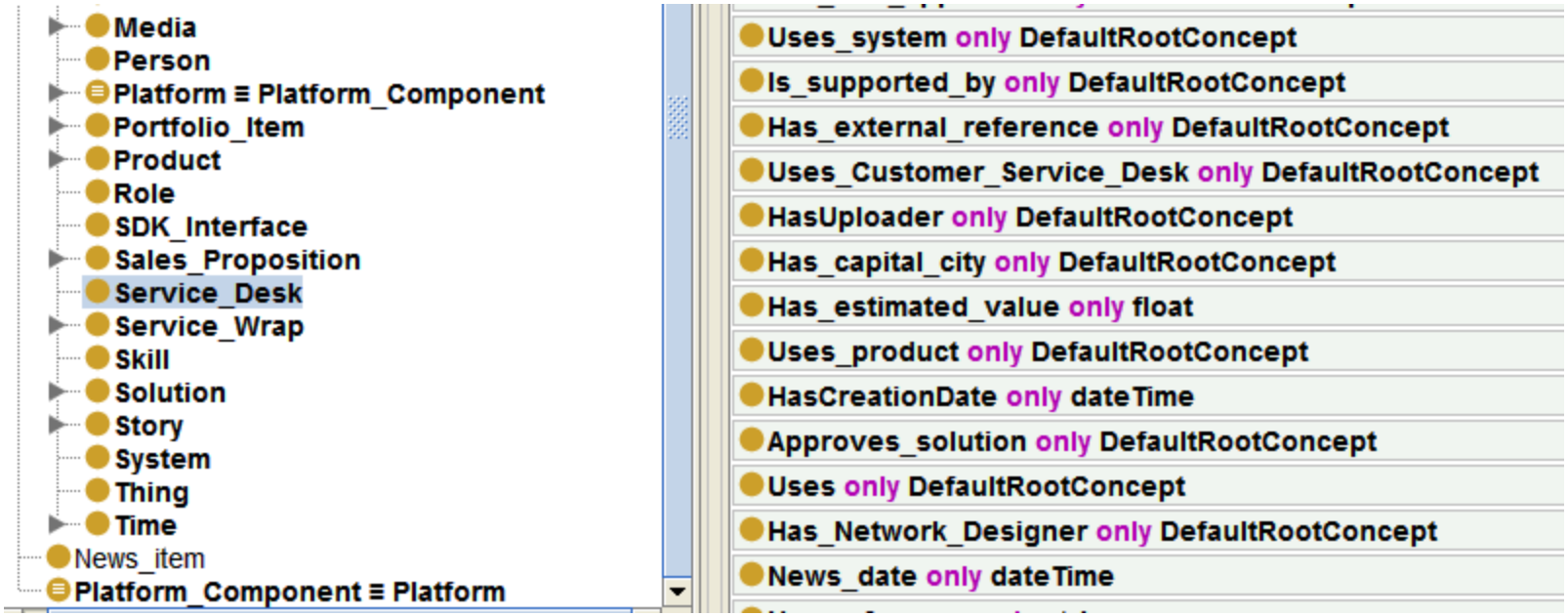
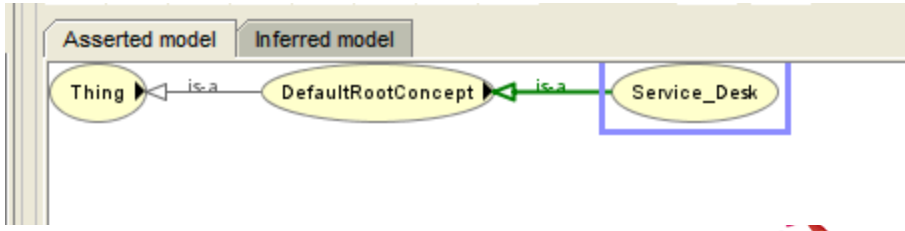
Service Desk





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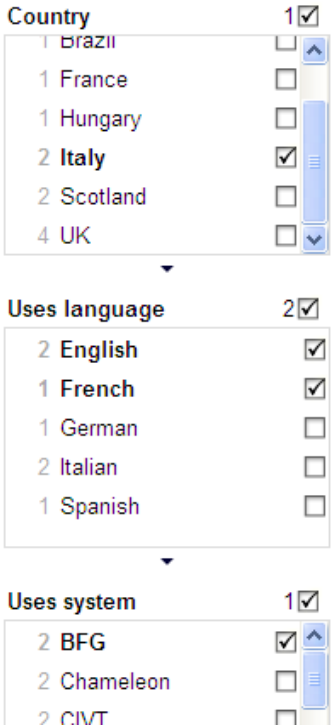
Service Desk Selector

```
{{#ask: [[Category:Service Desk]]
|?Country
|?Is in=Timezone
|?Uses language=Italian
|?Uses system
|?Supports
| format=exhibit
| views=tabular,tiles
| limit=100
| facets=Country,Uses language,Uses system,Supports,Supports,Timezone}}
```

TABLE • TILES

	Country	Timezone	Uses language	Uses system	Supports
Milan Customer Service Desk	Italy	GMT+1	English and Italian	Clarify, BFG, Netcool, EMSE SMARTS Availability Manager, Chameleon, CIVT, Classic, Expedio FM, GS One Portal, HPSC, Klara, MPLS DU, Orion, and TACACS	ATM, Access, BT Business Voice, BT Inbound Services, BT Internet, BT MPLS, BT Mobile Express, BT OneVoice, BT OneVoice Conferencing, BT OneVoice Global VPN, BT OneVoice Mobile Access, BT Wholesale VOIP, BT iWorks, CLAN, Conferencing, Expedio order management, Firewall, Frame Relay, IPSec, Inventory Management, Private Leased Lines, Request management, and Service Desk Function
Rome Customer Service Desk	Italy	GMT+1	Italian, English, German, French, and Spanish	Clarify, BFG, Netcool, EMSE SMARTS Availability Manager, Chameleon, CIVT, Classic, Expedio FM, GS One Portal, HPSC, Klara, MPLS DU, Orion, and TACACS	BT Business Voice, BT Contact Centre, BT Inbound Services, BT Internet, BT MPLS, BT Mobile Express, BT OneVoice, BT OneVoice Conferencing, BT OneVoice Global VPN, BT OneVoice Mobile Access, BT Wholesale VOIP, BT iWorks, CLAN, Conferencing, Firewall, Frame Relay, IPSec, and Private Leased Lines



BT

Country	UK
City	Leavsden
Time Zone	GMT+0
Language(s)	English
System(s)	Chameleon, CIVT, Clarify, Classic, Expedio FM, HPSC, IMS, MPLS DU, Netcool, Orion, SMARTS, TACACS

Leavesden Service Desk can support the following Products and Solutions:

Supported Products	Supported Standard Solutions	
ATM	Availability Management	No contracts are currently recorded as supported by Leavesden Service Desk.
Access	B2B Bonding	
BT Business Voice	Event Management	
BT Contact Centre	Expedio Change Management	
BT Internet	Expedio Request Management	
BT MPLS	Incident management	
BT Mobile Express	Inventory Management	
BT OneVoice	Release Management	
BT OneVoice Mobile Access	Request management	
BT Wholesale VOIP		
BT iWorks		
Conferencing		
Converged LAN		
Firewall		
Frame Relay		
IPSec		
Private Leased Lines		

Benefits

- Easy information entry
  - consistent format
  - shared repository
- Improved knowledge re-use
  - easier to find relevant information to current bid
  - easier to find people with relevant experience
- Improved management information
  - better access to info through structured queries
  - automatically generated reports
  - ‘how many solutions involve service X’
  - ‘how much Y do we sell in North America’
  - ‘which service desks can interact in Italian’

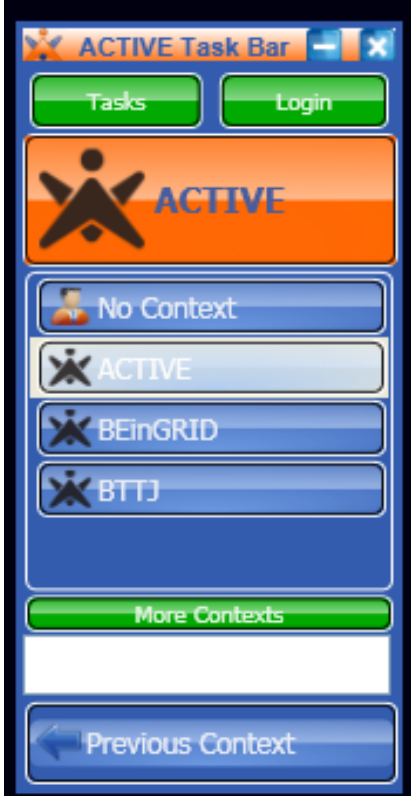
BT

Status

- Deployed in live environment
  - 300+ historic solution designs entered plus other information
  - now mandatory to create new designs using the system

BT

Automatic information filtering
in standard MS tools

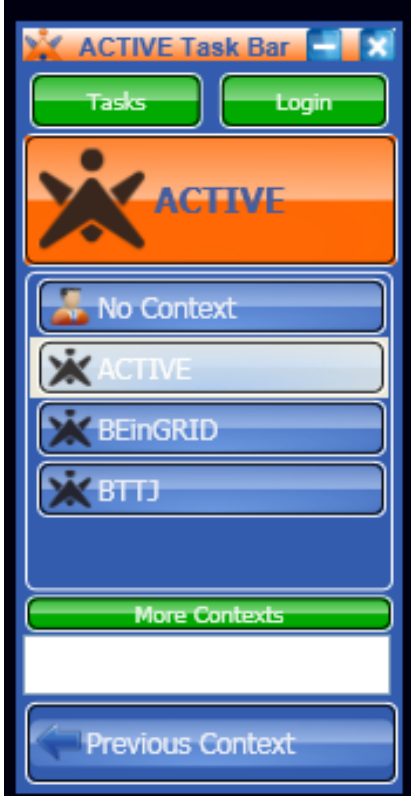


- Prioritising and filtering information relevant to your current work
- User defines and selects contexts (e.g. customers)
  - information prioritised according to context
    - email, search, opening a file
- Automated approach with machine-learning
  - learn association between information and context
  - learn contexts
  - automatically switch contexts
  - automatically discovers new contexts

BT

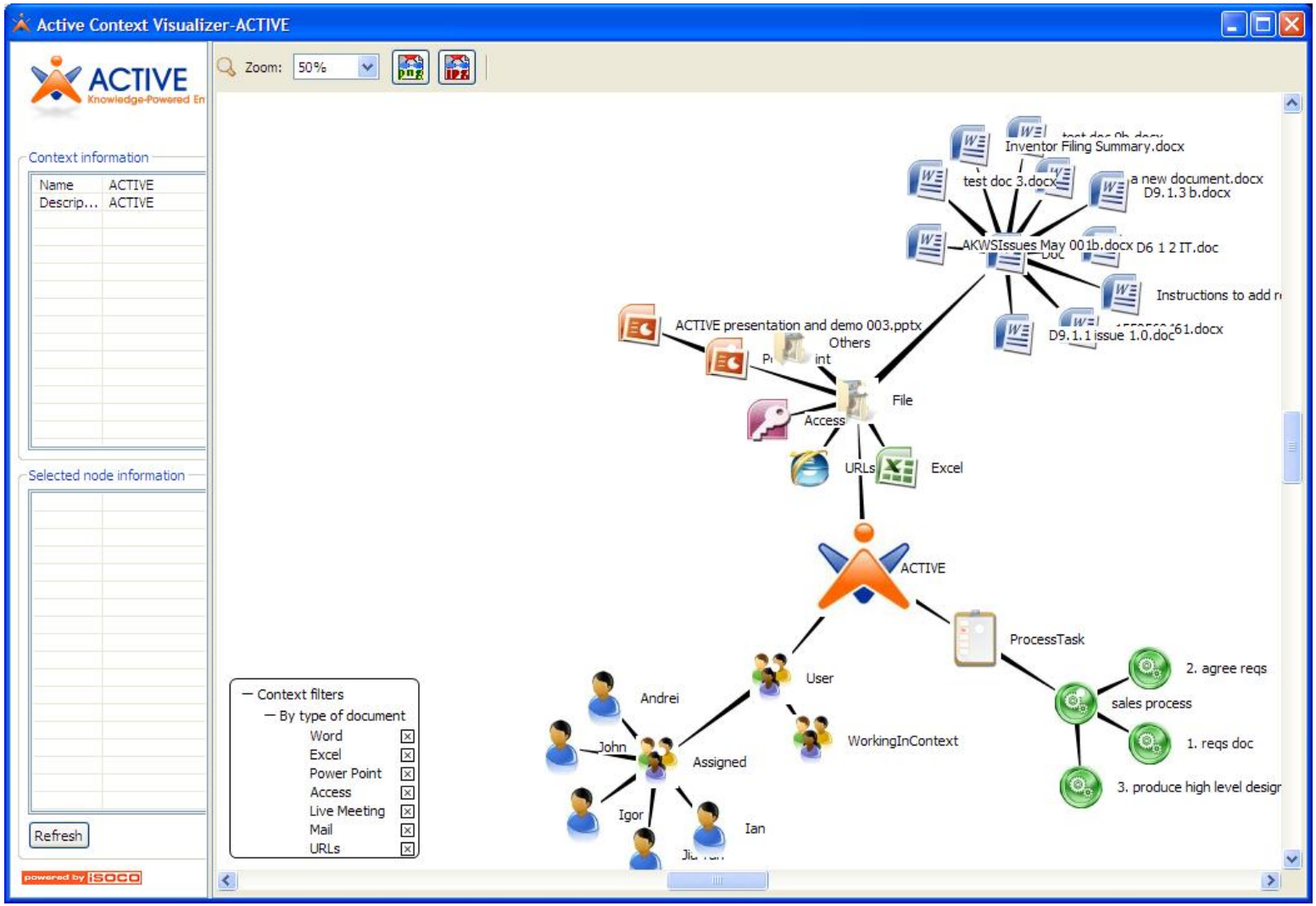
AKWS

- ACTIVE Knowledge WorkSpace
  - Activated MS applications (Word, PowerPoint, IE, Outlook, File Explorer)
    - Associate/de-associate information resources with a context
    - Tag information resources
      - user provided tags
      - system suggested tags
  - AKWS management portal
    - manage users
    - manage contexts and group contexts



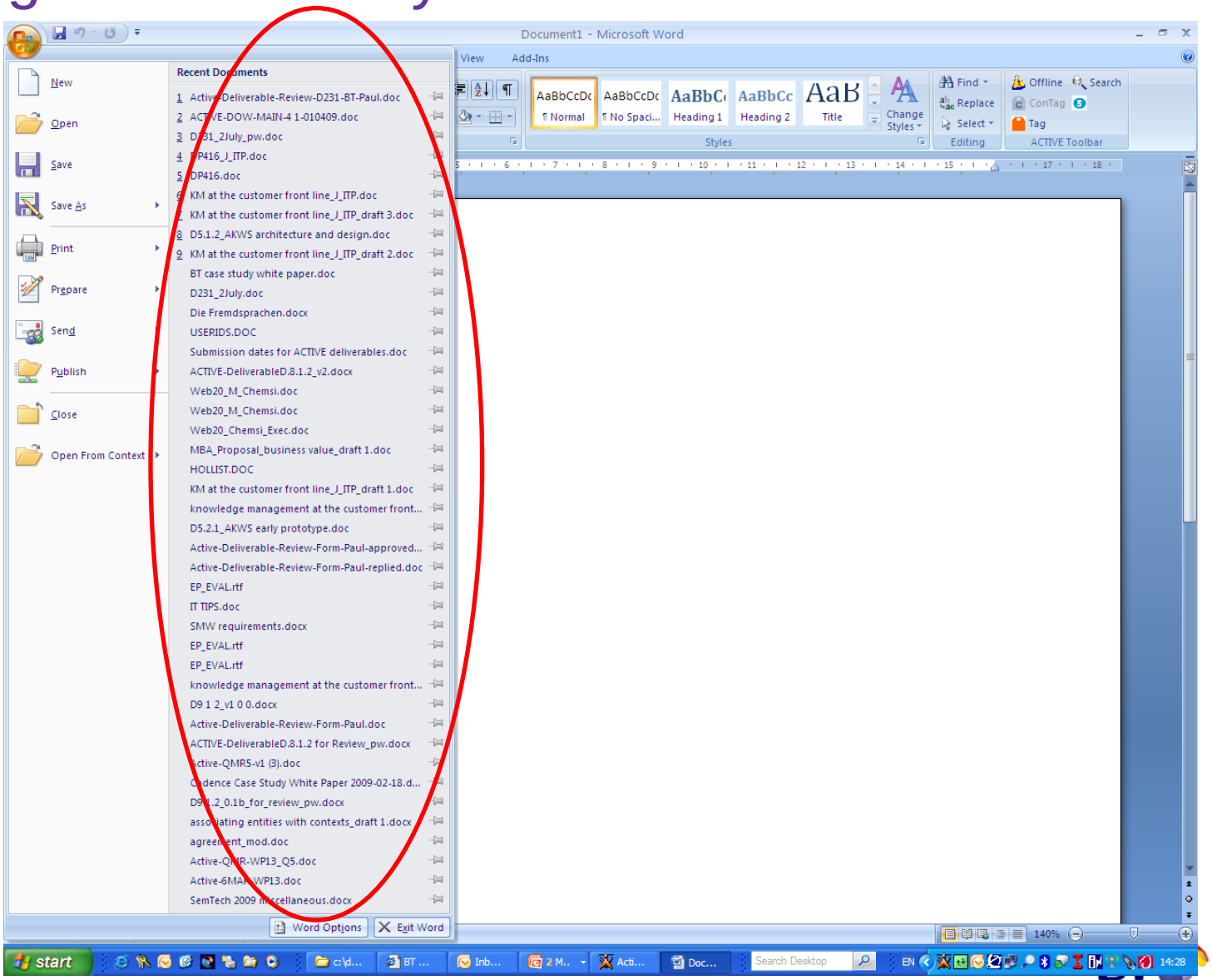
BT

AKWS - Context visualiser

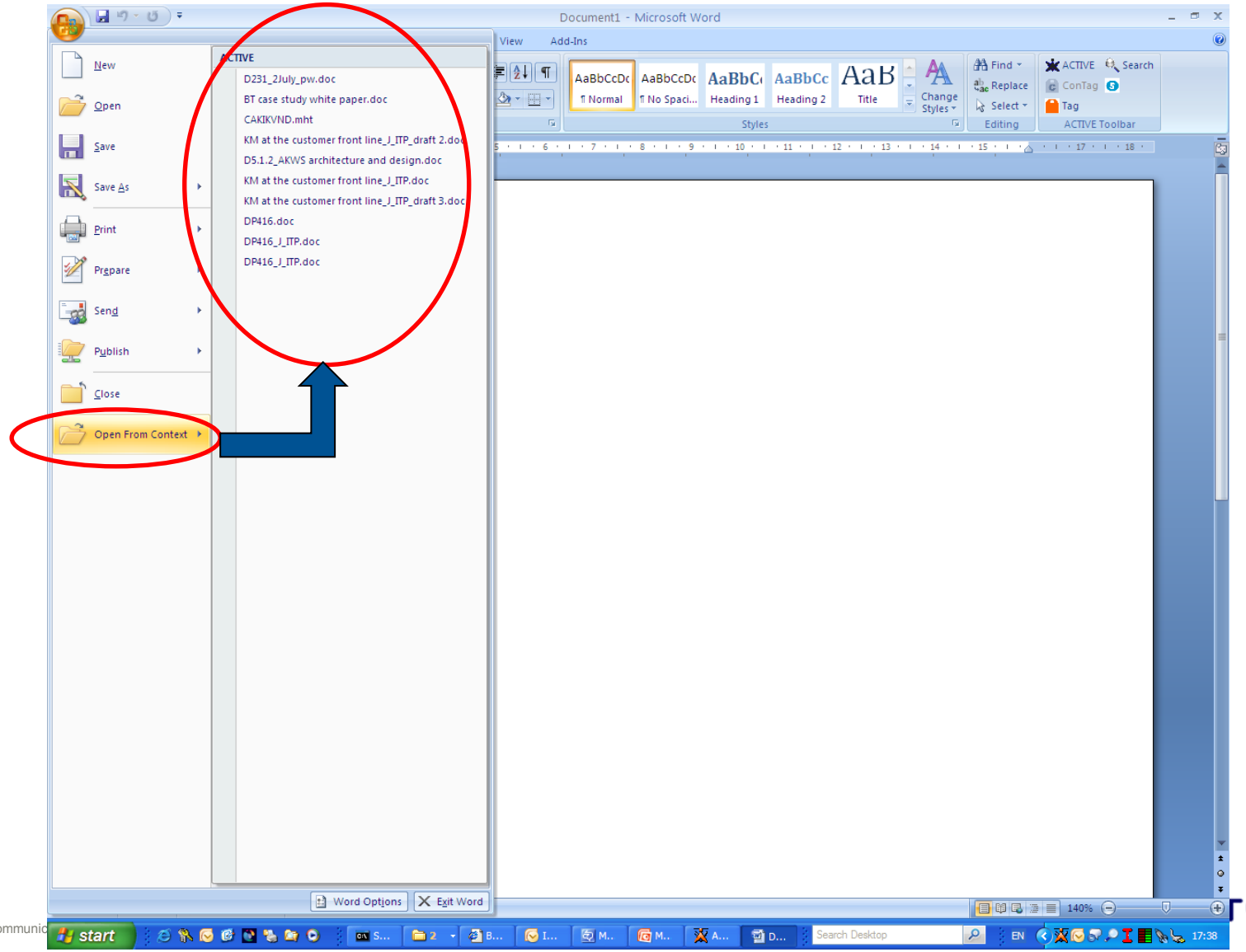


BT

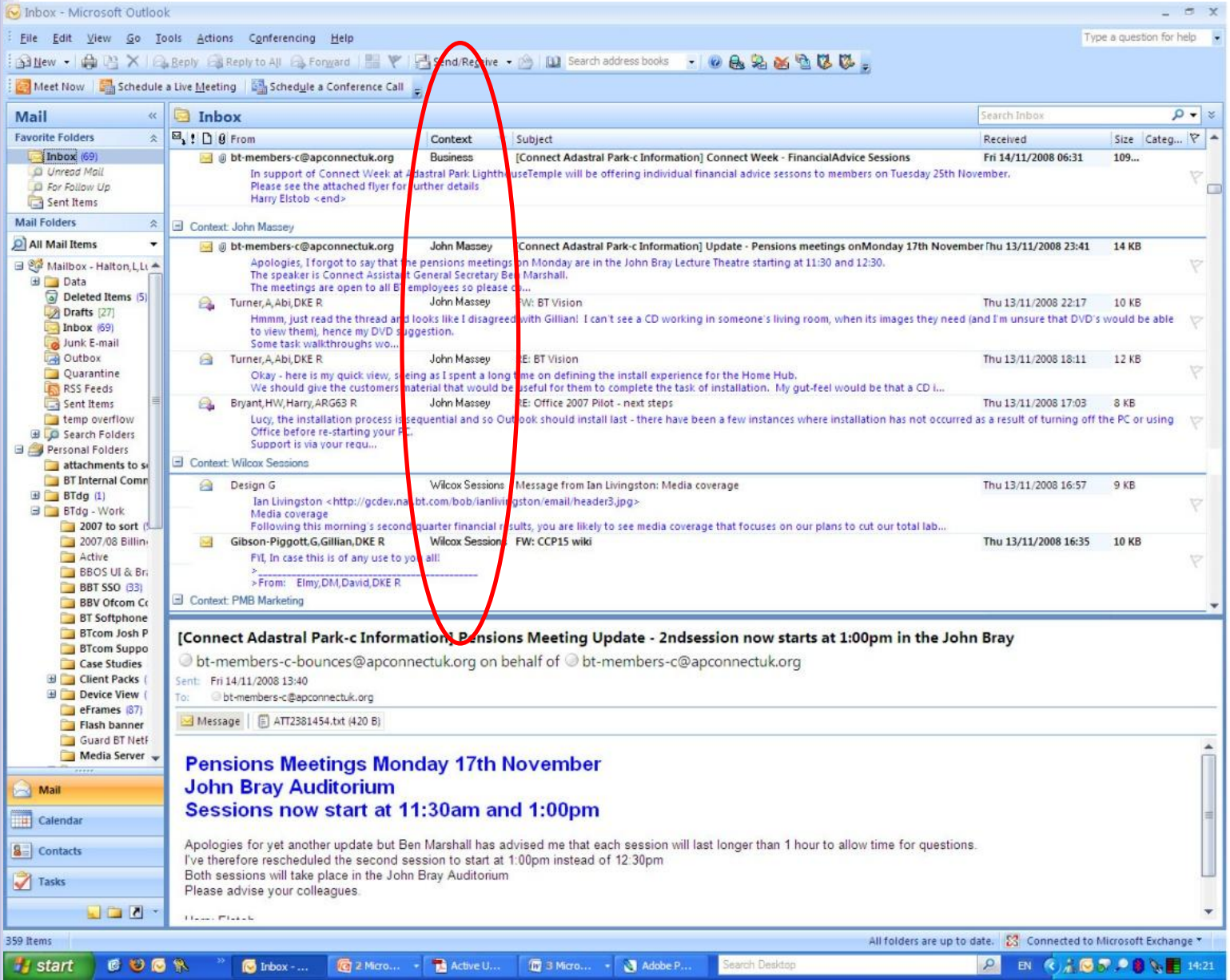
Opening a file normally



Opening a file from context



Context in email



Status

- Trial with restricted set of user (10-15) underway
  - Initial feedback very positive

"There is an increasing understanding of the potential of 'working in context' and for the data we have available to us to be 'arranged and presented in context'. In the past few weeks we have had people proactively approaching us to join in with the pre-trial activity, a very good sign."

- Ramping up to 100-150 over January-February
- Formal trial evaluation – results due March 2011

BT

Summing up

ACTIVE
using informal semantics and machine intelligence to
- combat information overload
- aid knowledge sharing

Being trialled in large-scale enterprise environments

Combining the low user-barriers of Web2.0
with the power of semantic technology

Prototype available for trial from ACTIVE website

BT

Linked Data

Linked Data

Linked Data Principles:

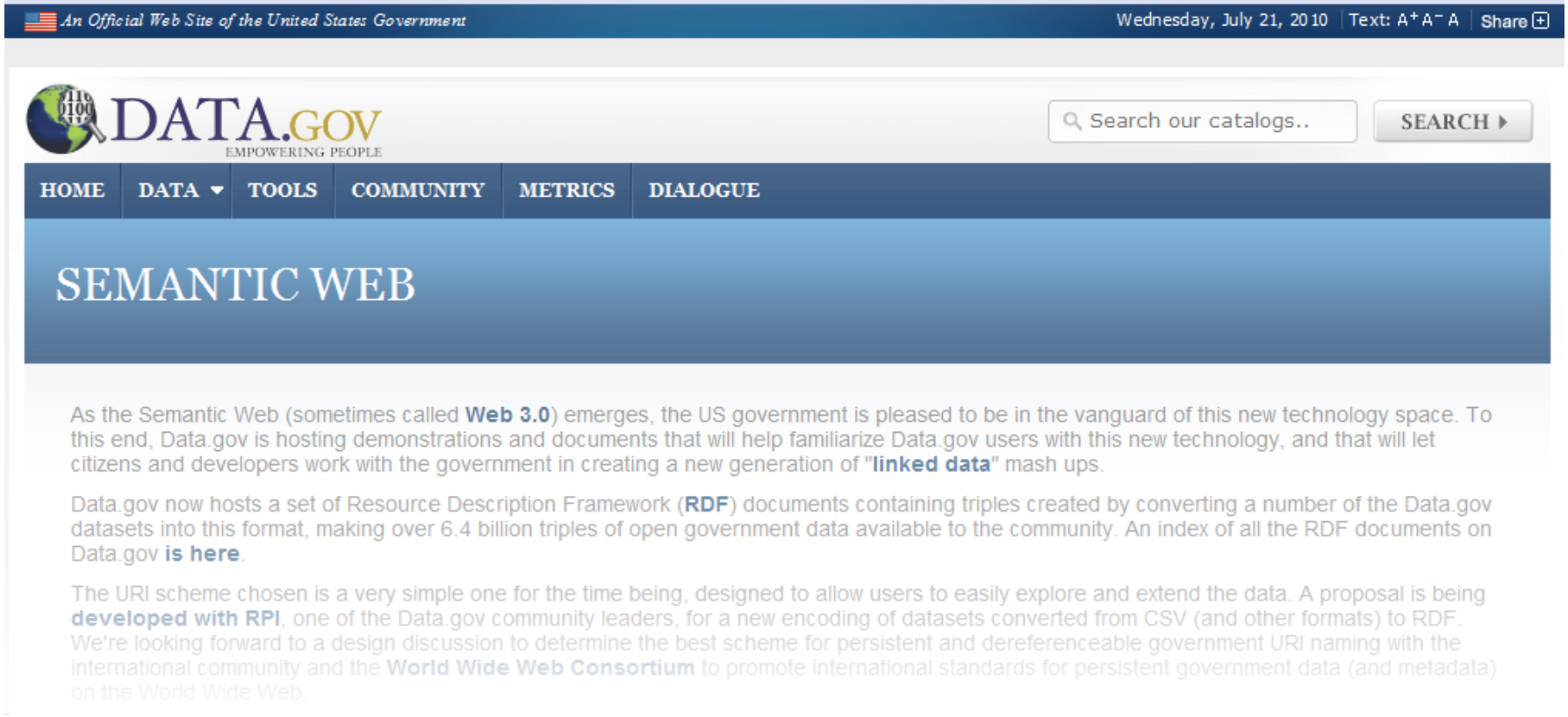
1. Use URIs as names for things
2. Use HTTP URIs so that people can look up those names.
3. When someone looks up a URI, provide useful information, using the standards (RDF*, SPARQL)
4. Include links to other URIs. so that they can discover more things.

- Also includes ‘best practice’, such as:
  - Separate URIs for real world entities (non-informational resources) from representations (informational resources), either by #URIs, or redirection (as shown before, but usually Status Code 303)

What RDF should be returned?

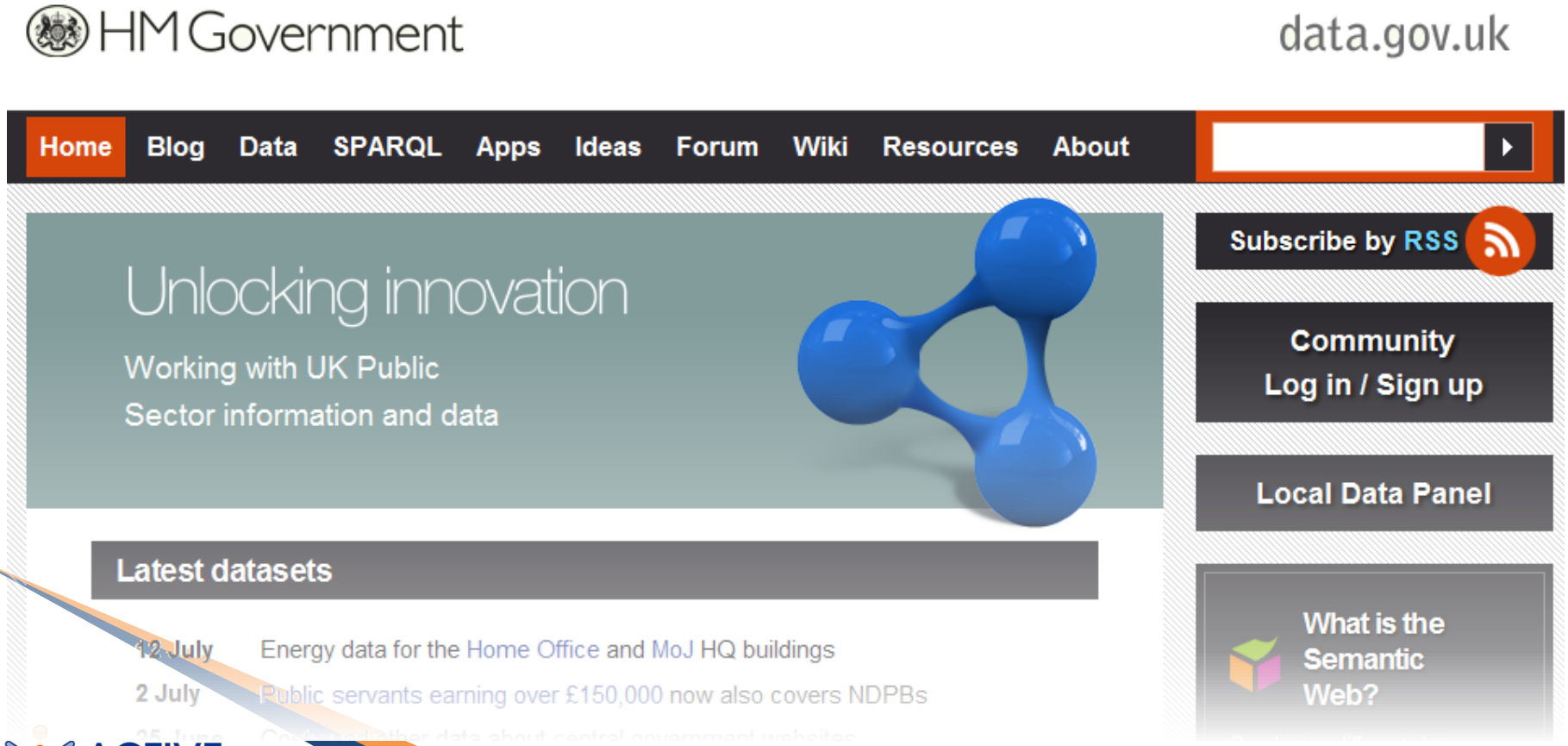
- **The (immediate) description:** All triples that have the resource's URI as the subject.
- **Backlinks:** All triples that have the resource's URI as the object. This is redundant, but it allows bi-directional traversal.
- **Related descriptions**: Anything about related resources that may be of interest in typical usage scenarios; use prudence.
- **Metadata:** Any metadata such as the author and licensing information.
- **Syntax:** At least RDF descriptions as RDF/XML which is the only official syntax for RDF.
  - As RDF/XML is not very human-readable, the data could additionally be provided in other formats; e.g., for MIME-type application/x-turtle.

Data.gov


An Official Web Site of the United States Government
Wednesday, July 21, 2010
Text: A+ A- A
Share
DATA.GOV
EMPOWERING PEOPLE
Search our catalogs..
SEARCH
HOME
DATA
TOOLS
COMMUNITY
METRICS
DIALOGUE
SEMANTIC WEB
As the Semantic Web (sometimes called Web 3.0) emerges, the US government is pleased to be in the vanguard of this new technology space. To this end, Data.gov is hosting demonstrations and documents that will help familiarize Data.gov users with this new technology, and that will let citizens and developers work with the government in creating a new generation of "linked data" mash ups.
Data.gov now hosts a set of Resource Description Framework (RDF) documents containing triples created by converting a number of the Data.gov datasets into this format, making over 6.4 billion triples of open government data available to the community. An index of all the RDF documents on Data.gov is here.
The URI scheme chosen is a very simple one for the time being, designed to allow users to easily explore and extend the data. A proposal is being developed with RPI, one of the Data.gov community leaders, for a new encoding of datasets converted from CSV (and other formats) to RDF. We're looking forward to a design discussion to determine the best scheme for persistent and dereferenceable government URI naming with the international community and the World Wide Web Consortium to promote international standards for persistent government data (and metadata) on the World Wide Web.

Data.gov.uk & Others

- Other governments are getting on board
  - UK an enthusiastic adopter



BBC & Media

- Value of resources increased by Linked Data

« Previous | Main | Next »

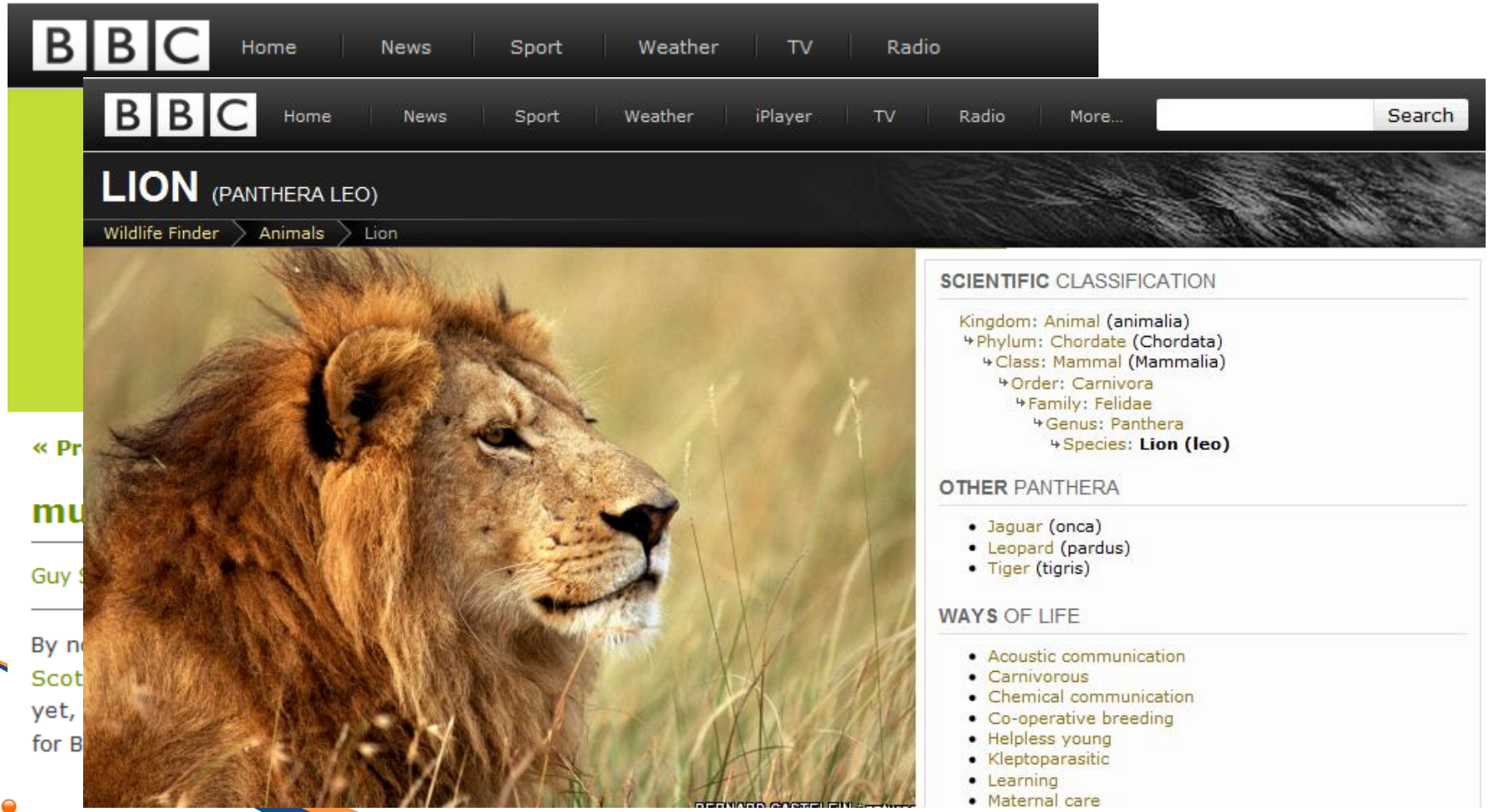
music beta and linked data

Guy Strelitz | 14:58 UK time, Wednesday, 30 July 2008

By now you may well have found the new BBC Music beta site - Matthew Shorter and Tom Scott have both blogged about it, and it's shown up on TechCrunch. If you haven't seen it yet, I strongly urge you read the blogs and take a look - it really is a huge step forward for BBC Music online, and for the data infrastructure of bbc.co.uk as a whole.

BBC & Media

- Value of resources increased by Linked Data



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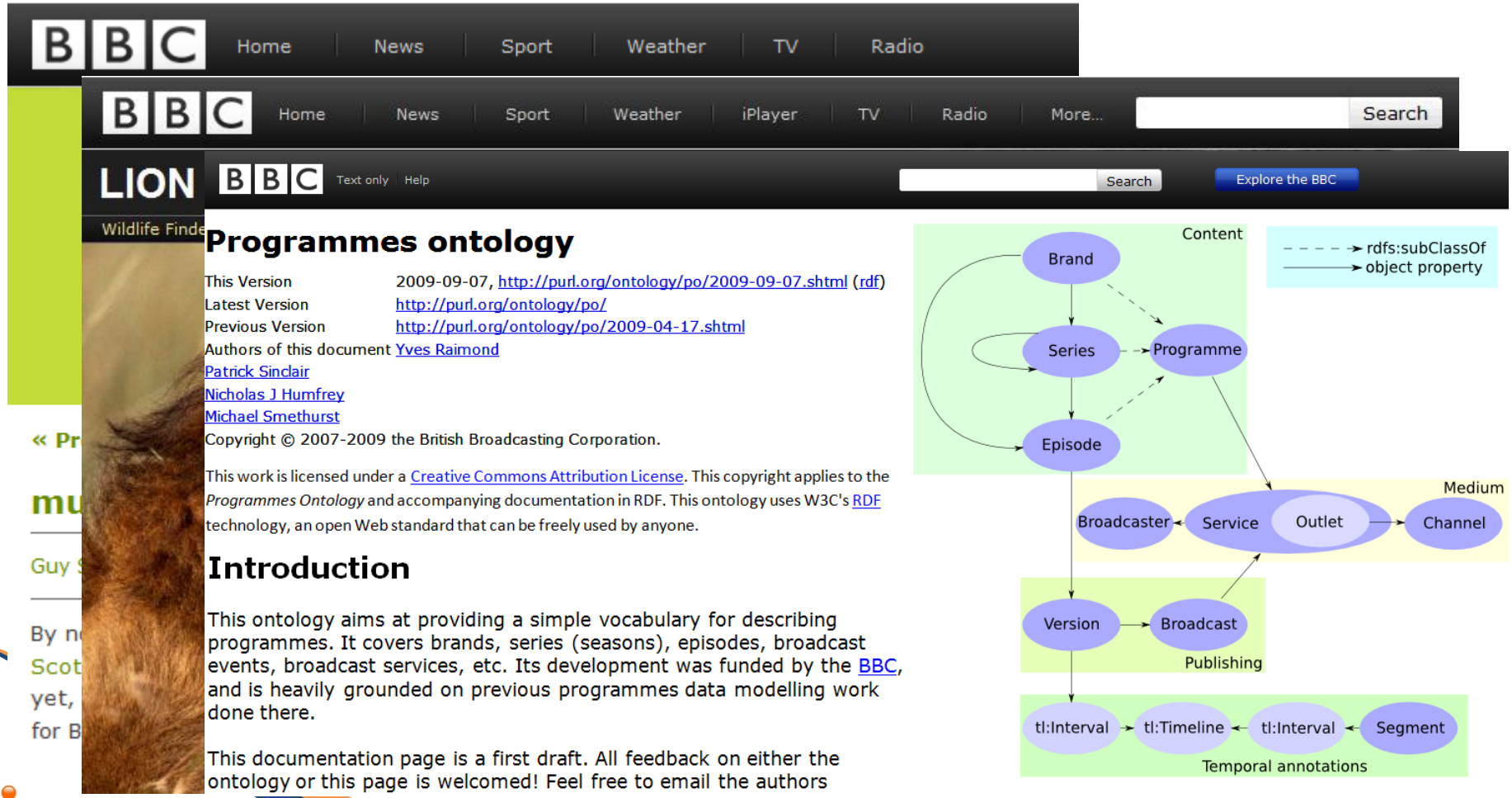

BestBuy

How Best Buy is Using The Semantic Web

Written by Richard MacManus / July 1, 2010 6:00 AM / 5 Comments

« Prior Post Next Post »

Yesterday we wrote about the increasing usage of Semantic Web technologies by large commercial companies like Facebook, Google and Best Buy. The Semantic Web is a Web of added meaning, which ultimately enables smarter and more personalized web apps to be built. In this post we explore how a leading U.S. retailer, Best Buy, is using a Semantic Web markup language called RDFa to add semantics to its webpages.

322 tweets retweet

This is not just an academic exercise for Best Buy. As we will see, semantic technology has already led to increased traffic and better service to its customers. We spoke to Jay Myers, Lead Web Development Engineer at BestBuy.com, to find out how.

BestBuy

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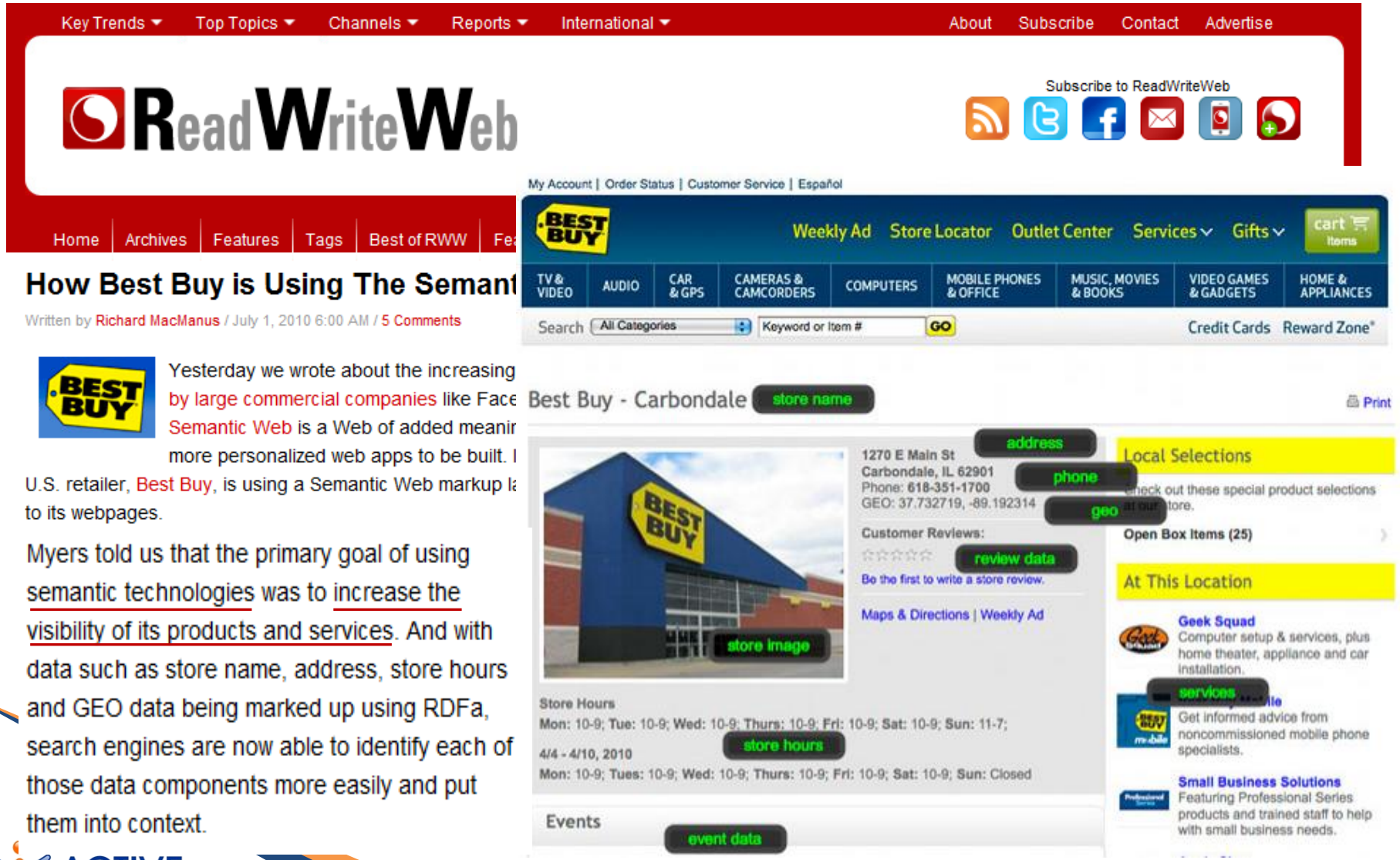
322 tweets

retweet

Myers told us that the primary goal of using semantic technologies was to increase the visibility of its products and services. And with data such as store name, address, store hours and GEO data being marked up using RDFa, search engines are now able to identify each of those data components more easily and put them into context.

ll see, semantic technology customers. We spoke to Jay o find out how.

BestBuy


Key Trends
Top Topics
Channels
Reports
International
About
Subscribe
Contact
Advertise
ReadWriteWeb
Subscribe to ReadWriteWeb
Home
Archives
Features
Tags
Best of RWW
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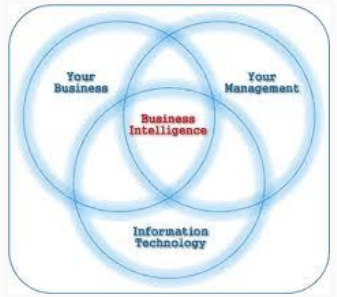
those data components more easily and put
them into context.
My Account | Order Status | Customer Service | Español
Weekly Ad
Store Locator
Outlet Center
Services
Gifts
cart
TV & VIDEO
AUDIO
CAR & GPS
CAMERAS & CAMCORDERS
COMPUTERS
MOBILE PHONES & OFFICE
MUSIC, MOVIES & BOOKS
VIDEO GAMES & GADGETS
HOME & APPLIANCES
Search
All Categories
Keyword or Item #
GO
Credit Cards
Reward Zone
Best Buy - Carbondale
store name
Print
address
1270 E Main St
Carbondale, IL 62901
phone
Phone: 618-351-1700
geo
GEO: 37.732719, -89.192314
Customer Reviews:
review data
Be the first to write a store review.
Maps & Directions | Weekly Ad
store image
Local Selections
Open Box Items (25)
At This Location
Geek Squad
Computer setup & services, plus home theater, appliance and car installation.
services
Get informed advice from noncommissioned mobile phone specialists.
Small Business Solutions
Featuring Professional Series products and trained staff to help with small business needs.
Store Hours
Mon: 10-9; Tue: 10-9; Wed: 10-9; Thurs: 10-9; Fri: 10-9; Sat: 10-9; Sun: 11-7;
4/4 - 4/10, 2010
store hours
Mon: 10-9; Tues: 10-9; Wed: 10-9; Thurs: 10-9; Fri: 10-9; Sat: 10-9; Sun: Closed
Events
event data

Overview

- Brief introduction to semantic technology
- **Applications**
  - Knowledge Management & the ACTIVE project
  - Linked Open Data
  - Business Intelligence
- Specific application in the health sector
- Semantic Technology uptake & resources



BT

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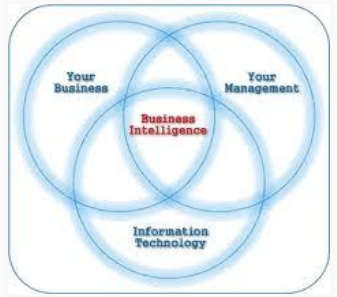


BT

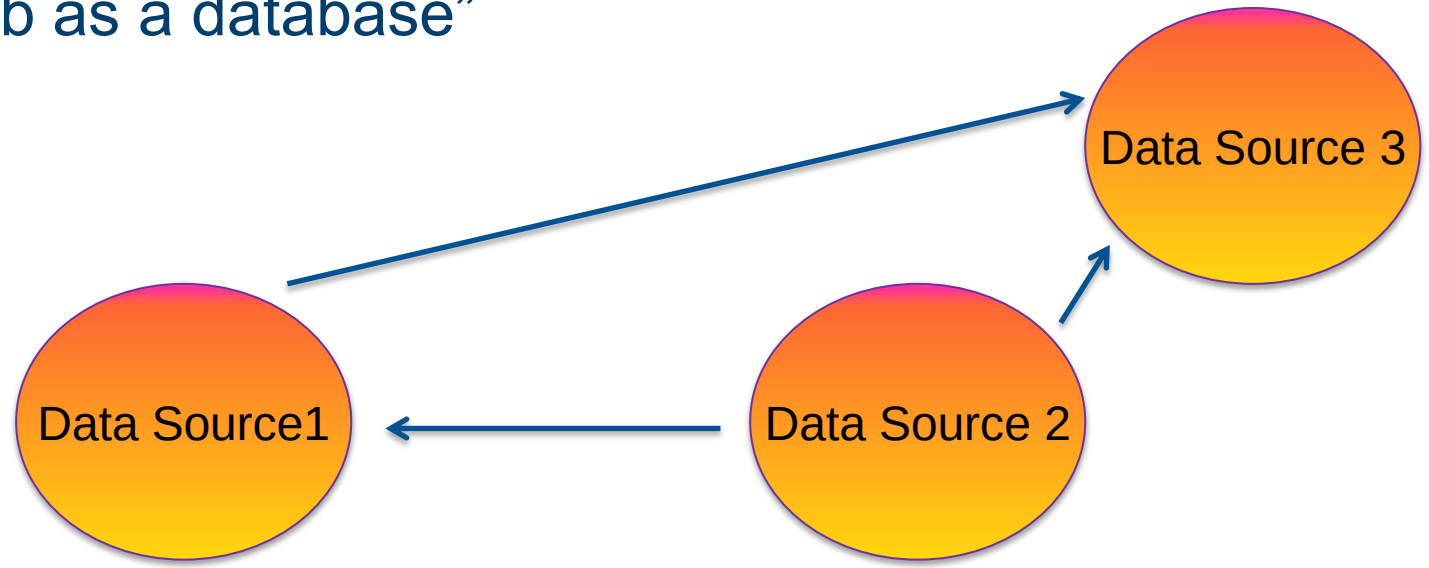
Today, too much information is stuck inside data silos: hard to query and hard to inter-link

By LadyDragonflyCC - Explore MY World http://www.flickr.com/photos/19646481@N06/4285739547/

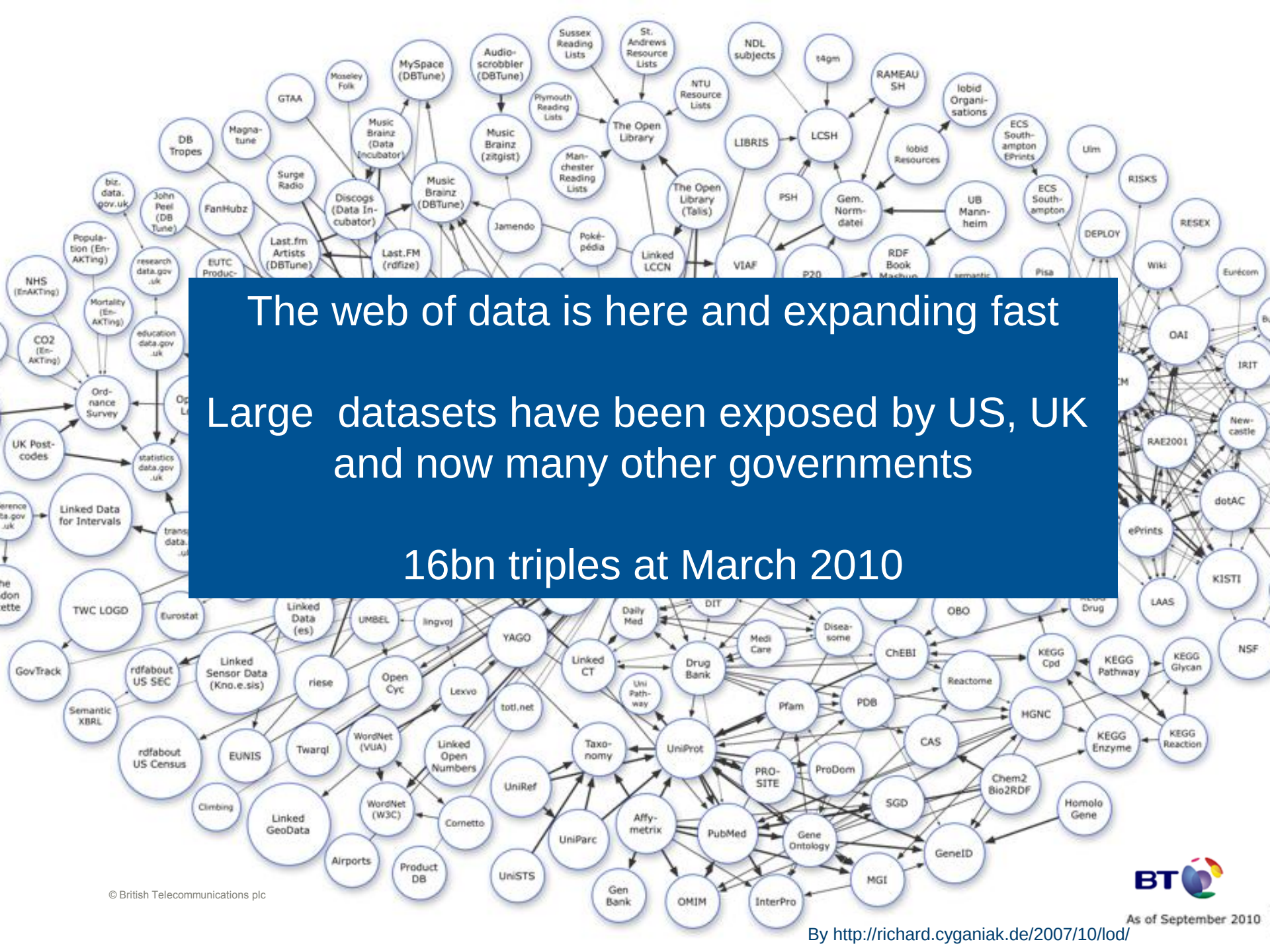
Data Web

Using web technology to create a WWW database

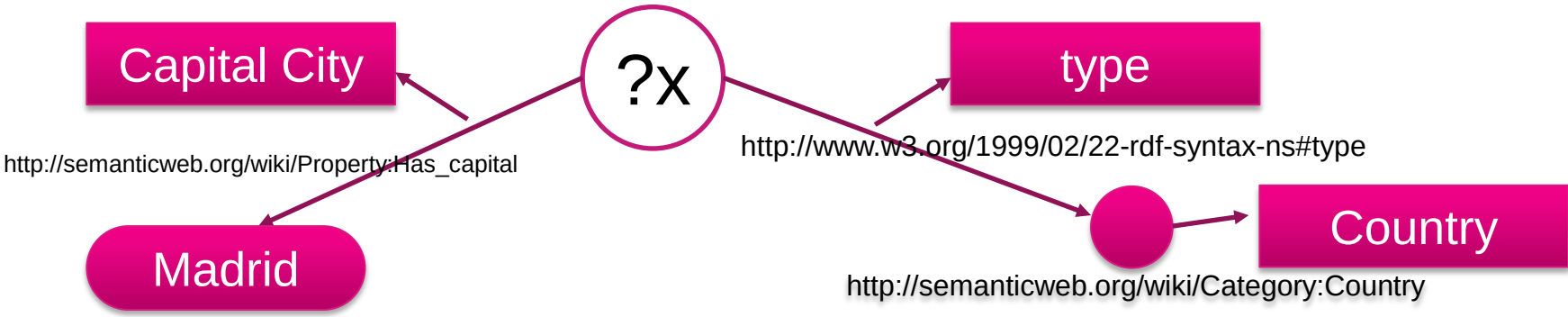
- Linking Data instead of documents using RDF(S)
- Linking Data Silos
  - Open standards, easily extensible to new datasets
- Machine processable
- “Web as a database”



BT


The web of data is here and expanding fast
Large datasets have been exposed by US, UK and now many other governments
16bn triples at March 2010
Sussex Reading Lists
St. Andrews Resource Lists
NDL subjects
t4gm
RAMEAU SH
lobid Organi-sations
MySpace (DBTune)
Audio-scrobbler (DBTune)
Moseley Folk
GTAA
Plymouth Reading Lists
NTU Resource Lists
The Open Library
LIBRIS
LCSH
lobid Resources
ECS South-ampton EPrints
Ulm
RISKS
DB Tropes
Magna-tune
Music Brainz (Data Incubator)
Music Brainz (zitgist)
Man-chester Reading Lists
Surge Radio
Discogs (Data In-cubator)
Music Brainz (DBTune)
Jamendo
The Open Library (Talis)
PSH
Gem. Norm-datei
UB Mann-heim
ECS South-ampton
DEPLOY
RESEX
biz. data. gov.uk
John Peel (DB Tune)
FanHubz
Last.fm Artists (DBTune)
Last.FM (rdfize)
Poké-pédia
Linked LCCN
VIAF
RDF Book Mashup
Pisa
Wiki
Eurécom
Popula-tion (En-AKTing)
research data.gov .uk
NHS (EnAKTing)
Mortality (En-AKTing)
CO2 (En-AKTing)
education data.gov .uk
OAI
IRIT
Ord-nance Survey
UK Post-codes
statistics data.gov .uk
RAE2001
New-castle
Linked Data for Intervals
dotAC
ePrints
KISTI
TWC LOGD
Eurostat
Linked Data (es)
UMBEL
lingvoj
YAGO
Daily Med
DIT
OBO
LAAS
NSF
GovTrack
rdfabout US SEC
Linked Sensor Data (Kno.e.sis)
riese
Open Cyc
Lexvo
totl.net
Linked CT
Drug Bank
Medi Care
Disea-some
ChEBI
KEGG Cpd
KEGG Pathway
KEGG Glycan
Uni Path-way
Pfam
PDB
Reactome
HGNC
Semantic XBRL
rdfabout US Census
EUNIS
Twarql
WordNet (VUA)
Linked Open Numbers
Taxo-nomy
UniProt
CAS
KEGG Enzyme
KEGG Reaction
PRO-SITE
ProDom
Chem2 Bio2RDF
Climbing
Linked GeoData
WordNet (W3C)
Cometto
UniRef
SGD
Homolo Gene
Affy-metrix
PubMed
Gene Ontology
GeneID
Airports
Product DB
UniParc
UniSTS
Gen Bank
OMIM
InterPro
MGI
© British Telecommunications plc
BT
As of September 2010
By http://richard.cyganiak.de/2007/10/lod/

SPARQL – Query Language for RDF Triples

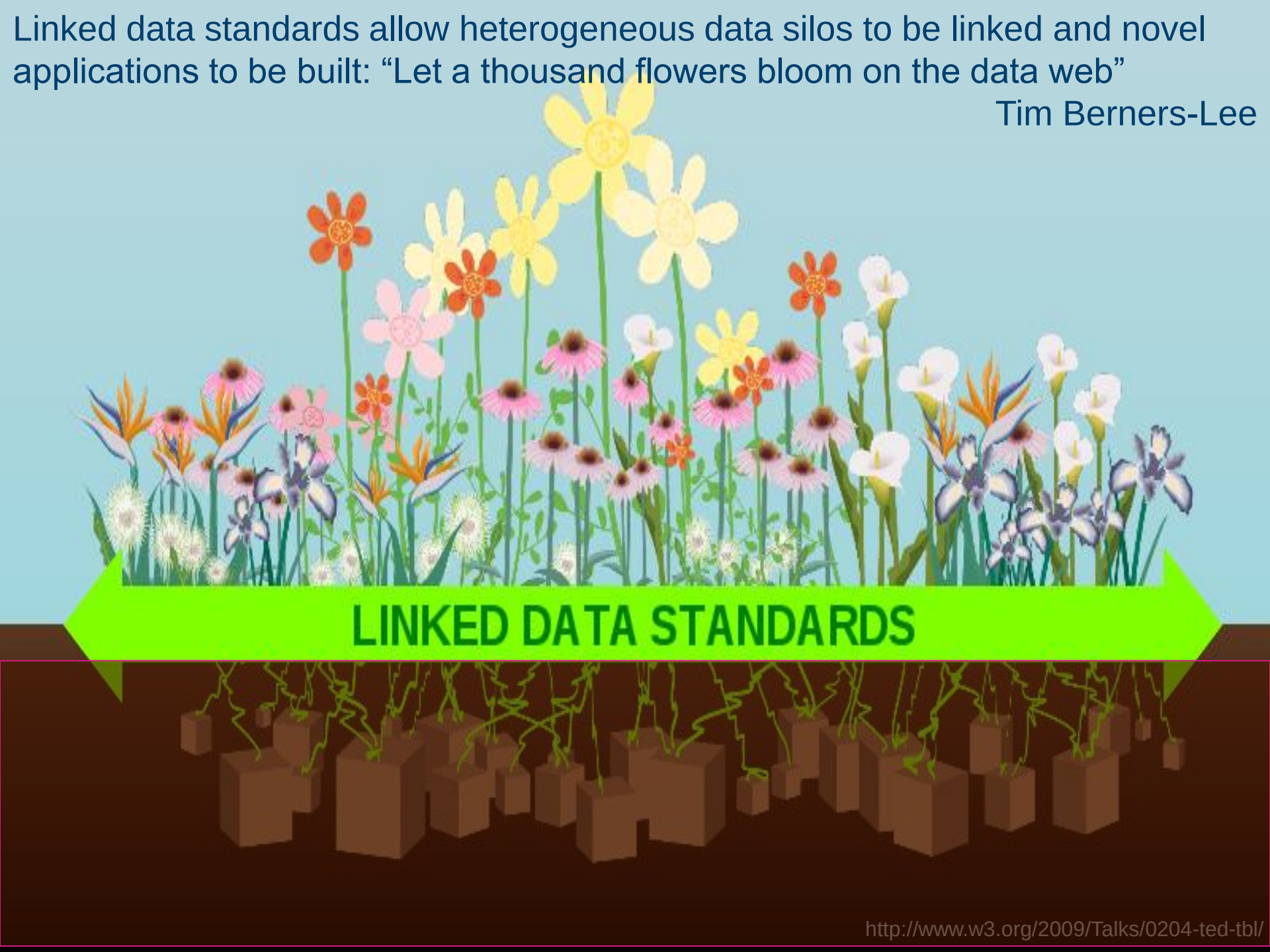



```
SELECT ?x WHERE
{
  ?x        rdf:type      http://semanticweb.rg/id/Category:Country .
  ?x        http://semanticweb.org/wiki/Property:Has_capital          „Madrid„
}
```

x: http://semanticweb.org/id/Spain

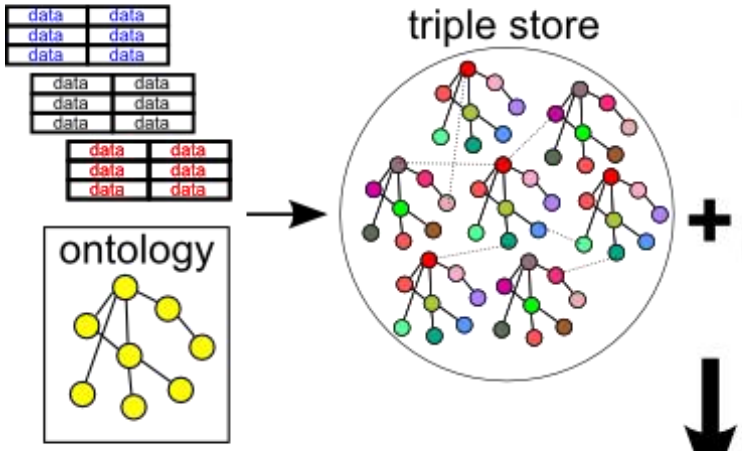
Linked data standards allow heterogeneous data silos to be linked and novel applications to be built: “Let a thousand flowers bloom on the data web”

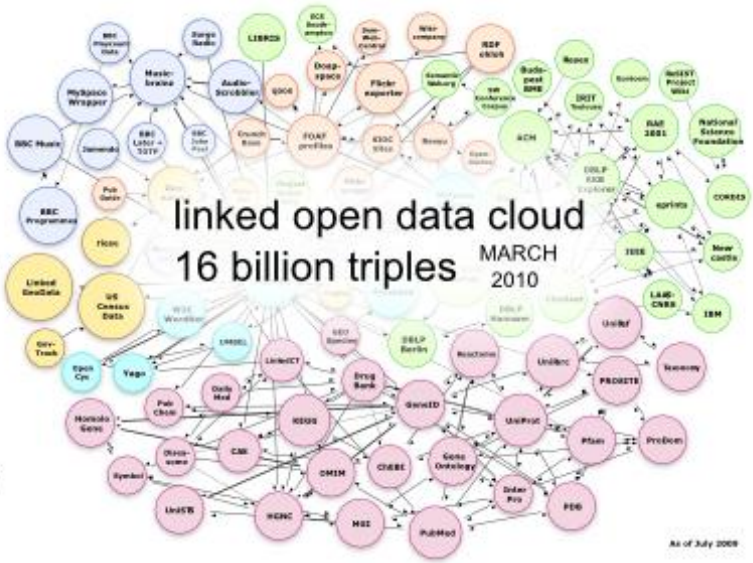
Tim Berners-Lee

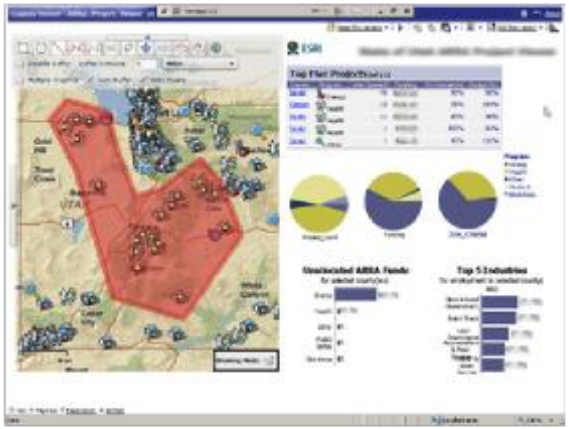


http://www.w3.org/2009/Talks/0204-ted-tbl/

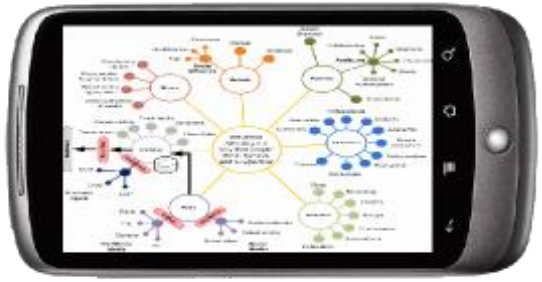
Linked Open Data







Intelligence Applications



BT

Crime Reporting

- Like a number of similar organisations, BT suffers significant losses and reinstatement costs from theft of cable and semi-precious metals
- BT launched “Operation Eiger” in 2008
  - nationwide intelligence-led task force to investigate cable thefts
  - strategy includes attending crime scenes, liaising with police and visiting scrap metal dealers
  - incident reporting is critical, details include:
    - time/date of incident
    - location and type of damage
    - size of the cable, length and type
    - volume of customers affected
    - estimate of the cost
- Working with 7 other organisations with similar problems

BT

What happens after incidents are reported?

- Each organisation records incidents in a different format of spreadsheet
- Linked together using an ontology

BT

Location-based Information from Incident Reporting

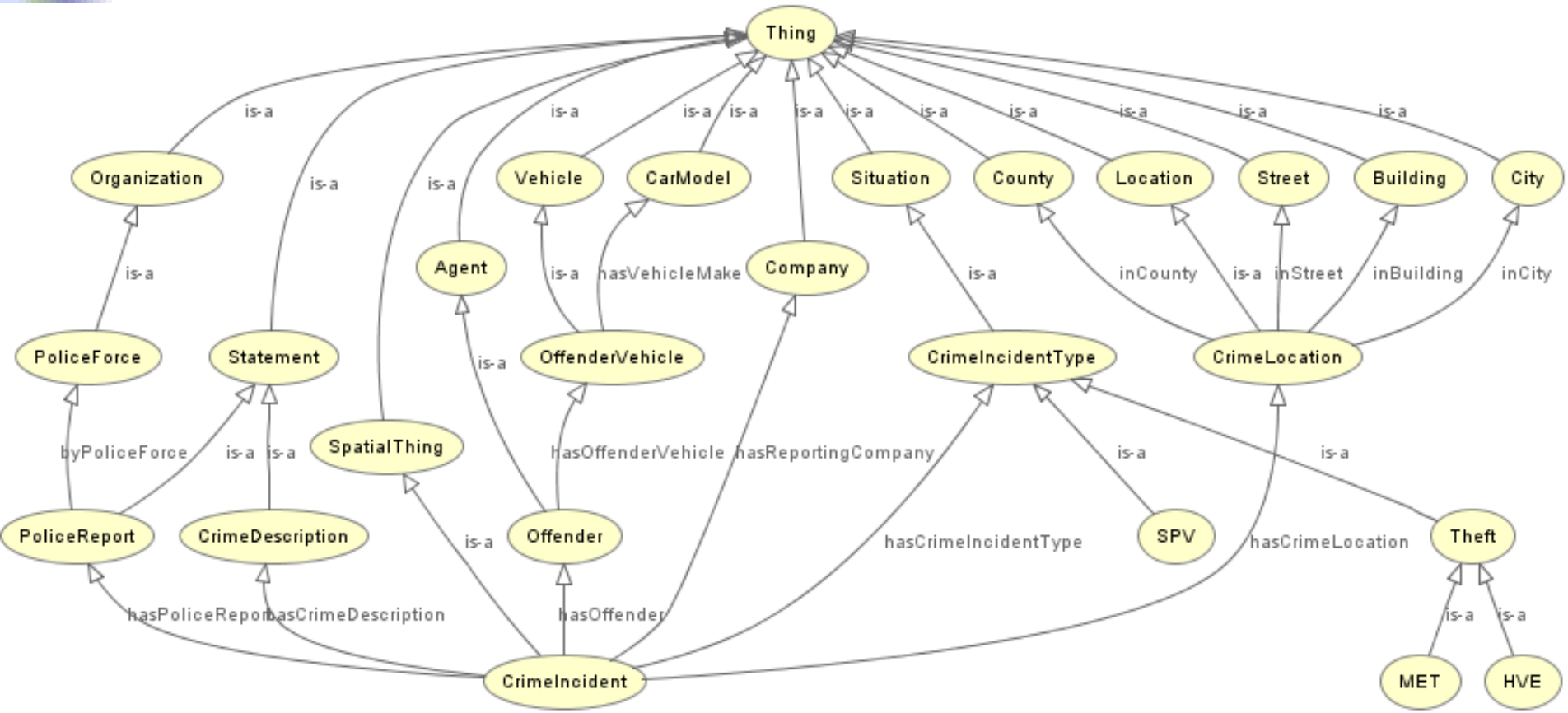
	A	B	C	D	E	F	G	H	I	J
4	Row Labels	Attempted Theft	Intelligence	Internal	Theft	Grand Total				
5	London	6	3	5	10	24				
6	Glasgow	2	2	1	2	7				
7	Gloucester		2		2	4				
8	Wolverhampton	1	1		2	4				
9	Reading	2			1	3				
10	Mexborough	3				3				
11	Sunderland	2			1	3				
12	Doncaster	1	1		1	3				
13	Peterborough				3	3				
14	Amersham				3	3				
15	Rotherham		1		2	3				

Jan (all entries) | Jan (single entries) | **Towns (pivot table)** | Counties (pivot table) | Data supplied for reports

BT

RDF Graph of Incident Data

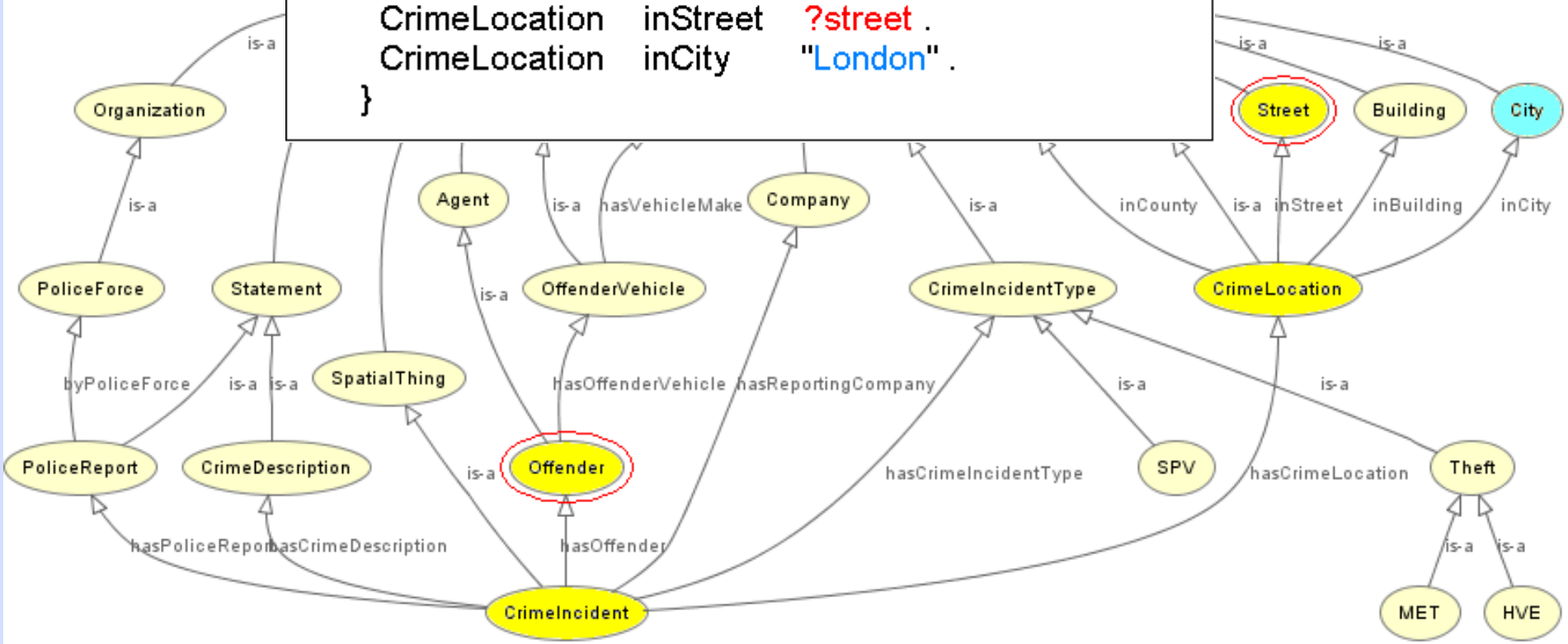
- Ontologies for common domain understanding and inferred concept relations



BT

Flexible Information Extraction from Graph Data

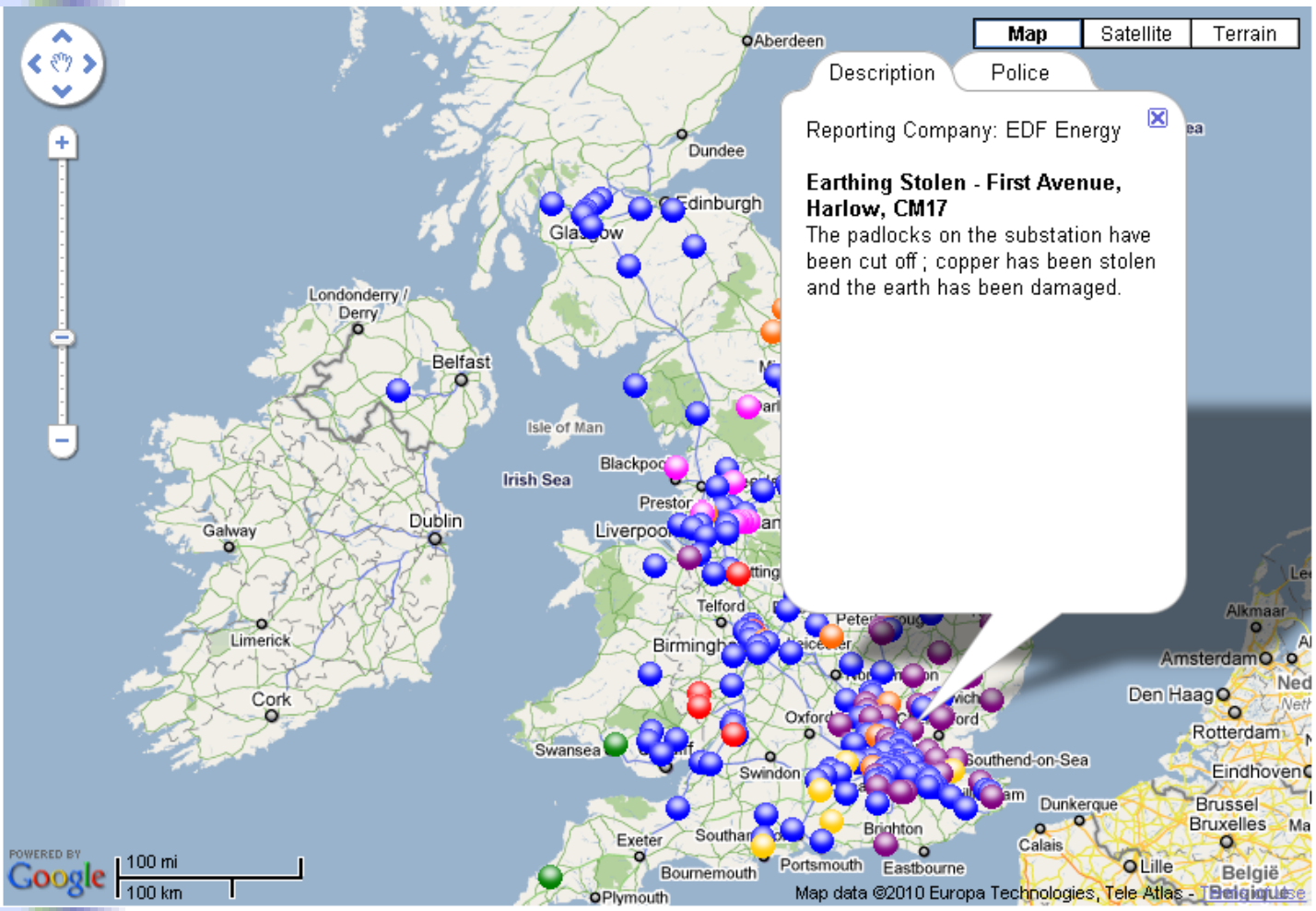
```
SELECT   ?offender   ?street

WHERE {
      CrimeIncident   hasOffender   ?offender .
      CrimeIncident   hasCrimeLocation   CrimeLocation .
      CrimeLocation   inStreet   ?street .
      CrimeLocation   inCity   "London" .
    }
```



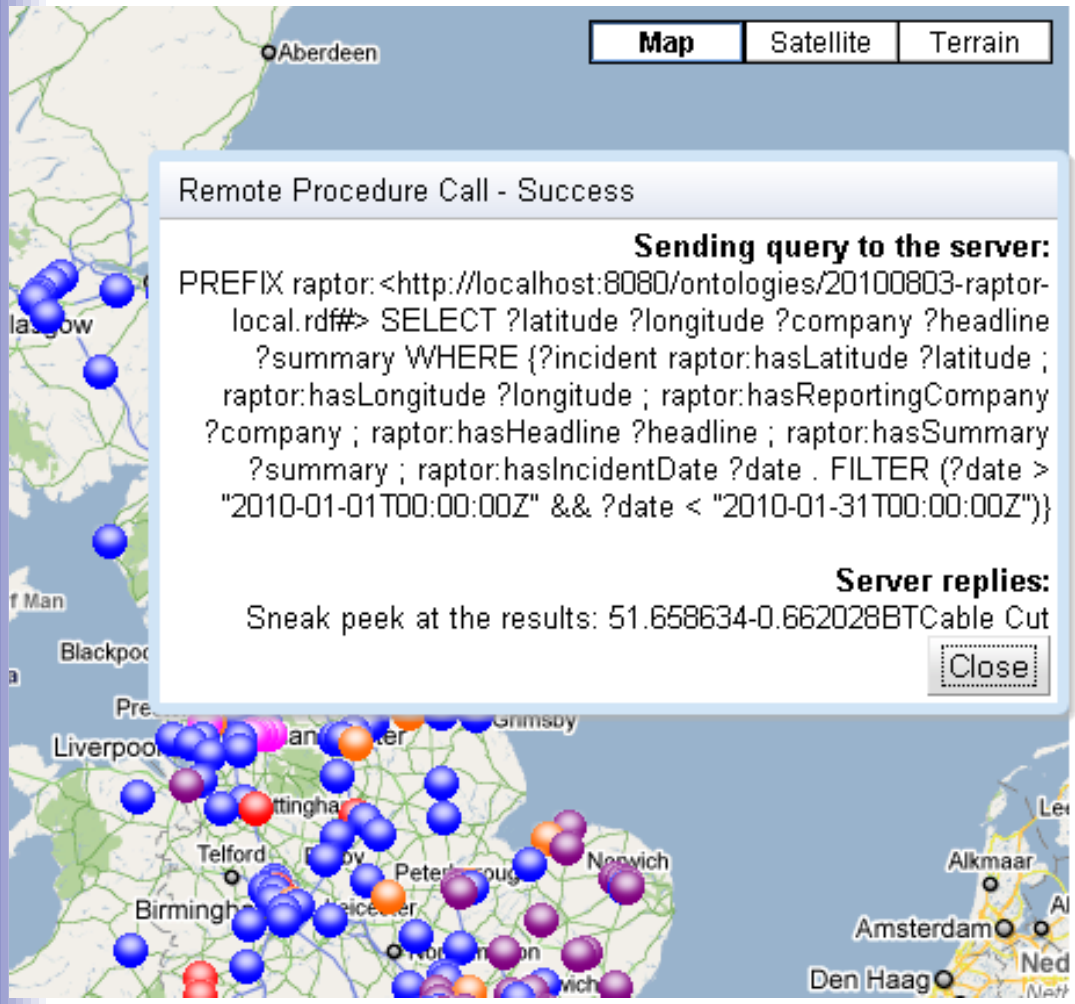
BT

Visualise Incident Reports for BT and others

- *merge data and add police information (data.gov.uk)*

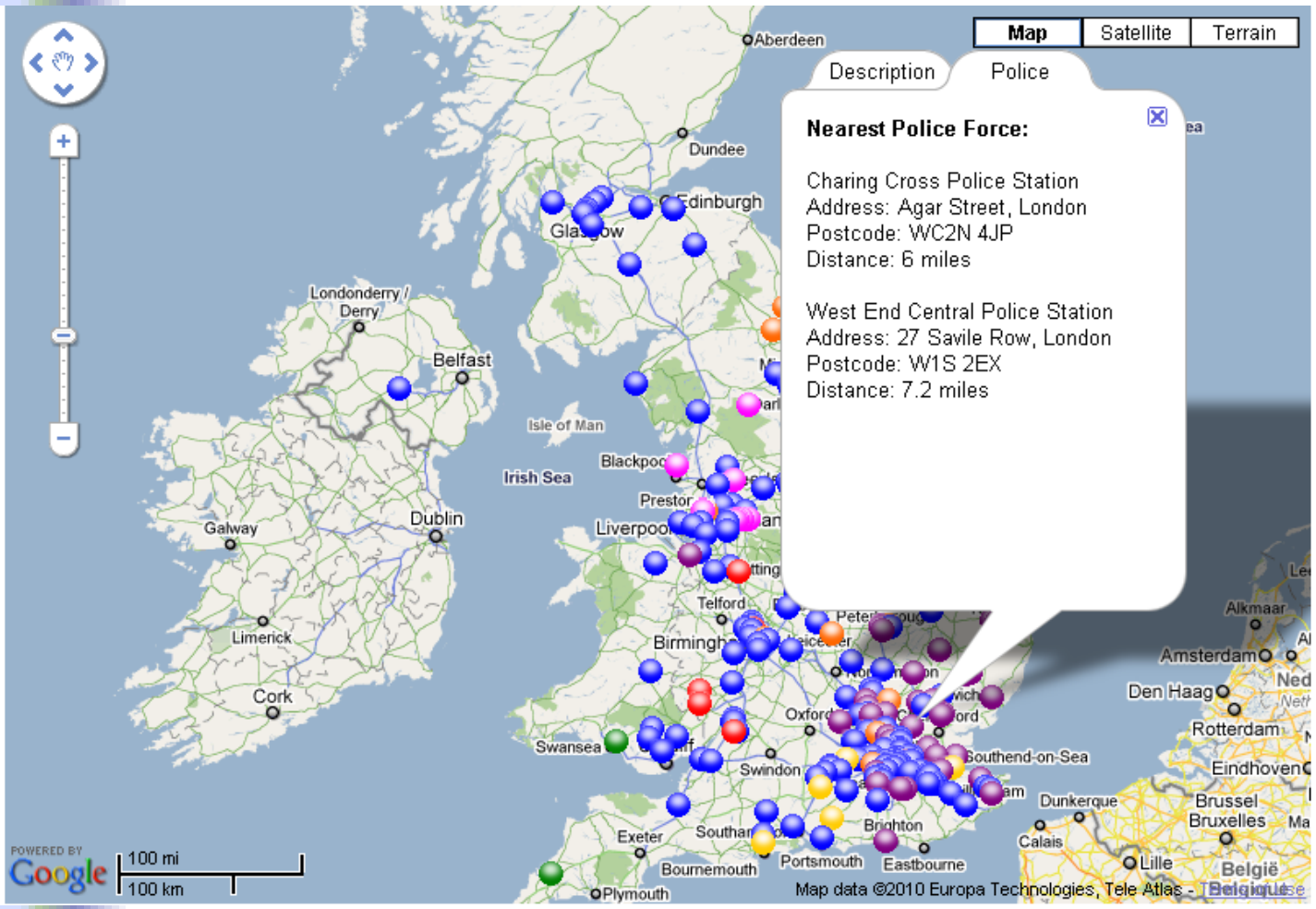


Semantic Technology – SPARQL
- a query language for graphs of data



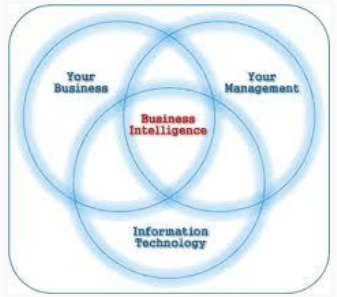
BT

Visualise Incident Reports for BT and others - a Linked Data prototype



Overview

- Brief introduction to semantic technology
- **Applications**
  - Knowledge Management & the ACTIVE project
  - Linked Open Data
  - **Business Intelligence**
- Specific application in the health sector
- Semantic Technology uptake & resources



BT

Semantic Business Intelligence

- Today's BI solutions
  - focus on an organisation's structured data (20%)
  - **ignore the 80%** unstructured information
    - webpages, emails, slides, documents, …
  - **ignore the tens of thousands** of external items in news articles, customer forums, blogs, …
- Semantic technologies can help
  - Information Extraction – identifying people, places, organisations, trends, sentiment in unstructured information
  - Information Fusion – uniform access to multiple heterogeneous (structured and unsstructured) data silos

BT

Semantic BI

Client Applications

Semantic Queries

Business Rules

Domain Ontology

Information Extraction

Semantic Data Integration

News feeds

Web pages

Documents

E-mails

Unstructured

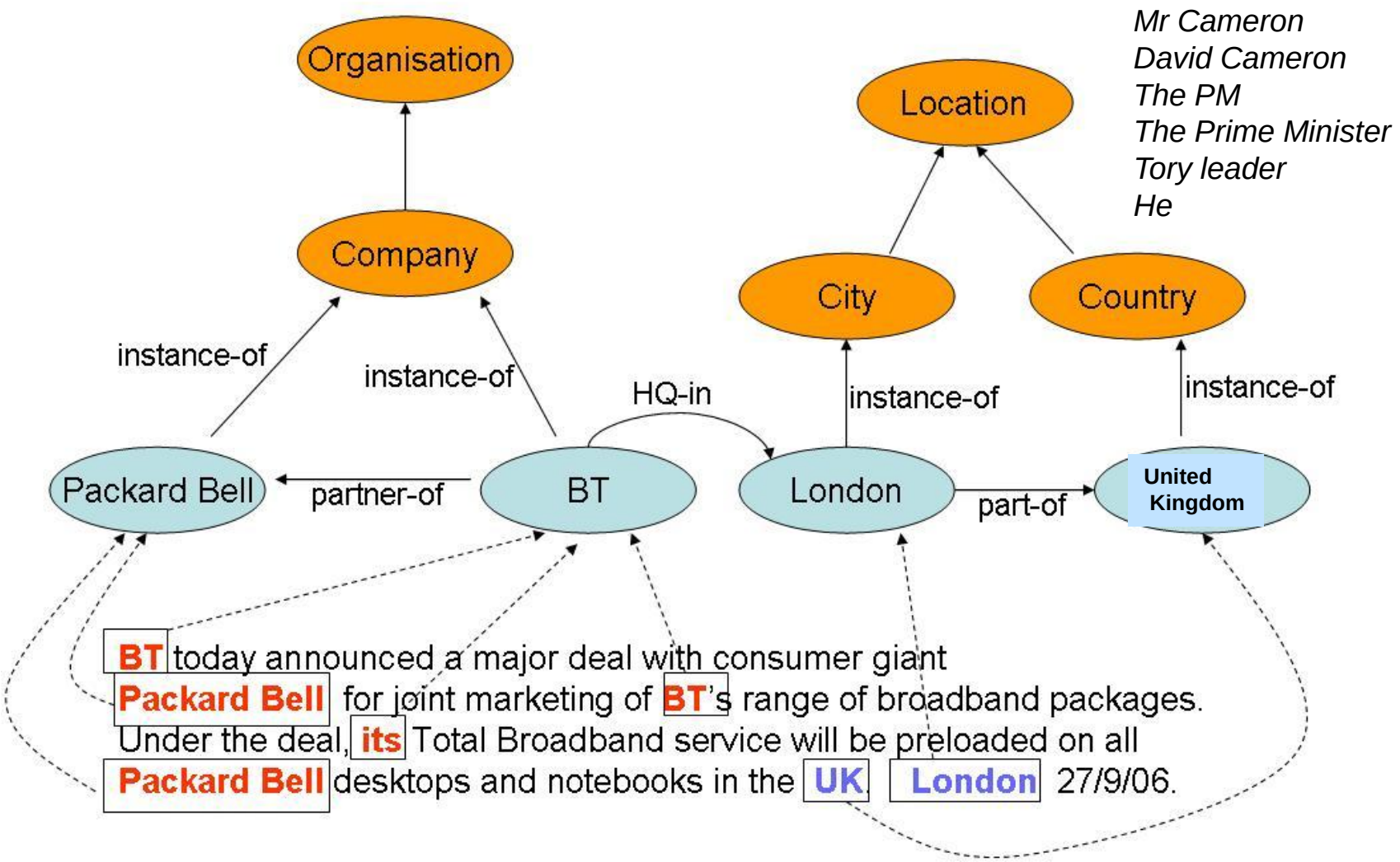
Structured

Data Sources

Databases

Semantic Annotation

Semantic annotation uses ***text analytics*** to associate text items with underlying concepts, represented in an **ontology**: people, places, locations, …



Mr Cameron
David Cameron
The PM
The Prime Minister
Tory leader
He

BT

Next Generation BI using semantic technology

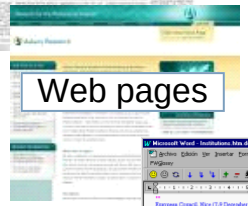
Client Applications

Semantic Queries

Business Rules

Domain Ontology

News feeds



Web pages

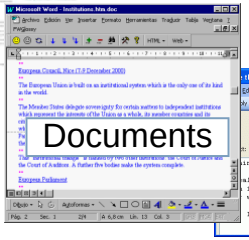
Information Extraction

Semantic Data Integration

Unstructured

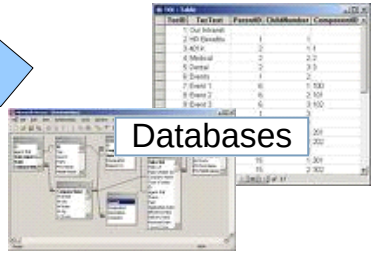
Structured

Data Sources



Documents

E-mails



Databases

BT

Application of NGBI in BT
Supporting Sales Teams: Win / Loss Analysis

- Win / Loss Reports are collected from BTB sales teams after a proposal is made and contains information that includes:
  - product offering
  - competitors
  - people involved
  - reasons for proposal outcome
  - why BT was successful or not

- Challenge is to identify related events and trends that are not obvious from reading discrete reports such as:
  - most / least successful teams?
  - bestselling or least selling products and why?
  - competitive landscape against a particular product mix?

BT

Supporting Sales Teams : Win / Loss Analysis

- The approach:
  - Apply **text analytics** to the unstructured data to identify
    - people, products, companies, locations and key-phrases
  - Integrate this with the structured data
  - Develop a **dashboard** to allow sales managers to:
    - Search and browse reports using criteria from both structured and unstructured data
      - "Show me reports where we lost and where XYZ is a competitor"
    - See timelines of resulting wins and losses
    - Analysis of virtual team performance
  - Currently very time-consuming manual process

Spreadsheet of Win/Loss Reports

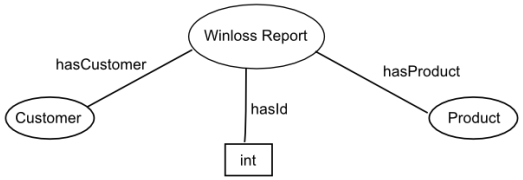
- Reports contain both structured and unstructured data
- Difficult for humans to process a large amount of data

	A	B	C	D	E	F	G	H	I	
1	**Name**	**EIN**	**Email**	**OUC**	**Manager EIN**	**W/L**	**Opportunity II**	**Customer / Sales Account Name**	**Reason for win / los**	**Why BT Won / Lost**
2	Brian Kerrigan	802144872	brian.kerrigan@bt.com	MKQ351	801907201	win	1-4Z7RCTB	Optical Express	Relationship	Optical Express are opening
3	Tracy McGhee	802867931	tracy.mcghee@bt.com	MKQ351	802144872	win	1-4RUTCNZ	Blackrock UK LTD	Unique Solution	Blackrock are one of the worl
4	Kirite Tank	803149739	kirite.tank@bt.com	MKQ362	801924789	win	1-1R912BW	CROMWELL GROUP (HOLDINGS) LTD	Relationship	The Cromwell Group have sig
5	Graeme Mckenzie	802882712	graeme.mckenzie@bt.com	MKQ351	802122078	win	1-3KERQD4	KCA Drilling Group	Price	KCA operate drilling rigs arou
6	Steve Smith	600869700	steve.8.smith@bt.com	MKQ353	700957437	win	1-2F8QKJ8	Edmundson Electrical	Unique Solution	BT have secured a managed
7	Jason Harrison	600242763	jason.harrison@bt.com	MKQ353	700957437	win	1-4XGSCY9	Done Brothers Cash Betting	Relationship	Done Brothers Cash Betting t
8	Simon Hill	803250824	simon.2.hill@bt.com	MKQ381	600744885	win	1-3L9IU7L	Plain English Ltd	Brand	Since meeting client in Jan w
9	David Wilson	701732002	david.1.wilson@bt.com	MKQ353	700957437	win	1-3KBY0BX	Ethel Austin Ltd	Relationship	Ethel Austin have taken a ma
10	Martin Wakefield	801694286	martin.d.wakefield@bt.com	MKQ382	802918626	win	1-50YL77M	ICMA ltd	Incumbent	Renewal of out of term kilostr
11	Alan Bruce	600529604	alan.bruce@bt.com	MKQ353	700957437	loss	1-3D1HC79	Redrow Homes	Price	Lost on price but key issues
12	Hazel Mumby	802008402	hazel.mumby@bt.com	MKQ352	703029124	win	1-3R220V2	Gilder Group Ltd	Relationship	A CSE1000 and call Pilot for
13	Malcolm Gay	801719279	malcolm.gay@bt.com	MKQ372	702834774	win	1-3OWKFLA	ASHDOWN PARK SUSSEX LTD	Incumbent	Upgrade CSS100 with Nortel
14	Malcolm Gay	801719279	malcolm.gay@bt.com	MKQ372	702834774	win	1-3OWKFLA	ASHDOWN PARK SUSSEX LTD	Incumbent	Upgrade CSS100 with Nortel
15	Malcolm Gay	801719279	malcolm.gay@bt.com	MKQ372	702834774	win	1-4RMUFWT	C G I GROUP (EUROPE) LTD	Price	Datapulse IVDR Upgrade and
16	Martin Wakefield	801694286	martin.d.wakefield@bt.com	MKQ382	802918626	win	1-56FBPRN	Von Essen Hotels	Relationship	BT Net Premium
17	David Wilson	701732002	david.1.wilson@bt.com	MKQ353	700957437	loss	1-3NSZM2V	Gregory Pennington (Think Money)	Politics/Strategy	Think Money decided to go w
18	Martyn Hawthorne	801702158	martyn.hawthorne@bt.com	MKQ382	802918626	loss	1-385eaic	Instant muscle	Relationship	The project was stopped. (La
19	Phillip Kingsley	803187922	phillip.kingsley@bt.com	MKQ351	802144872	win	1-4TU0B67	BeCogent Ltd	Unique Solution	The customer's main issue w
20	Glenn Avant	802588676	glenn.avant@bt.com	MKQ383	801750753	win	1-4OXJZH7	Denton Wilde Sapte	Unique Solution	Original sale was for 150 M3
21	Mark Ferguson	702088344	mark.3.ferguson@bt.com	MKQ353	700957437	loss	1-4S4BVWH	SDV BERNARD LTD /DUFOREST INT	Stage with Incumbent	Due to legal issues and pena
22	Steve Smith	600869700	steve.8.smith@bt.com	MKQ353	700957437	loss	1-3NKUSO1	Allied HealthCare	Stage with Incumbent	AHC are deploying a new CA
23	Tim Barker	803244847	timothy.2.barker@bt.com	MKQ353	703029124	win	1-2WTM2WG	Edward Mellor	Unique Solution	Wide Area network to link ret
24	Tim Barker	803244847	timothy.2.barker@bt.com	MKQ353	703029124	win	1-4RUI9RO	W H Stephens	Brand	Internet access to support fut
25	Tim Barker	803244847	timothy.2.barker@bt.com	MKQ353	703029124	win	1-501SMLE	Knowlegepoint 360	Relationship	Part of a project to link/centra
26	Tim Barker	803244847	timothy.2.barker@bt.com	MKQ353	703029124	win	1-47YY604	LED Electrical	Unique Solution	Acquisiton of data link from T
27	Alex Norman	702617810	alex.norman@bt.com	MKQ371	603005600	loss	1-4JO0YVX	Sungard Vivista	Price	The customer was looking to

BT

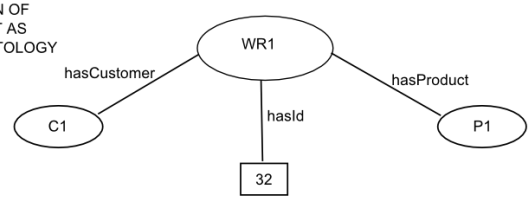
ONTOLOGY

Classes



Instances

REPRESENTATION OF WINLOSS REPORT AS INSTANCE OF ONTOLOGY



QUERY

which bids has Fred won?

KIM API

SQL

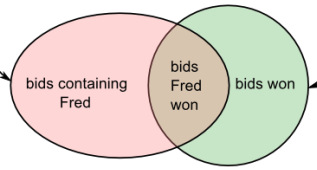
<URI...32><URI#type><URI...#WinLossReport> .
<URI...32><URI#hasProduct><URI...P1> .
<URI...32><URI#hasCustomer><URI...C1> .
...
<URI...32><URI#hasWon> true .

KIM
Semantic Annotation
Indexing & Retrieval

Id	Win/Loss	Product	Customer
32	win	LAN	Unilever
33	loss	...	...
...	...	...	...
...	...		

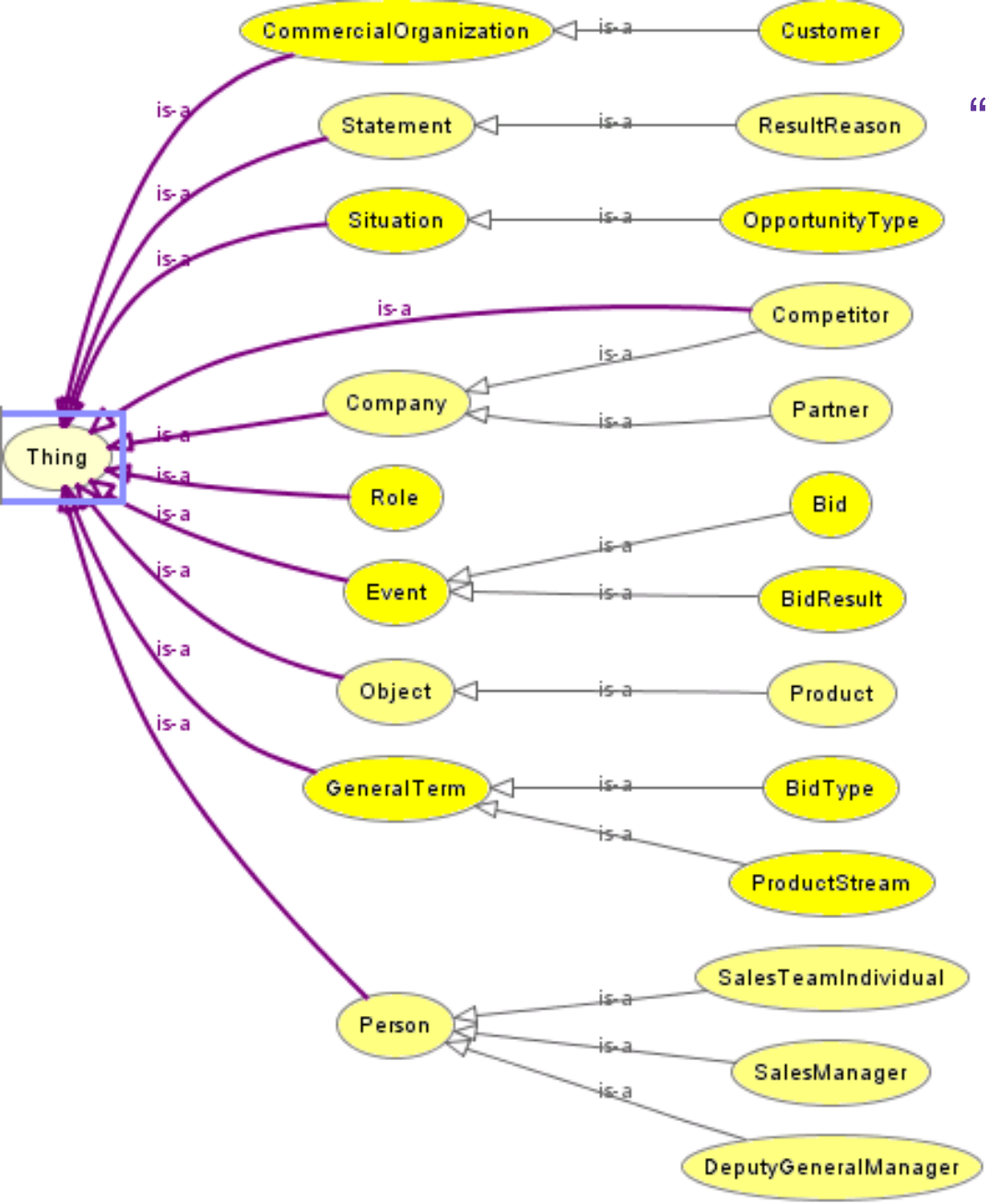
Oracle

Unstructured



Structured

BT



"Win/Loss" Ontology fragment

- **People**
  - BTB supplied
  - additional people are semantically extracted
- **Products**
  - BTB supplied
  - additional products are trained from reports
- **Customers**
  - trained from reports
- **Partners**
  - trained from reports
- **Competitors**
  - BTB supplied
  - additional competitors are trained from reports
- **Roles**
  - BTB supplied
  - additional roles are trained from reports

BT

WinLoss Report Application - Microsoft Internet Explorer provided by BT Webtop

http://sekt.info.bt.co.uk:9080/SBIWL/

Search BT Intranet

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WinLoss Report Application

Page

BT

Semantic BI

Document parameters

Win/Loss:
Win and Loss

Reason:
< ALL >

Value
Min:
0

Max:
4341

Competitor:
< ALL >

Product Streams:
< ALL >

From (dd/mm/yy):
01/07/08

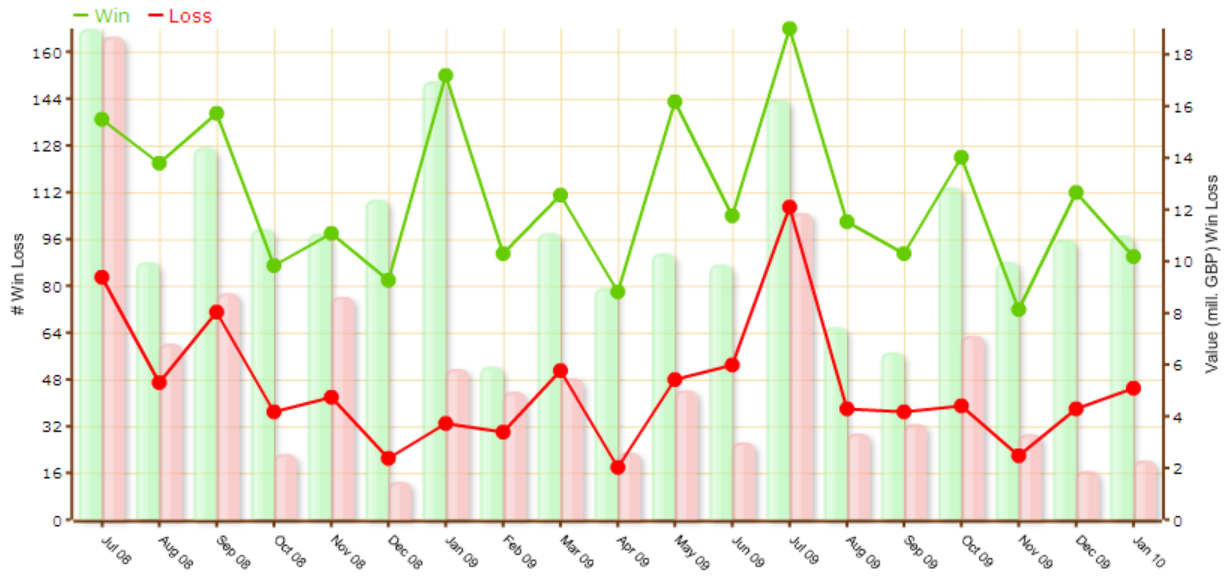
To (dd/mm/yy):
29/01/10

Build Chart

Time Analysis | Team Performance Analysis

Group by Monthly

Win/Loss Distribution



Proposals

Date	Lead by	Customer	WinL...	Competitor	Value ...	Reason	Product Stream
01/07/2008	Malcolm Gay	C G I GROU...	win	None	87	Price	Other
02/07/2008	Martin Wakefi...	Von Essen ...	win	None	27	Relationship	WAN
03/07/2008	David Wilson	Gregory Pe...	loss	Other	300	Politics/Strategy	Other
03/07/2008	Martyn Hawth...	Instant mus...	loss	None	20	Relationship	WAN
03/07/2008	Phillip Kingsley	BeCogent Ltd	win	None	443	Unique Solution	BT Basilica / L...
07/07/2008	Glenn Avant	Denton Wild...	win	Other	60	Unique Solution	Nortel

Page 1 of 119 | Displaying proposals 1 - 25 of 2963

Entities

People
- Jason Harrison
- Steve Pound
- Paul Turner
- Patrick Fahy
- Tracy McGhee

Page 1 of 7

Organizations
- BT Lynx
- BT Basilica
- iNet
- Cisco
- Nornet

Page 1 of 22

Product
- LAN
- MPLS
- IP Telephony
- IP Clear
- DSL

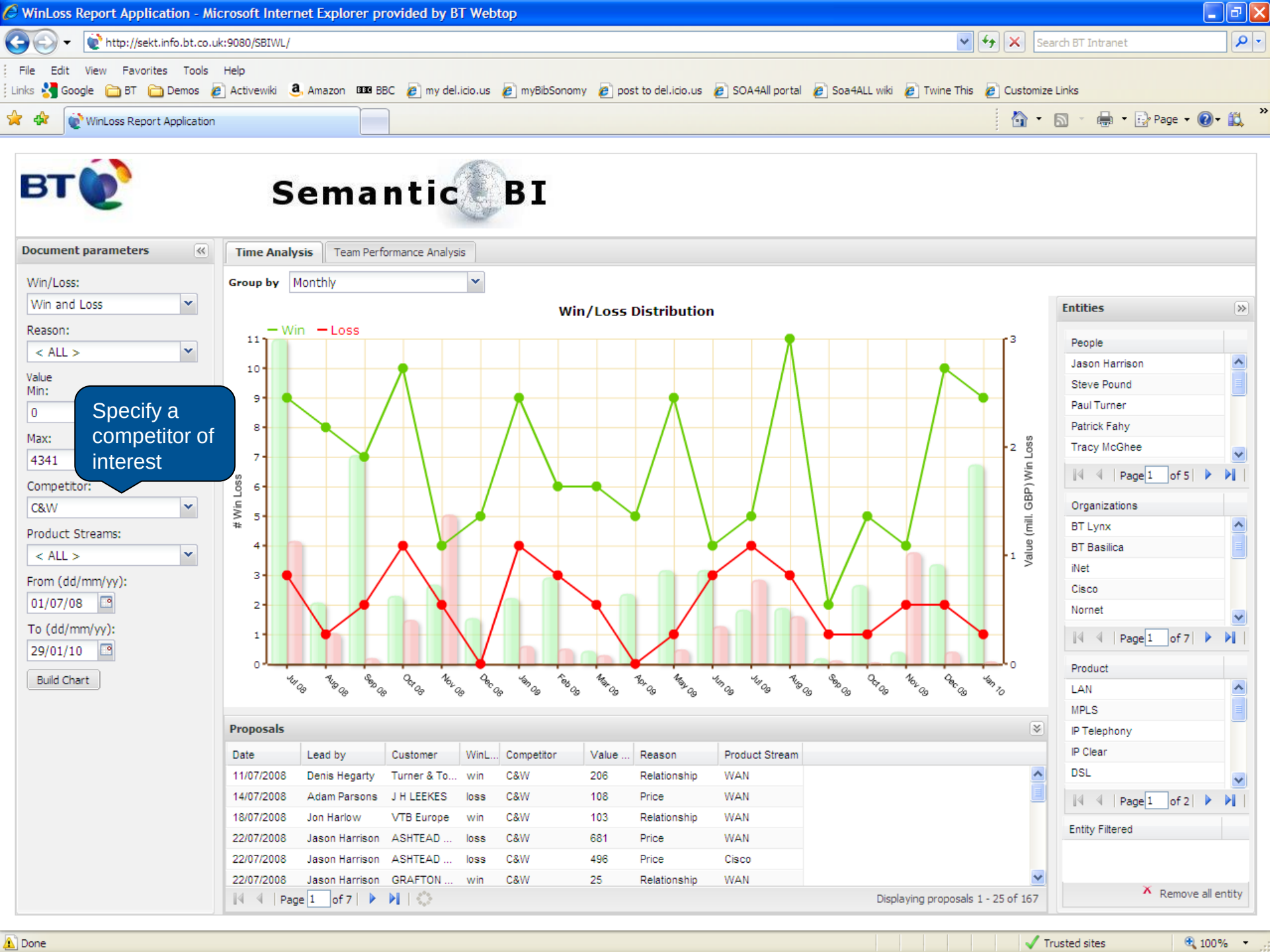
Page 1 of 2

Entity Filters

Filters for *structured* data

Filters for *unstructured* data

Trusted


WinLoss Report Application - Microsoft Internet Explorer provided by BT Webtop
http://sekt.info.bt.co.uk:9080/SBIWL/
Search BT Intranet
File Edit View Favorites Tools Help
Links Google BT Demos Activewiki Amazon BBC my del.icio.us myBibSonomy post to del.icio.us SOA4All portal Soa4ALL wiki Twine This Customize Links
WinLoss Report Application
Page
BT
Semantic BI
Document parameters
Win/Loss:
Win and Loss
Reason:
< ALL >
Value
Min:
0
Max:
4341
Specify a competitor of interest
Competitor:
C&W
Product Streams:
< ALL >
From (dd/mm/yy):
01/07/08
To (dd/mm/yy):
29/01/10
Build Chart
Time Analysis
Team Performance Analysis
Group by
Monthly
Win/Loss Distribution
Win
Loss
Win Loss
Value (mill. GBP) Win Loss
Jul 08
Aug 08
Sep 08
Oct 08
Nov 08
Dec 08
Jan 09
Feb 09
Mar 09
Apr 09
May 09
Jun 09
Jul 09
Aug 09
Sep 09
Oct 09
Nov 09
Dec 09
Jan 10
Proposals
Date
Lead by
Customer
WinL...
Competitor
Value ...
Reason
Product Stream
11/07/2008 Denis Hegarty Turner & To... win C&W 206 Relationship WAN
14/07/2008 Adam Parsons J H LEEKES loss C&W 108 Price WAN
18/07/2008 Jon Harlow VTB Europe win C&W 103 Relationship WAN
22/07/2008 Jason Harrison ASHTEAD ... loss C&W 681 Price WAN
22/07/2008 Jason Harrison ASHTEAD ... loss C&W 496 Price Cisco
22/07/2008 Jason Harrison GRAFTON ... win C&W 25 Relationship WAN
Page 1 of 7
Displaying proposals 1 - 25 of 167
Entities
People
Jason Harrison
Steve Pound
Paul Turner
Patrick Fahy
Tracy McGhee
Page 1 of 5
Organizations
BT Lynx
BT Basilica
iNet
Cisco
Nornet
Page 1 of 7
Product
LAN
MPLS
IP Telephony
IP Clear
DSL
Page 1 of 2
Entity Filtered
Remove all entity
Done
Trusted sites
100%

WinLoss Report Application - Microsoft Internet Explorer provided by BT Webtop

http://sekt.info.bt.co.uk:9080/SBIWL/

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WinLoss Report Application

Page

BT

Semantic BI

Document parameters

Win/Loss:
Win and Loss

Reason:
< ALL >

Value
Min:
0

Max:
4341

Competitor:
C&W

Product Streams:
< ALL >

From (dd/mm/yy):
01/07/08

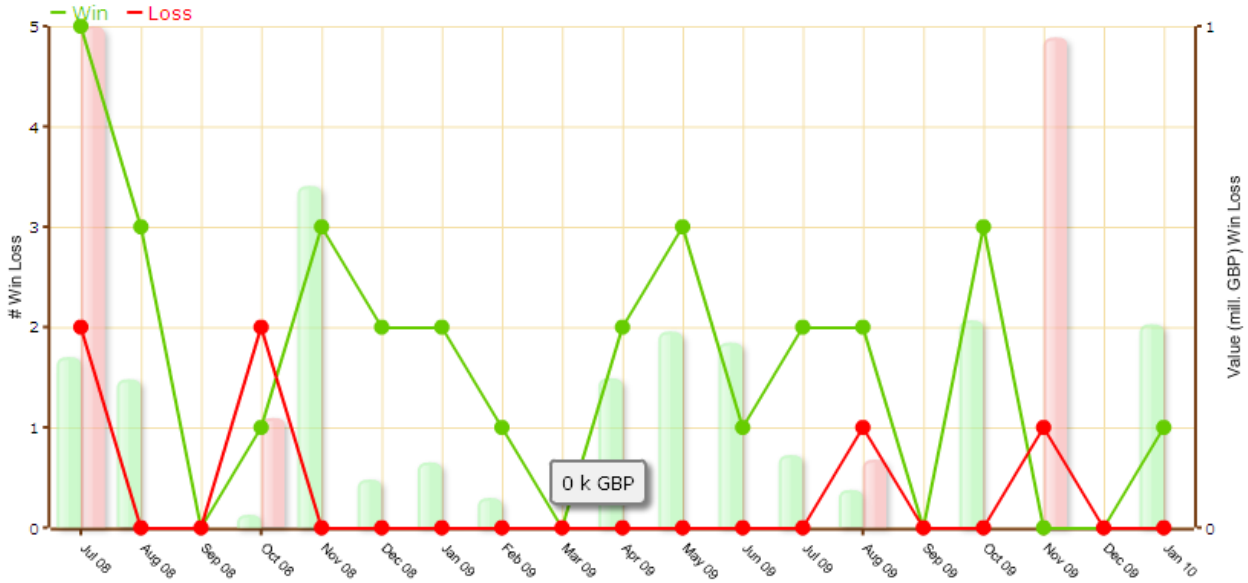
To (dd/mm/yy):
29/01/10

Build Chart

Time Analysis | Team Performance Analysis

Group by Monthly

Win/Loss Distribution



Proposals

Date	Lead by	Customer	WinL...	Competitor	Value ...	Reason	Product Stream
11/07/2008	Denis Hegarty	Turner & To...	win	C&W	206	Relationship	WAN
18/07/2008	Jon Harlow	VTB Europe	win	C&W	103	Relationship	WAN
22/07/2008	Jason Harrison	ASHTEAD ...	loss	C&W	681	Price	WAN
22/07/2008	Jason Harrison	GRAFTON ...	win	C&W	25	Relationship	WAN
22/07/2008	Jason Harrison	ASHTEAD ...	loss	C&W	496	Price	Cisco
22/07/2008	Jason Harrison	ASHTEAD ...	win	C&W	66	Incumbent	WAN

Page 1 of 2

Displaying proposals 1 - 25 of 37

Entities

People
- Bruce Richman
- Jason Harrison
- Steve Pound
- Chanter Amirthaseelan
- Stuart Thomson

Page 1 of 7

Organizations
- BT Lynx
- Cable & Wireless
- Cisco
- iNet
- BT Basilica

Page 1 of 7

Product
- MPLS
- DSL
- LAN
- IP Con
- IP Tele

of 2

Specify a product

Entity Filter
MPLS (PR)

Remove all entity

WinLoss Report Application - Microsoft Internet Explorer provided by BT Webtop

http://sekt.info.bt.co.uk:9080/SBIWL/

Search BT Intranet

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WinLoss Report Application

Page

BT

Semantic BI

Document parameters

Win/Loss:
Win and Loss

Reason:
< ALL >

Value
Min:
0

Max:
4341

Competitor:
C&W

Product Streams:
< ALL >

From (dd/mm/yy):
01/09/09

To (dd/mm/yy):
29/01/10

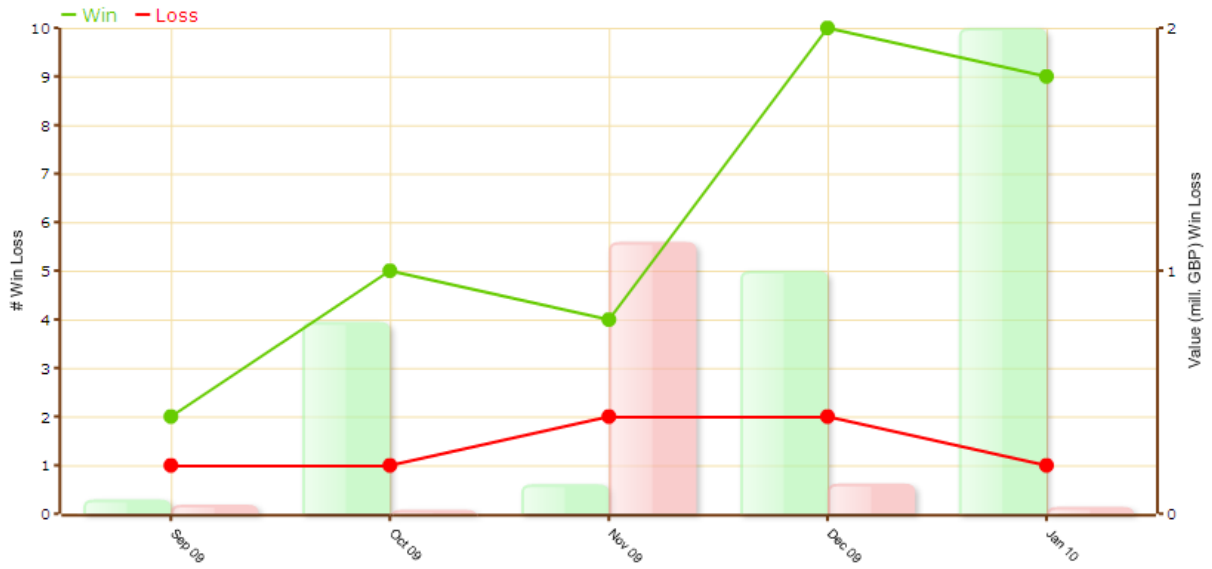
Build Chart

Specify a time period

Time Analysis | Team Performance Analysis

Group by Monthly

Win/Loss Distribution



Proposals

Date	Lead by	Customer	WinL...	Competitor	Value ...	Reason	Product Stream
03/09/2009	Martyn Hawth...	E C Harris	win	C&W	27	Relationship	BT Basilica / L...
15/09/2009	William Baillie	The Wise G...	win	C&W	34	Relationship	BTNet
18/09/2009	Simon Hill	HAMPTON T...	loss	C&W	40	Budget/Projec...	WAN
02/10/2009	Simon Hill	ROLEX UK	win	C&W	38	Brand	WAN
07/10/2009	Bruce Richman	WATERFOR...	loss	C&W	18	Stayed with In...	Other
07/10/2009	Andrew Chap...	Rural Planni...	win	C&W	394	Relationship	WAN

Page 1 of 2

Displaying proposals 1 - 25 of 37

Entities

People
- Jason Harrison
- Paul Turner
- Tracy McGhee
- Martyn Hawthorne
- Simon Tilden

Page 1 of 3

Organizations
- BT Lynx
- BT Basilica
- iNet
- Cisco
- Cable & Wireless

Page 1 of 3

Product
- LAN
- MPLS
- IP Telephony
- IP Clear
- DSL

Page 1 of 1

Entity Filtered

Remove all entity

Done

Trusted sites

100%

Team performance analysis slide

BT

Reasons for wins/losses by product stream

Semantic BI

Document parameters

Win/Loss:
Win and Loss

Reason:
< ALL >

Value
Min:
0

Max:
4341

Competitor:
C&W

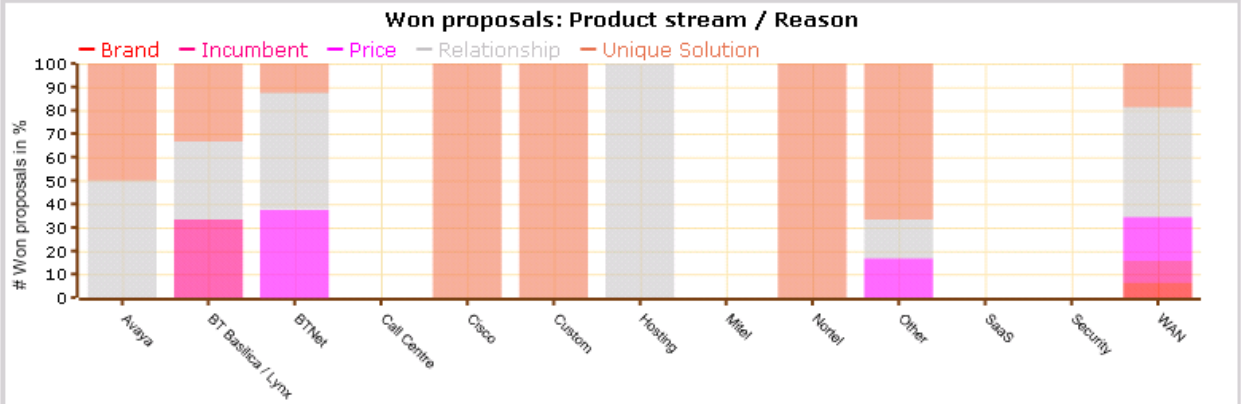
Product Streams:
< ALL >

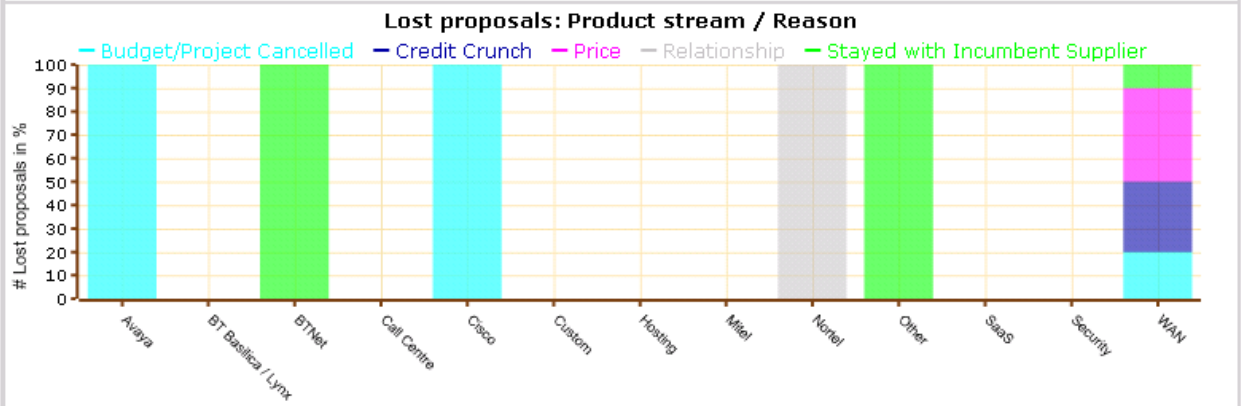
From (dd/mm/yy):
01/07/09

To (dd/mm/yy):
26/05/10

Build Chart

Time Analysis | Team Performance Analysis | **Product/Reason Analysis** | Product/Competitor Analysis





Proposals

Date	Lead by	Customer	WinLos	Competitor	Value (k	Reason	Product Stream
05/07/2009	Godfrey Brown	Prologic Comp	win	C&W	120	Unique Solution	WAN
06/07/2009	Chanter Amirtha	Oystertec PLC	win	C&W	97	Relationship	WAN
15/07/2009	Helen Ellis	HERMES DATA	loss	C&W	20	Price	WAN
15/07/2009	David Wilson	English Institut	win	C&W	253	Incumbent	BT Basilica / Lyr
17/07/2009	Tim Barker	Lakeland Limit	win	C&W	74	Price	WAN
17/07/2009	Rod Chandler	Mccarthy & St	loss	C&W	200	Credit Crunch	WAN

Page 1 of 3 | Displaying proposals 1 - 25 of 71

Entities

People
Jason Harrison
Patrick Fahy
Paul Turner
Martyn Hawthorne
Simon Tilden
Tracy McGhee
Page 1 of 4

Organizations
BT Lynx
BT Basilica
iNet
Cisco
Cable & Wireless
Nornet
Page 1 of 5

Products
WAN
Network
MPLS
LAN
IP telephones
BTNet Premium
Page 1 of 3

Entity Filtered

Remove all entity

Semantic BI

Reasons for wins/losses by competitor

Document parameters

Win/Loss: Win and Loss

Reason: < ALL >

Value Min: 0

Max: 4341

Competitor: < ALL >

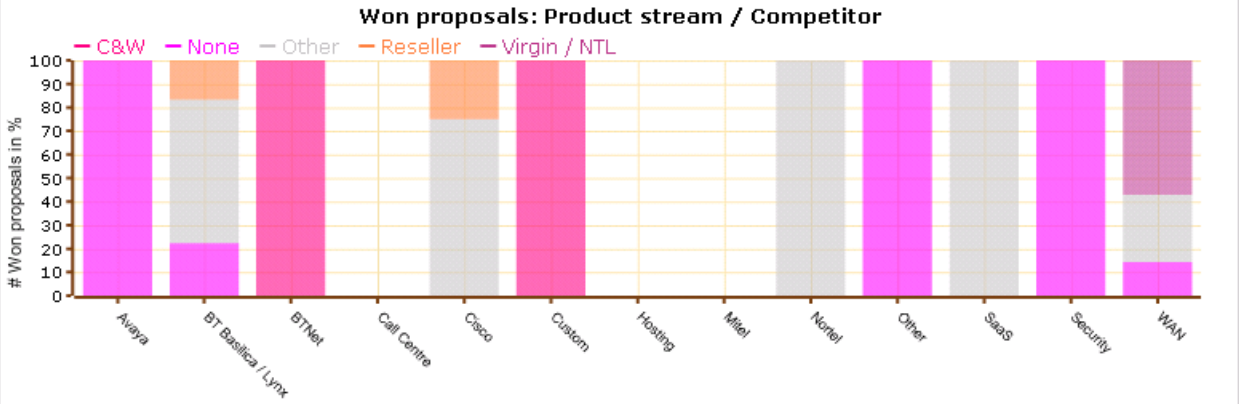
Product Streams: < ALL >

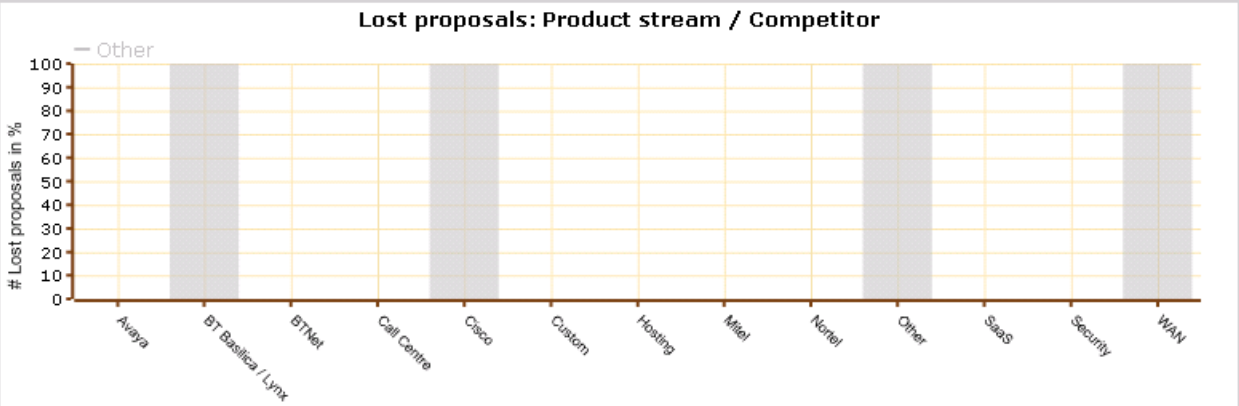
From (dd/mm/yy): 01/07/09

To (dd/mm/yy): 26/05/10

Build Chart

Time Analysis | Team Performance Analysis | Product/Reason Analysis | **Product/Competitor Analysis**





Proposals

Date	Lead by	Customer	WinLos	Competitor	Value (k	Reason	Product Stream
01/07/2009	Graham Burton	Dunfermline Bu	win	None	61	Relationship	Nortel
01/07/2009	Nick Fry	Billington Holdi	loss	Other	24	Price	BT Basilica / Lyr
01/07/2009	Nick Fry	Experian Ltd	loss	AT&T	184	Stayed with Incu	BTNet
01/07/2009	Nick Fry	Hillarys Blinds	loss	None	20	No need / Compe	Nortel
01/07/2009	Nick Fry	Midland Softw	win	None	22	Incumbent	WAN
01/07/2009	Nick Fry	Midland Softw	win	None	27	Incumbent	WAN

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Entities

People
- Tracy McGhee
- Jason Harrison
- David Roy
- Simon Tilden
- Paul Wright
- Andrew Chapman

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Organizations
- BT Engage
- BT Lynx
- BT Basilica
- Cisco
- iNet
- Betfred

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Products
- WAN
- Network
- IP telephones
- Hardware
- LAN
- Security

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Entity Filtered
- BT Engage (OR)

Remove all entity

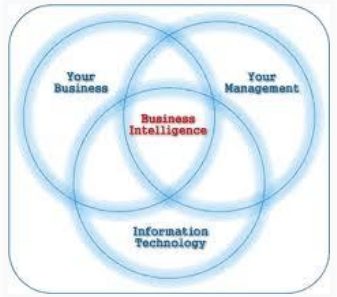
Supporting Sales Teams : Win / Loss Analysis

- Key benefits
  - extraction of business intelligence without manual intervention from previously un-mined information
  - identification of trends and issues
  - integration of previously disparate data silos
  - replacing previous manual, costly approaches

- Status
  - trial ongoing in BT Business
  - early tangible benefits identified & estimated
  - patent application under development
  - integration with salesforce.com underway

Overview

- Brief introduction to semantic technology
- Applications
  - Knowledge Management & the ACTIVE project
  - Linked Open Data
  - Business Intelligence
- **Specific application in the health sector**
- Semantic Technology uptake & resources



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BT Global Services

- Provides networked IT solutions for multi-site organisations (>35% total BT revenue)
- The Health division has a prominent role in ~€10bn UK NHS National Programme for IT
- ~€3bn of contracts for
  - Networking
  - National application service provider
  - Local application service provider for London

BT

Health IT is heterogeneous & distributed

Hospital ward

Community health

General practice

Pathology

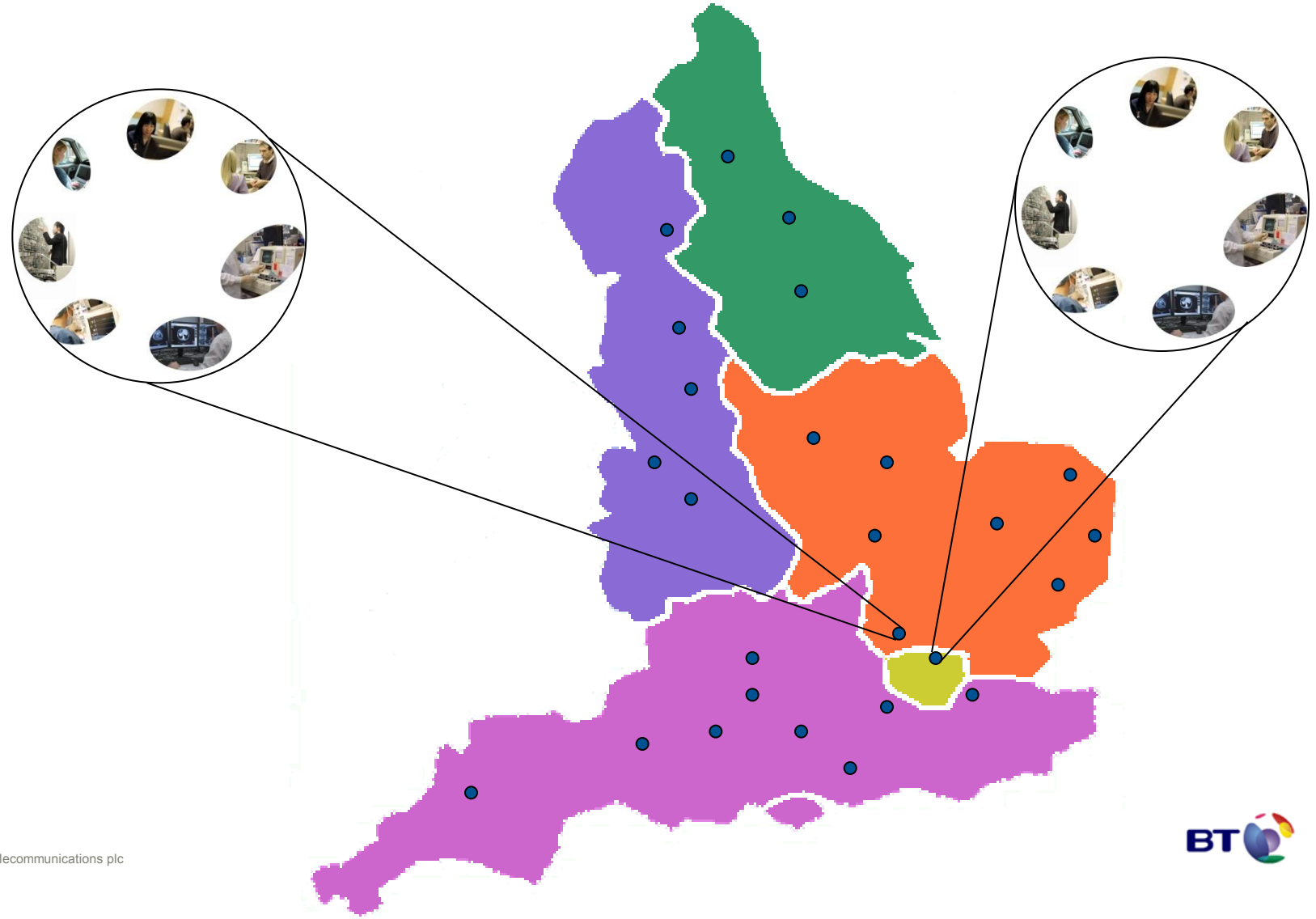
Pharmacy

Surgery

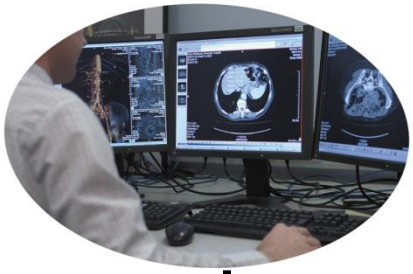
Radiology

BT

Pattern repeated in each health community



Patient centric Health IT



Patient journey

BT

NHS Connecting for Health

- Patient data
  - Represented consistently
  - Available at all stages of the patient journey
- National Health Records Service
  - A live, interactive patient record service accessible by health professionals whether they work in hospital, primary care or community services
- .

Medical vocabularies

- **SNOMED-CT** - Consistent use of medical vocabulary
  - Systematised Nomenclature Of Medicine - Clinical Terms
  - Merger of UK and US efforts with a joint editorial board
  - Original development – College of American Pathologists
  - Now managed by an international organisation based in Denmark
  - Large reference terminology (>400,000 concepts)
  - Aim to be machine interpretable for the exchange, aggregation, analysis of clinical data and to enable clinical decision support

    ⇨***semantic technology!***

BT

Semantic Technology & Health

- SNOMED-CT
  - Standard medical ontology (a “terminology”)
  - 400000+ concepts
- Now expressed formally in OWL
  - Reasoning
  - Consistency checking

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SNOMED-CT & OWL

SNOMED-CT

- Concept based
- Clear separation of lexical representation and conceptualisation
  - ***Whipple's procedure*** and ***pancreatoduodenectomy*** terms represent the same medical concept
  - **Cold** can mean **cold temperature** or a **common cold**

OWL

- SNOMED concept directly corresponds with **OWL Class**
  - Class(Appendicectomy)
- **RDFS label** can be used to represent term labels (synonyms)

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Pure subsumption hierarchy

SNOMED-CT

- has an '*is-a*' relationship equivalent to logical implication / subsumption
- A patient with asthma implies a patient with a respiratory disorder

Asthma is-a Respiratory-disorder

OWL

- Corresponds to OWL subclass
  - SubClassOf(Asthma Respiratory_disorder)

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Composite Concepts: Defining new concepts on the fly

SNOMED-CT

- Relationships with other concepts that partially or fully define the concept of interest
- Description logic reasoner used to classify concepts

OWL

- Can be modelled as existential restrictions
- Description logic reasoner used to classify classes

An **appendicectomy** is defined as a surgical procedure using the method **excision** at the site **appendix structure**

```
EquivalentClasses(Appendicectomy
  ObjectIntersectionOf(Surgical_Procedure
    ObjectIntersectionOf(
          ObjectSomeValuesFrom(procedure_site Appendix_Structure)
          ObjectSomeValuesFrom(method Excision))))
```


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Post coordination

SNOMED-CT

- Not designed to be complete ‘out of the box’
- Extensible at the point of data entry through ‘post coordination’

OWL

- Corresponds to anonymous class expressions of OWL-DL

Concepts for **kidney, excision,** and **left** exist: can create a new concept ‘left kidney excision’

```
intersectionOf(Excision
  restriction(procedure-site someValuesFrom
    intersectionOf(kidney
      restriction(laterality someValuesFrom left))))
```


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Semantic reasoning at point of care

- Description Logic reasoning is required in the live environment
- Why do you need semantic reasoning in the live environment?
  - *Post coordination* (i.e. allowing users – clinicians - to create new terms)
  - Can never enumerate all required medical concepts in advance
  - New concepts are created by combining and/or extending old terms and reasoning determines the correct logical place for new concepts
  - Creation of new anonymous class expressions (in OWL terminology)

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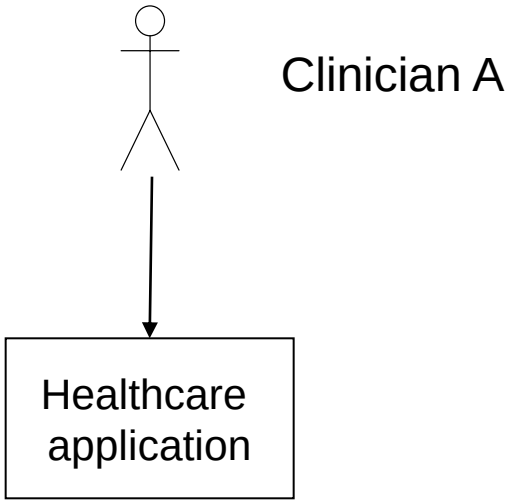
1 Clinician records clinical data using novel expression e.g. patient has almond allergy

`Allergy+caused_by+almond`



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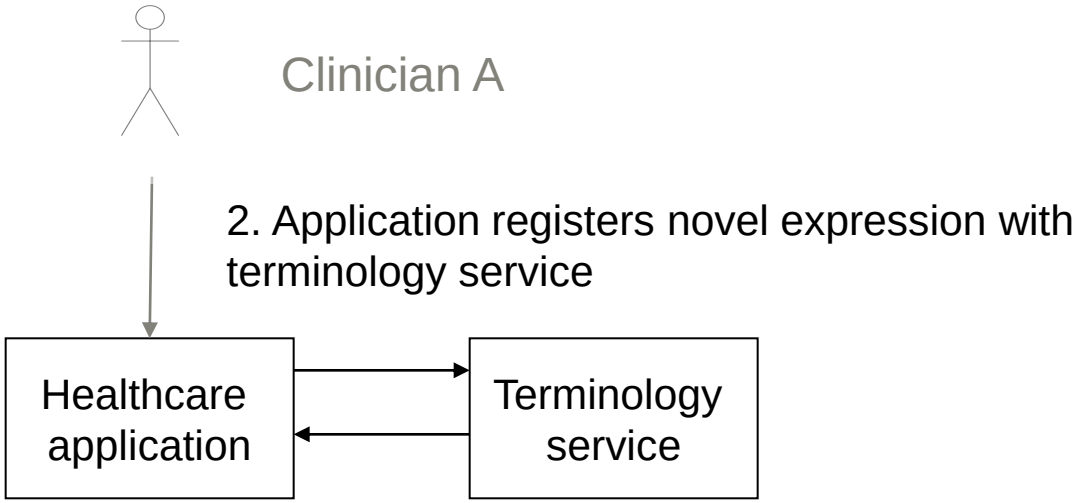
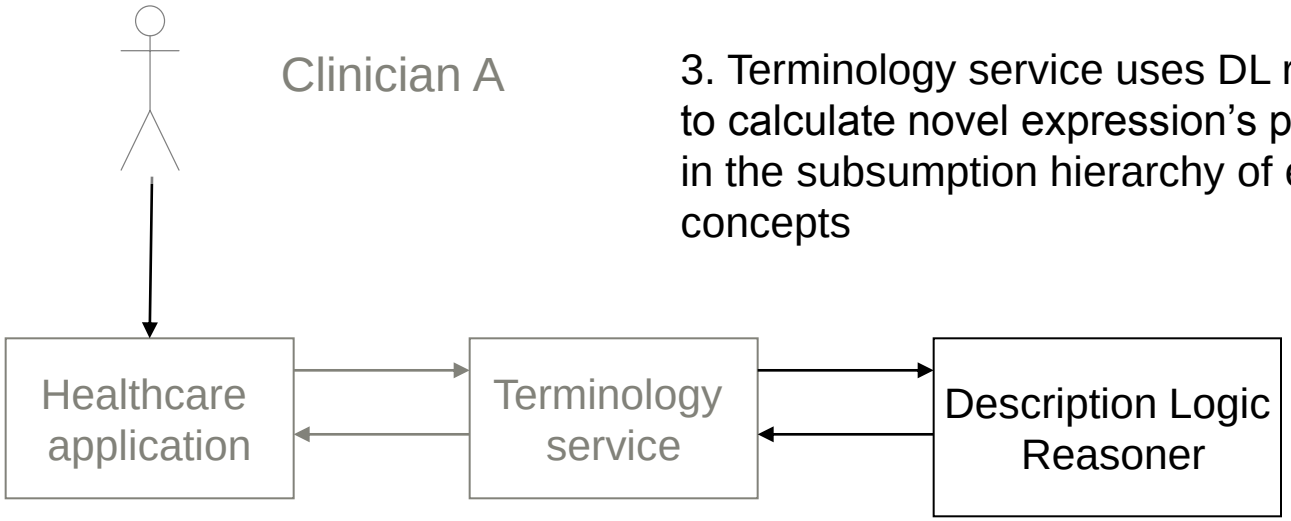
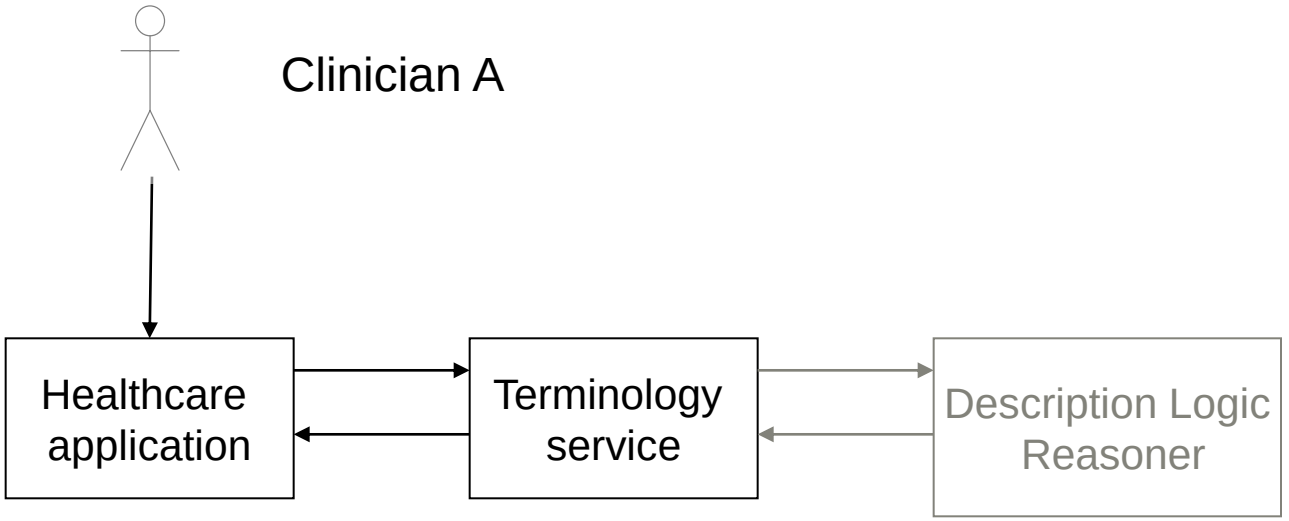




3. Terminology service uses DL reasoner to calculate novel expression's position in the subsumption hierarchy of existing concepts

NB Specification of property values make this a non-trivial task

BT



4. Terminology service provides information to application on the subsumption hierarchy including the position of the novel expression e.g.

```
allergy+caused_by+almond is-a
        nut allergy
```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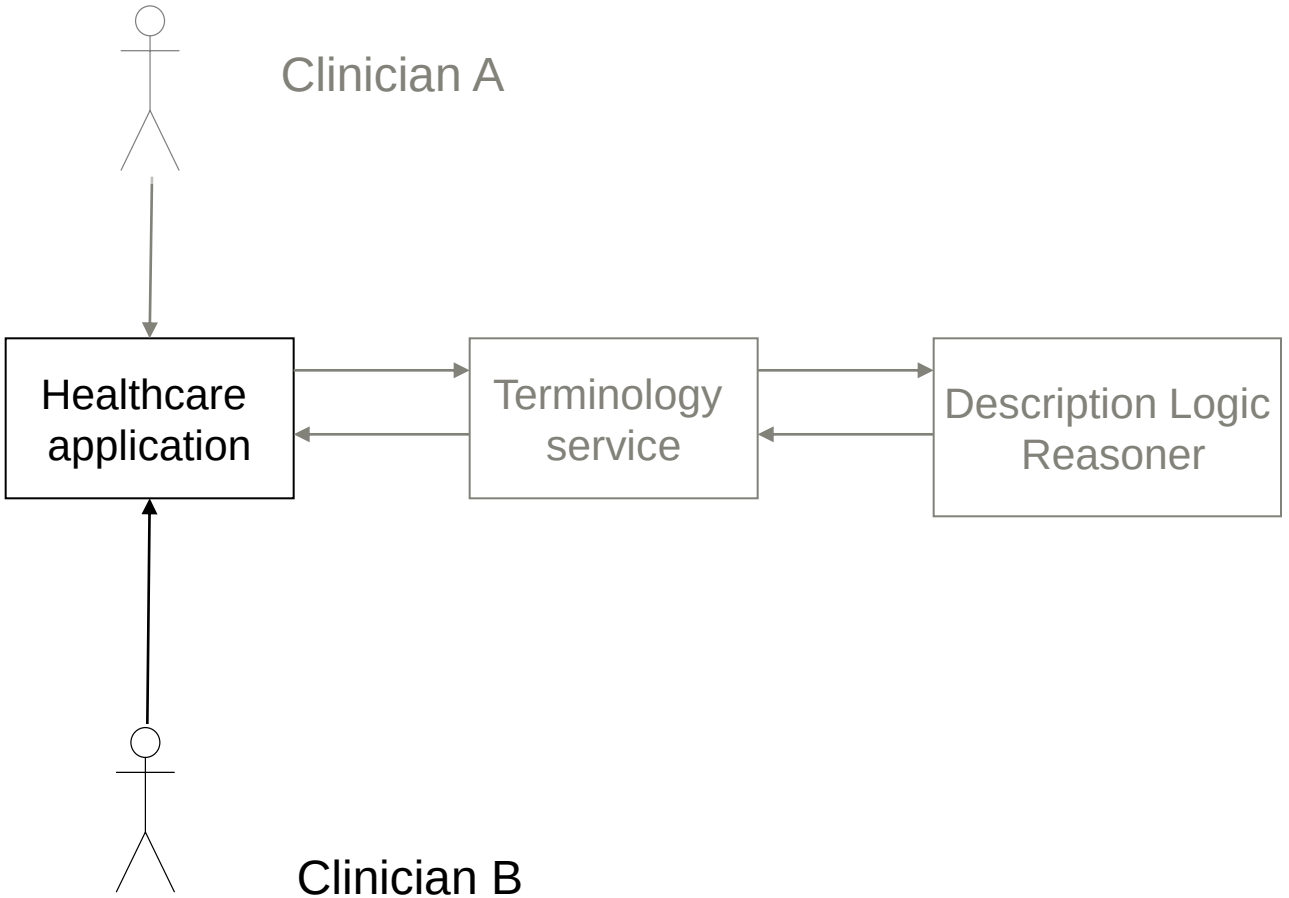

5 Clinician queries for patient data which contains novel expressions e.g. `Which patients have nut allergies?`

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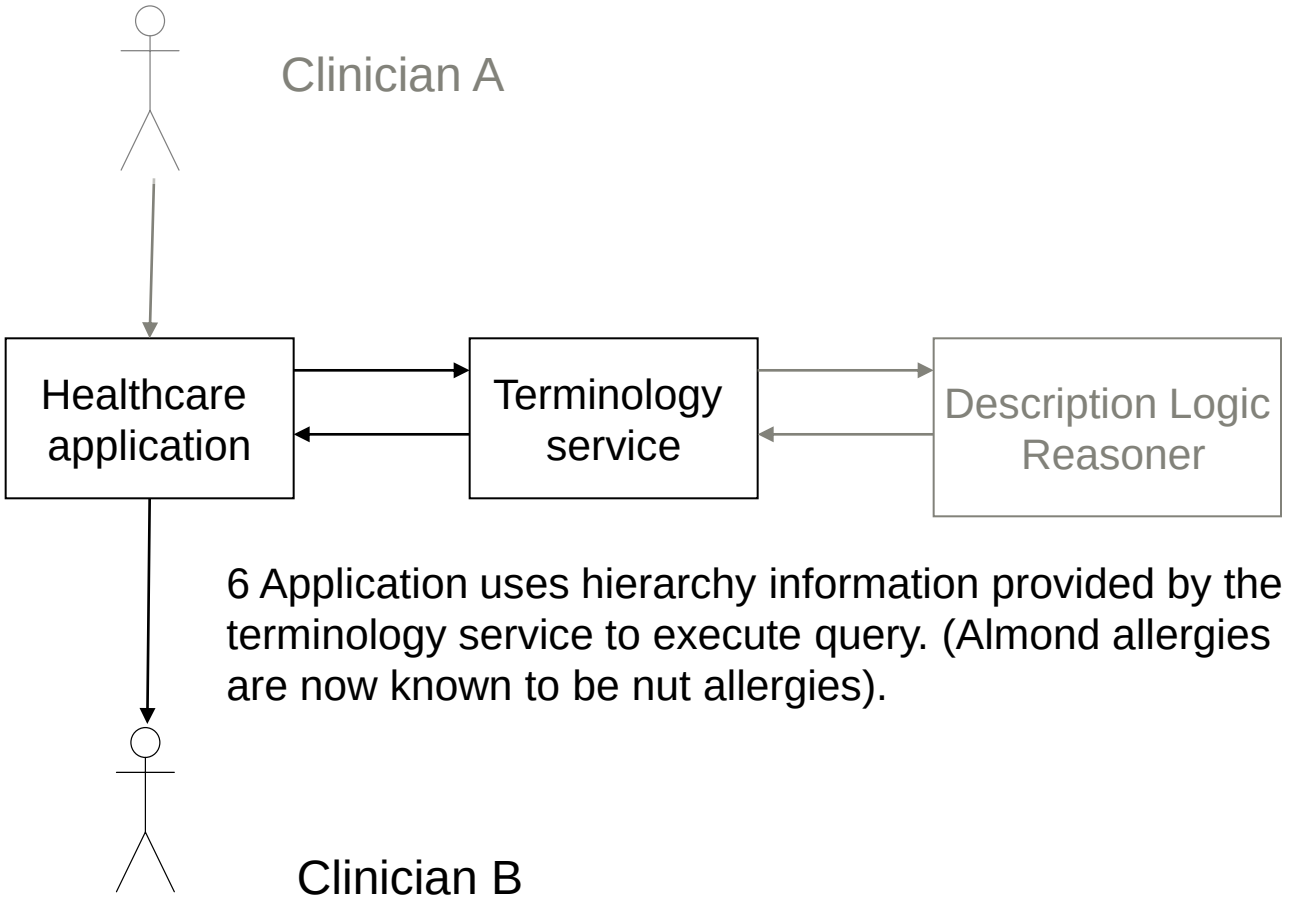

6 Application uses hierarchy information provided by the terminology service to execute query. (Almond allergies are now known to be nut allergies).

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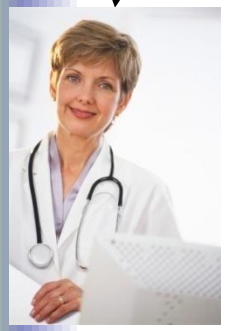
Semantic reasoning – example 2

A procedure involving a laparoscope is a keyhole procedure: how is the system to determine the number of keyhole procedures if not explicitly stated to be such?

By use of a rule which states that use of laparoscope implies procedure was a laparoscopy, which is a kind of keyhole procedure

Pre-coordination

Post-coordination



Hernia Repair

Access Instrument?

Laparoscope
(implies keyhole procedure)

Q: How many 'Key hole' procedures?

Progress in BT

- Proof of concept using Semantic technology
  - evaluating a range of reasoners
  - FaCT++ Description logic reasoner from University of Manchester
  - ~30 mins to initially load over 400,000 concepts in SNOMED-CT
  - <10ms to calculate subsumption of simple anonymous class expressions shown in example above
- Work now handed over from research to development team

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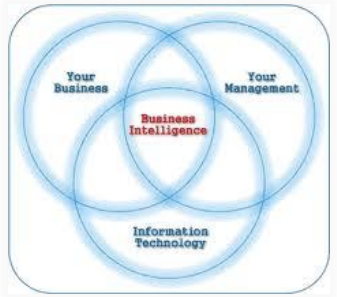

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Semantic Technology uptake

- Semantic Technology is going mainstream…
  - Oracle – adoption of RDF in 10g
  - Reuters – all its information now available in RDF via Calais
    - **"Oracle Integrates Semantic Data into Workflows Using OpenCalais"**
  - BBC: programme information in RDF
  - Much start-up activity
    - Ontoprise, Ontotext, Metatomix, Ontos, SEMgine, Hakia, ….
  - SNOMED-CT, GO – the Gene Ontology, …

Semantic Technology uptake

- Semantic Technology is going mainstream…
  - Microsoft $100m acquisition of Powerset
  - Yahoo!/Google also active
    - Search Monkey & Rich Snippets
    - Google adoption of GoodRelations ontology
- Organisations which can help
  - ST International (www.sti2.org)
  - W3C (www.w3c.org)

A couple of (non-)controversies

- Web 2.0 renders the Semantic Web redundant ?
  - Both are concerned with metadata (tags/ontological)
  - A continuum
  - Tag clouds for photos

    → RDF for Open Calais

    → OWL-Full for life-critical health ontologies
- 'Bottom-up' versus 'Top-down' ?
  - Appropriate technology for the task at hand
  - Massive annotation of text – bottom-up
  - Gene Ontology – top-down
  - OntoGen – combines the two – generates an ontology bottom-up from a corpus, to be refined 'top-down' by human

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Semantic Technology uptake

- Semantic Technology has applications both on and beyond the web
- Many sectors are using the technology today
  - See http://www.w3.org/2001/sw/sweo/public/UseCases/ for 26 further case study examples
- “Semantic technologies could revolutionize enterprise decision making and information sharing”
  - PWC Technology Forecast, Spring 2008

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Semantic Technology resources (not exhaustive!)

- Ontology engineering environments
  - Protege
  - OntoStudio
- Triple stores
  - SESAME
- Text Analytics
  - Text Garden
- Information Extraction & Named Entity Recognition
  - KIM/GATE
  - Open Calais
  - Zemanta
- Reasoners
  - FACT++
  - OWLIM
- Associations
  - Semantic Technology Institutes International (www.sti2.at)
  - W3C (www.w3c.org/2001/sw)

Thank you for your attention

Questions?

BT