



Combining and Uniting Business Intelligence with Semantic Technologies

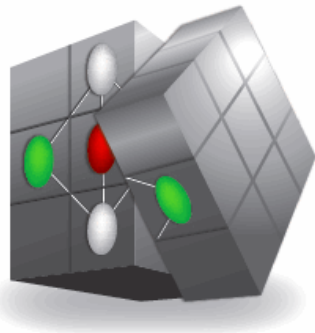
Acronym: CUBIST

Project No: 257403

Small or Medium-scale Focused Research Project

FP7-ICT-2009-5

Duration: 2010/10/01-2013/09/30



cubist

Your Business Intelligence

Requirements Document – 9.1.1

Abstract: Based on the directives provided by D.1.1.1, this report describes the requirements for the Innovantage Recruitment use case.

Type	Other
Document ID:	CUBIST D9.1.1
Workpackage:	WP9
Leading partner:	INN
Author(s):	Hazzaz Imtiaz (INN)
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Dissemination level:	PU
Status:	Final
Date:	07 April 2011
Version:	1.0



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Versioning and contribution history

Version	Description	Contributors
1.0	First draft	Hazzaz Imtiaz (INN)
1.1	First update after reviews	Hazzaz Imtiaz (INN), Alex Simov (Onto), Constantinos Orphanides (SHU)



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1 Introduction

This document describes the Innovantage recruitment use case, mainly expanding on the Insight 3.0¹ software and then providing the requirements for the use case centric aspect of the CUBIST project.

There is a brief discussion on the Insight 3.0 architecture on section 2. Section 3 describes the personas in the context of Insight, who will be benefited by the CUBIST developments. Section 4 details common user operations in Insight and results of those operations, presenting many screen shots. Section 5 presents a common utilization scenario for different personas in the current situation and how it would change once the CUBIST modifications are implemented. Section 6 lists the formal requirement for the Innovantage usecase, using modified Volere template, adapted for CUBIST.

¹ <http://login.innovantage.co.uk/insight/>



2 Insight 3.0 Architecture

The architecture of the Insight application is shown in figure 1. It consists of a front end to the job extraction data that the backend crawls and scrapes from a large number of popular job boards, UK employer websites and some external feeds.

It is a web based job recruitment system, based on SAAS (software as a service) principles. Its purpose is to help the job recruiters by providing vacancy data of all major internet job boards and all the employers websites based in UK and giving them an aggregated view of total recruitment activities in the country accessing from a single terminal. The recruiters can search with precise criteria, set notification for monitoring particular employers etc,

The two crawling frameworks, one for scraping the job boards called RENDE and the other for corporate websites crawling called JOCI are independent from the web application and the user interface. The Insight web application consists of client web pages, scripts, components for relational mapping to the back end database and querying the information retrieval framework etc.

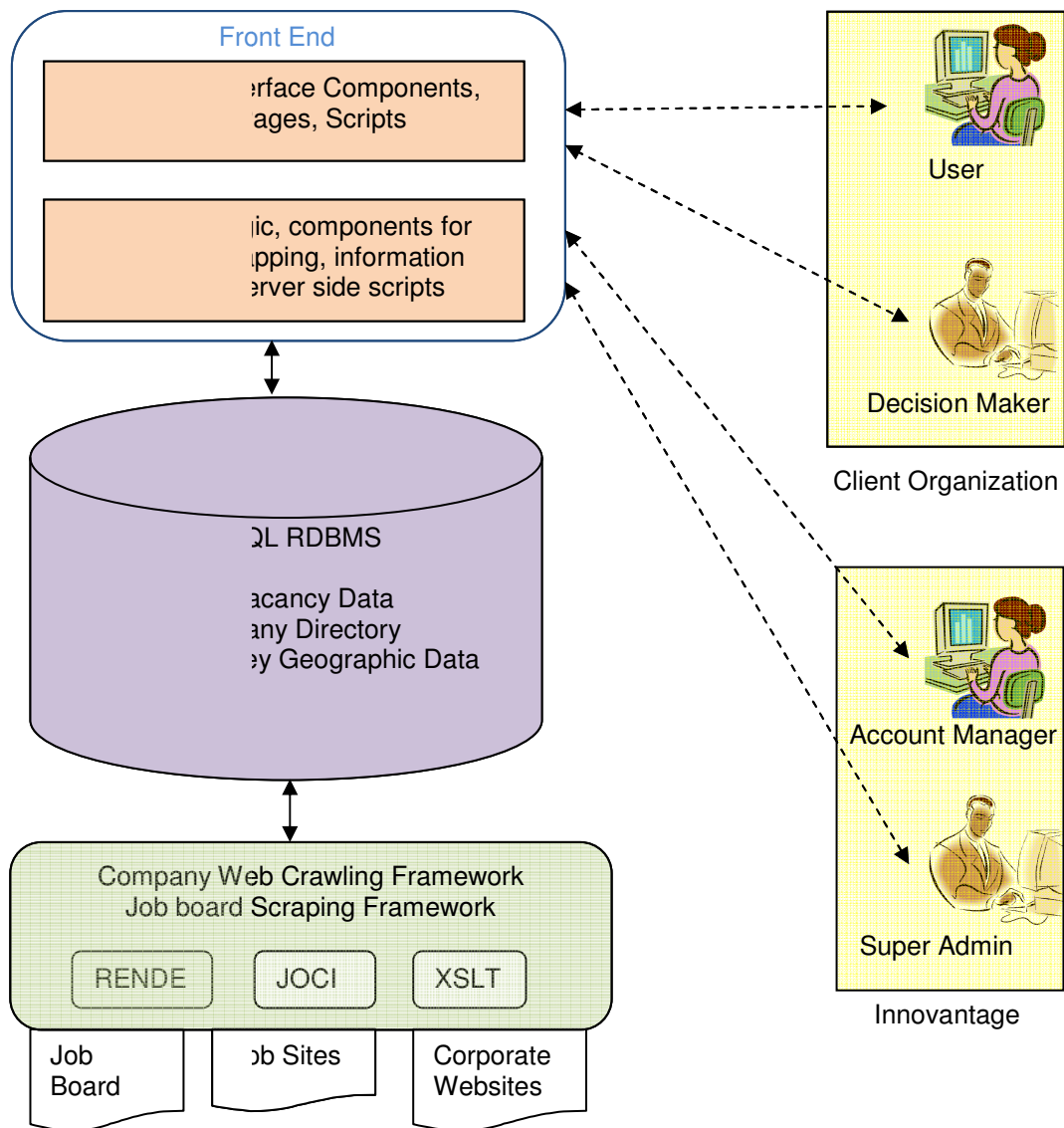


Figure 1 – Insight 3.0 Architecture



3 Personas

This chapter discusses the personas for the Innovantage use case in the context of the Insight software.

Persona	Description
User	An Agent in a Recruitment Consultancy performing vacancy or advertiser searches and related operations
Decision Maker	Decision Maker of a client Organization, supervises operations of other users in that organization
Account Manager	An Innovantage employee responsible for managing a client organization
Super Admin	Decision Maker of the organization Innovantage, supervises Innovantage users as well as other users
Client Organization	Group of users working for a recruitment consultancy

Figure 2 – Insight 3.0 Personas

Users are organized into groups called Client Organization. Every user in the system is a part of a single "Client Organization". Some of the client organization's preferences are applied to all the users of that client organization- such as "Enabled and Disabled Sources".

There are 4 types of user accounts: user, decision maker, account manager and super admin

Decision maker, account manager and the superadmin can execute all the actions that the ordinary user can execute plus some more

Client organization has an administrator which can add, edit, delete and view details of this organization and it's users. This administrator is called Account Manager. Each client organization has a user which is called Decision Maker.

3.1 User

An Insight user is an employee in a recruitment consultancy. Steve is 31 years old and has a public relations bachelor degree at university. Following his degree, Steve has worked in several customer services role, before starting to work for a recruitment consultancy, ABC Recruitment.

Now his days are divided between searching for vacancies in the region his consultancy is located in, contacting the employers and potential employees. He specialises in searching for IT related roles and specifically in manufacturing sector. He has set of roles organised by preferred locations, experience and skills and matches them to a set of CVs. Part of his role also involves reporting to the decision maker of the consultancy who is usually the owner.

After his consultancy has subscribed to insight software, he has become productive in his role. Now he can search all the UK job boards that he is interested in from a single terminal. Additionally he can also search through jobs picked up from all employer websites in UK. Insight is offering him latest contact details of these employers, head offices as well as site offices, the industry sector it is operating in, where this employer is advertising his vacancies in etc.



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Here are some of the typical things Steve does with Insight, a large part of his day:

1. He executes vacancy searches and advertiser searches.
2. He can report an Advertiser as agency.
3. He can create Saved Search.
4. He can export result sets as Excel spreadsheets.

3.2 Decision maker

A Decision Maker is the first user to be created in Insight for the client organization. Bob is 35 years old and the owner of ABC Recruitment. He has worked as a recruitment agent for last 5 years and opened his own consultancy last year. Now Bob supervises Steve as well as 3 other agents in his consultancy.

Each client organization has exactly one decision maker. Insight provides Bob the lead management interface to check what the agents are doing with Insight as well as how much they are progressing in different leads. Bob also contacts with large employers on behalf of the agents and also publishes some of his job advertisements in popular job boards and their own hosted website.

Here are some of the typical things Bob does with Insight.

1. Bob has access to monthly reporting of the users within the Client Organization
2. Bob can manage enabled and disabled sources per client organization. Here sources refer to job boards and company websites.

3.3 Account Manager (Admin)

The Account manager is a user who belongs to the internal client organization of Insight UI - Innovantage. Sara is 28 years old and working for Innovantage last one year. She has worked as a recruitment agent for last 3 years. She is responsible for managing client organizations assigned to her (created through her account).

When a new organization signs up for Insight, she trains all the users of that organisation about the UI, different features and functionalities. She also calls them after a period to check if everything is going well with the Insight usage. She can also inform the organization's decision maker about the usage of different users. In case of any issues, she is the first point of contact as well as the first line of support for the users. She reports to the decision maker of Innovantage, the Super Admin.

Here are some of the typical things Sara does with Insight

1. She can view/create/delete and edit the Client Organizations assigned to her
2. She can view/create/delete and edit users within the Client Organization that are assigned to her
3. She can view the monthly/weekly reports about the users of her Client Organizations
4. She can edit client's settings; add, remove or update user's settings of that Client Organization.
5. She can manage enabled and disabled sources of the client organization.

3.4 Super Admin

The super admin is a single account within the Insight UI. He is the user who can add/edit/delete and monitor any information within the system. He is the decision maker for the internal client organization – Innovantage, whose users are the account managers.



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Mark is 37 years old and works as Sales Manager in Innovantage. He worked with recruitment industry for 6 years, and worked as Sales Manager for a large corporate for last 4 years. Mark also works with companies who are interested in the crawled recruitment data of Innovantage but not a client of the Insight UI.

1. Mark is able to add/edit/delete/monitor any client organizations.
2. Mark is able to add/edit/delete/monitor any user account within Insight UI. Thus the Super Admin is the only user in the system who can create Account Manager in the system.
3. When a new job board crawler is developed, its available first in the Super Admin user account for Mark to test the results are ok in Insight UI. If he is satisfied, he enables it for the client organizations to search and access the results.



4 User Operations in Innovantage and Insight 3.0

4.1 Job Vacancy Search

The main goal of Insight UI is to introduce interface for searching and viewing job vacancies matching complicated criterions. Each job vacancy in the Insight Index is a complicated record. The main properties of such a record are:

- Title of the job vacancy (such as "Java Developer")
- Description
- Advertiser (The organization providing the job vacancy)
- Location (Geographical location like "London" or "Cardif")
- Date posted
- Sector (Sector of business)
- Source (The job boards like "Totaljobs" or "JustEngineers" or corporate websites)

Instead of filling the search criteria in the search form of the Insight UI again and again, users might save the set of criterions into a "Saved Search" in order to reuse that criteria in future.

Figure 3 – Job Search Page

On the top of the menu strip user has a quick search box. The options are

1. Keywords - He can enter any number of keywords in it. The keywords entered will be searched within the entire content (title, description, source, etc.) of the job vacancy record - any job vacancy which contains all of the keywords is a match.



Figure 4 – Quick Search Options

2. Job type - user may specify if the vacancies he is interested in are matched as permanent or contract
3. Date posted - user can specify the period this job vacancy is posted. Available options are:
 - o 1 day - the current day of the search
 - o 1 week - the current week of the search
 - o 2 weeks - the current and the previous week of the search
 - o 1 month - the current month of the search
4. Advertiser type - user may specify if the vacancies he is interested in have been advertised by employers direct or through recruitment agencies
5. Order By - user may specify if the search results will be ordered by date or relevant to the keywords specified
6. Source - user may specify if the search results will include or exclude jobs extracted from job boards and direct employer company websites, he may also select one or multiple job boards to search from the drop down list

Figure 5 –Source Options

7. Public Sector - user may specify if the search results will include or exclude public sector jobs

Side options

On the left side of the search screen user has several options:

1. Location - if a job vacancy has a matched location then the user can specify the geographical area in which he wants to search, user can also select from preset locations from a 'Location tree' on a right panel and if the head office or any site address needs to match that location. User can select as many locations as he wants - selecting a location adds another keyword (or phrase) in the 'Location' search box in the General section



2. Job Category – the system has predefined set of categories of job vacancies. Each category corresponds to a set of phrases that describe that job category. User can select a category (or more than one) and this will cause the search engine to match those job vacancies which contain at least one of these phrases in the entire textual content of the job record.

JOB CATEGORY ▾

- Accountancy, Finance
- Arts
- Banking, Insurance
- Catering & Hospitality
- Charity
- Customer Services
- Design/Media/Creative
- Education
- Engineering/Manufacturing
- Graduate, Trainees
- Health & Safety
- Health, Nursing, Social Services
- Human Resources

Figure 6 – Job Category Options

Categories available are : Accountancy, Finance; Arts; Banking, Insurance; Catering & Hospitality; Charity; Customer Services; Design/Media/Creative; Education; Engineering/Manufacturing; Graduate, Trainees; Health & Safety; Health, Nursing, Social Services; Human Resources; IT & Internet; Legal; Marketing, Advertising, PR; Oil, Gas, Alternative Energy; Pharmaceutical; Procurement and supply chain; Property, Construction; Retail, Wholesale; Sales; Science; Secretarial, PAs, Administration; Senior Executive; Social Care; Telecoms; Transport, Logistics, Aerospace; Travel, Leisure, Tourism

Job Title options

If user wants to specify keywords and phrases to be searched within the title of the job vacancy record, he may insert those into the Job Title section of the search screen.

JOB TITLE ▾

All Words

Any Words

Not Words

Figure 7 – Job Title Options

Options available are:

- 'All words' option - all words inserted in this box should be contained in the title of the job vacancy in order to have a match



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- 'Any words' option - at least one of the words included in this section should be contained by the title
- 'Not words' option - no match should contain any of the words specified in this section in it's title

Job Description options

If user wants to specify keywords and phrases to be searched within the description of the job vacancy record, he may insert those into the Job Description section of the search screen.

JOB DESCRIPTION ▾	
All Words	<input type="text"/>
Any Words	<input type="text"/>
Not Words	<input type="text"/>

Figure 8 – Job Description Options

Options available are:

- 'All words' option - all words inserted in this box should be contained in the description of the job vacancy in order to have a match
- 'Any words' option - at least one of the words included in this section should be contained by the description
- 'Not words' option - no match should contain any of the words specified in this section in it's description

Salary options

If user wants to specify minimum and/or maximum salary he may do so by selecting from a range of salary options



Advertiser Company options

COMPANY ▾

- Construction
 - + Building Construction and Operative Builders - General Contractors
 - + Construction - Special Trade Contractors
 - + Heavy Construction Other Than Building Construction Contractors
- + Agriculture
- + Finance
- + Mining
- + Wholesale
- + Transport & Communications
- + Services
- + Retail
- + Manufacturing

Market Description... Company Name...

Minimum Employees

Maximum Employees

Please, select the first letters of the company names you wish to search

A	B	C	D	E	F	G	H	I	J	K	L	M
N	O	P	Q	R	S	T	U	V	W	X	Y	Z

Select All | Deselect All

Figure 9 – Advertiser Company Options

The user may wish to specify the business sector of the advertiser company from a sector hierarchy or a textual description of the market the advertiser is engaged in. The user may also specify full or part of the company name, minimum and/or maximum no. of employees from a range of options.



4.2 Search Results

Source	Percentage
Company Website	38%
Monster	31%
EngineerBoard	6%
NewScientistJobs	6%
PurelyIT	6%
Other	13%

Source Origin	Percentage
JobBoard	63%
Company Website	38%

Location	Percentage
London	31%
High Wycombe	13%
Cardiff	6%
England	6%
Glasgow	6%
Other	38%

Agency/Direct	Percentage
Direct Employer	100%

Company	Percentage
Ashley Bolser Agency	13%
BT	13%
Agile Talent Management	6%
Limbe	6%
BBC	6%
BBC South West	6%
Other	56%

Employees	Percentage
A (1-19)	38%
No information	25%
F (500-999)	13%
B (20-49)	6%

Title	Organisation	Location	Date	Source
Web Designer	Ashley Bolser Agency	Yeadon, Leeds	06 Oct 2010	Company Website
Web Designer	Ashley Bolser Agency	Yeadon, Leeds	06 Oct 2010	Company Website
Postdoctoral Research Assistants (two posts) Oxford	University Of Oxford	Oxford	03 Nov 2010	NewScientistJobs
Market Intelligence/Data Analyst	Innovantage	Cardiff	27 Oct 2010	TotalJobs
Web Developer	Big Communications	London	20 Oct 2010	Company Website
Senior Interface Developer Opportunity	It Services	Glasgow	30 Oct 2010	PurelyIT
Web Developer XHTML, CSS, JavaScript	BT	High Wycombe	08 Nov 2010	Monster
Web Developer	BT	High Wycombe	05 Nov 2010	Monster
Front End Developer / Designer	Purestone Ltd	London	20 Oct 2010	Monster
Postdoctoral Researcher	John Innes Centre Ltd	England	05 Nov 2010	Company Website
Web Developer (HTML, CSS, JavaScript, PHP) - 12 month FTC- London	BBC South West	London	09 Nov 2010	TheITJobBoard
IT Web Developer	Eclectic Productions Logo	London	15 Oct 2010	EngineerBoard
IT Recruitment Resourcer - Talent Spotter - Surrey	Agile Talent Management Limite	Guildford	09 Nov 2010	Monster
Web Developer (HTML, CSS, JavaScript, PHP) - 12 month FTC- London	BBC	London	09 Nov 2010	Monster
Assessment Handling Assistant	Open University Validation Services	Milton Keynes	06 Oct 2010	Company Website
Spa Manager	Foxshop Sports Goods Shops	U.K	21 Sep 2010	Company Website

After performing a search user is navigated to the Search Results screen as shown in figure 10. This

Figure 10 – Search Results

screen contains several sections:

- The results table on the right frame,
- Option for exporting the results in excel
- Option for saving the search and receiving jobs with this search criteria in email
- left frame contains statistics of the number of job hits by sources, locations, companies etc.



SEARCH RESULTS						Showing results from 1 to 16 of total 16 << < 1 > >>	
	Edit Search		Export results to Excel		Receive jobs like this by email	Hi Job Relevance Low	
Title	Organisation	Location	Date	Source			
Web Designer	Ashley Bolser Agency	Yeadon, Leeds	06 Oct 2010	Company Website			
Web Designer	Ashley Bolser Agency	Yeadon, Leeds	06 Oct 2010	Company Website			
Postdoctoral Research Assistants (two posts) Oxford	University Of Oxford	Oxford	03 Nov 2010	NewScientistJobs			
Market Intelligence/Data Analyst,	Innovantage	Cardiff	27 Oct 2010	TotalJobs			
Web Developer	Big Communications	London	20 Oct 2010	Company Website			
Senior Interface Developer Opportunity	It Services	Glasgow	30 Oct 2010	PurelyIT			
Web Developer XHTML, CSS, JavaScript	BT	High Wycombe	08 Nov 2010	Monster			
Web Developer	BT	High Wycombe	05 Nov 2010	Monster			
Front End Developer / Designer	Purestone Ltd	London	20 Oct 2010	Monster			
Postdoctoral Researcher	John Innes Centre Ltd	England	05 Nov 2010	Company Website			
Web Developer (HTML, CSS, JavaScript, PHP) - 12 month FTC- London	BBC South West	London	09 Nov 2010	TheITJobBoard			
IT Web Developer	Eclectic Productions Logo	London	15 Oct 2010	EngineerBoard			
IT Recruitment Resourcer - Talent Spotter - Surrey	Agile Talent Management Limite	Guildford	09 Nov 2010	Monster			

Figure 11 – Search Results Table

The results table displays general information about 20 (this number is configurable) amount of results that match the search criteria. In order to see rest of the results user can use the pagination strip to navigate to the other results. The information displayed in each row for each job vacancy is the following:

- Match Score - a number between 0 and 100 that shows the relevance of the job offer to the search criteria. This score is computed by the Lucene² search engine. The score is displayed in a colored box in order to visualize this relevance as the color starts from green (relevant) to red (not relevant)
- Title - the title of the job vacancy - Clicking on the title column in the results table will navigate the user to the actual page the vacancy details were extracted from
- Location - the extracted location of the job vacancy
- Organization (Advertiser)- the organization of the job vacancy - Clicking on the organization column of the job vacancy in the results table will navigate the user to the "Company display" page on which he will have a link to the job vacancy web page (the page the vacancy details were extracted from)
- Date - the date the job vacancy has been posted
- Source - the source of the job vacancy - whether it has been extracted from a particular job board, or from a corporate website
- Remove Advertiser icon - in order perform searches that will no longer contain a certain advertiser. This preference is per user. The user can bring back the advertiser to his search results by "My Insight tab"
- Report advertiser as an agency icon - clicking on this icon will notify the Account manager that this certain advertiser might be an agency instead of direct employer

• ² <http://lucene.apache.org/>



- Results Table Ordering

By default the results table is ordered descending by match score. User is able to click on title, location, organization, date and source headers of the table in order to receive the same search results ordered by any of those properties of the vacancy. Clicking on the header more than once will reverse the order from ascending to descending and vice versa. Each time the ordering is performed the results will be displayed from their first page and user then can navigate to any page of the result set

- Pagination



Figure 12 –Pagination

Since the results in the common case will be too much to display in the same screen, the result set is partitioned into pages of 20 (configurable). User can paginate to next/previous/first/last or to a certain index of page by the pagination strip. This strip also contains information about the total count of results in the set. Pagination preserves all the criteria of the search including ordering options, personal user preferences, Client Organization preferences (enabled/disabled sources) and search constraints

- Edit Search

user might see that the search results do not meet his expectations and he wants to slightly change the search criteria he entered instead of entering the entire constraints again. This link will lead the user to the advanced search screen (even if the search was executed from the quick search field or from the saved searches table). The field of the constraints will be populated once again in order to allow the user to change them

- Export Results to Excel

if the user needs a hard copy of this particular set of job vacancies he might export the set into an excel spreadsheet. The same basic information will be entered into this sheet as the one on the search results screen. User can choose whether to export the entire result set or the particular page he is viewing on the screen. Since the result set might contain several hundreds of thousands of results it might take a long time for this spreadsheet to be generated so the user might want to export only the current page

- Receive Jobs Like This By Email

user can save all the constraints of the performed search by a name. He can save multiple searches which can then be sent to his email.

4.3 Statistics

Various statistics are extracted from the search results which are displayed on the left pane: Source, Source Origin, Location, Agency Direct and Company. While the user can view no more than 20 results on the screen at the same time, he might be interested to derive the trend for the most frequent job locations, companies, job boards etc.



- Source

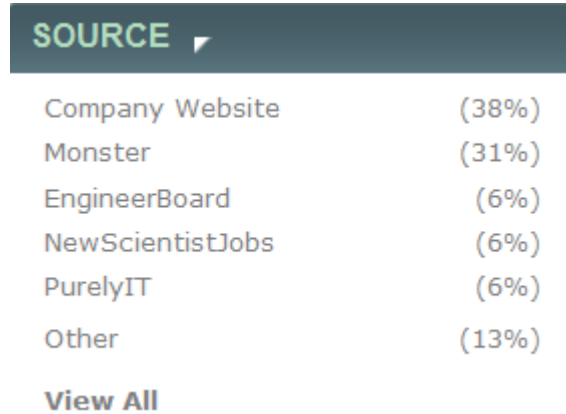


Figure 13 – Percentage by Job Source

It displays the percentage of jobs in the result set from company websites and top job boards.

- Source Origin

It displays the percentage of jobs in the result set from company websites and job boards in total.

- Location

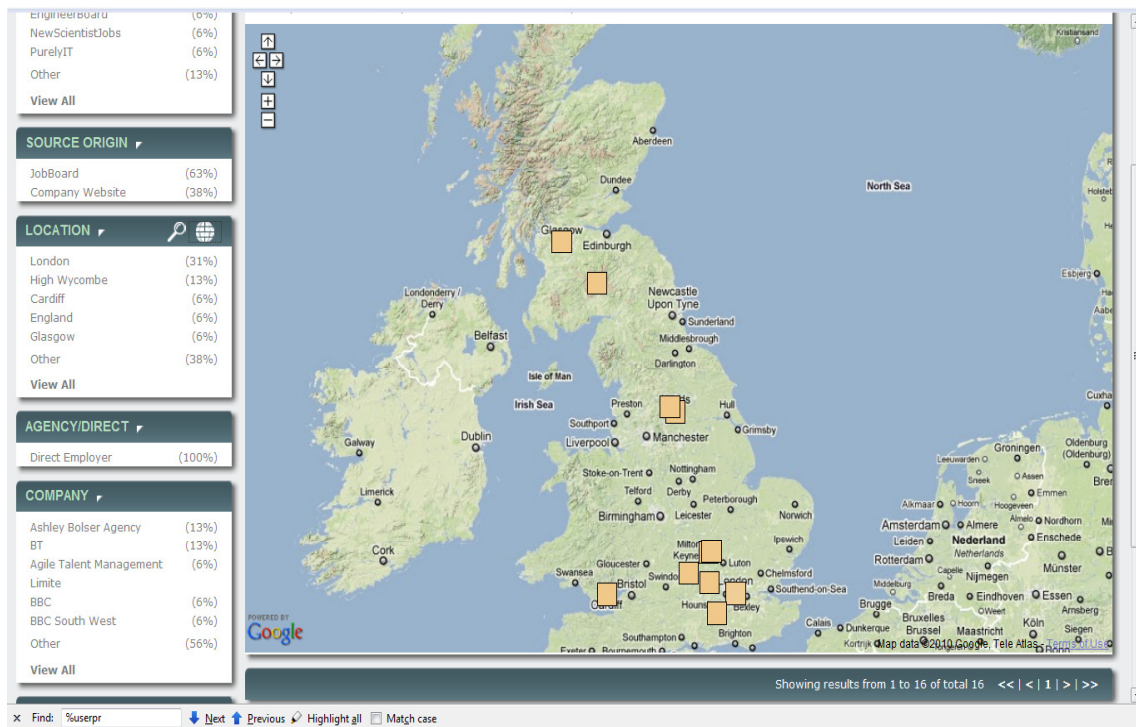


Figure 14 – Percentage by Job Location



It displays the most frequent job locations by percentage as shown in figure 14.

If the user clicks on the globe icon above the panel, using Google maps, the user interface displays in bubbles on the map the locations that enfold at least 5% of the results in the result set. Clicking on a bubble will display to the user the percentage of the results on that location.

- Agency/Direct

It displays the percentage of jobs in the result set from recruitment agencies and direct employers.

- Company

It displays the percentage of jobs in the result set by companies whether it's a direct employer or a recruitment agency.

- Employees

It displays the percentage of advertiser companies in different categories divided by their number of employees.

4.4 Company Lookup

4.4.1 Advertiser Search Screen

Insight database contains information about advertiser companies extracted from a 3rd party company directory list plus companies extracted from job vacancies. The advertisers extracted from the job vacancy sources are matched with certain percentage of confidence to those from the company directory list.

The advertisers in Insight Database have property called "parent company". The search is executed only over companies that have no "parent company" - i.e. they are "root" companies.

User has interface to search the companies from the company directory database based on name which is much simpler than the search screen of job vacancy records.

Figure 15 – Advertiser Search

- User can specify the name or part of the name of the companies.
- User can specify whether he is interested only in direct employers or agencies or both



4.4.2 Advertiser Search Results

RESULTS			Showing results from 1 to 20 of total 100
Advertiser	Address	Phone	
<input type="checkbox"/> BBC Radio Bristol Bath Office	17 Kingsmead Square, Bath, BA1 2AE	01225 466362	
<input type="checkbox"/> BBC Radio Stoke	Municipal Buildings, Earle Street, Crewe, CW1 2BJ	01270 585236	
<input type="checkbox"/> BBC Radio Oxford	269 Banbury Road, Oxford, OX2 7DW	08459 311444	
<input type="checkbox"/> BBC Drivers	134-140 Church Road, Hove, BN3 2DL	0781 3947590	
<input checked="" type="checkbox"/> BBCS	9 Huntingdon Court, Westminster Industrial Estate, Measham, Swadlincote, DE12 7DS	01530 274933	
<input type="checkbox"/> Ebbcourt Ltd	6 Test Valley Business Centre, Test Lane, Southampton, SO16 9JW	023 80871763	
<input type="checkbox"/> BBC Fencing & Landscape Supplies Ltd	Mayfield Light Indust Estate, Hatchet Lane, Winkfield, Windsor, SL4 2EG	01344 893644	
<input type="checkbox"/> BBC Radio Gloucestershire	61-63 London Road, Gloucester, GL1 1SW	01452 308585	
<input type="checkbox"/> Abbcott	13 Orchard Way, Croydon, CR0 7NP	020 87762351	
<input type="checkbox"/> BBC Dumfries	Lovers Walk, Dumfries, DG1 1NZ	01387 268008	
<input type="checkbox"/> BBC (BRANDREPUBLIC:119291)			
<input type="checkbox"/> BBC (RETAILWEEK:173279)			
<input type="checkbox"/> BBC (S1:OBS:238427)			
<input type="checkbox"/> BBC TRUST (GUARDIAN:68568)			
<input checked="" type="checkbox"/> BBC Television	Barrack Road, Newcastle Upon Tyne, NE99 2NE	0191 2321313	
<input type="checkbox"/> BBC Radio Cornwall	Phoenix Wharf, Truro, TR1 1UA	01872 275421	
<input type="checkbox"/> BBC Radio Bristol	The Weston Super Mareoffice, 22 Walliscote Road, Weston-Super-Mare, BS23 1EB	01934 627002	
<input type="checkbox"/> BBC Radio (Newcastle)	PO Box 173, Newcastle Upon Tyne, NE99 1RN	0191 2326555	
<input type="checkbox"/> BBC Radio Shropshire	2-4 Boscobel Drive, Shrewsbury, SY1 3TT	01743 248484	
<input type="checkbox"/> BBC Radio Humberside	96-98 Victoria Street, Grimsby, DN31 1BA	01472 340959	
<input type="checkbox"/> BBC Television Centre Tours	Television Centre, Wood Lane, London, W12 7RJ	08706 030304	
<input type="checkbox"/> BBC	66 Nethergate, Dundee, DD1 4ER	01382 202481	
<input type="checkbox"/> BBC Radio Norfolk	Unit 7a, Bargan Way, North Lynn Industrial Estate, King's Lynn, PE30 2JG	01553 763140	
<input type="checkbox"/> BBC Radio Cumbria	Annetwell Street, Carlisle, CA3 8BB	01228 592444	

Figure 16 – Advertiser Search Results Table

The advertiser Search Results Table consists of four columns – Advertiser, Address, Phone and a monitor advertiser option as shown in figure...

- Clicking on a company name will navigate the user to the "Company Information" screen.
- Clicking on the monitor advertiser will provide the user with a pop up screen where he can save this monitoring with a name. This means if this advertiser publishes a new job, the user will be notified.

4.4.3 Advertiser Details

User can navigate to Advertiser Details or Company Information Screen in two ways :

- From the Job Vacancies Search Result Screen by clicking on a the Organization columns
- From Advertiser Search Result Screen - by clicking on the title of a company

Figure 17 – Advertiser Details Page



This screen displays details stored in Insight Database about certain advertiser.

The advertisers extracted from the job vacancy sources are matched with certain percentage of confidence to those from the company directory list. If the confidence is greater than 75% (or greater than a percentage that each user can set for himself) the interface considers it as a good match.

Each job vacancy that is advertised by a "good match" in the Insight Index will be considered as a vacancy advertised by this company

Here is a list of details that are displayed:

- Contact information
 - Name
 - Url
 - Number of employees
 - Activity
 - telephones
- Live Jobs

Location	Category	
Lodge Porter	Oxford	11/11/2010
Research Technician and Laboratory Manager in neural stem cell and tissue engineering	Oxford	09/11/2010
Campaign Executive	Oxford	08/11/2010
Campaign Executive	Oxford	08/11/2010
DARS Trainer – 2 Year Fixed Contract	Oxford	04/11/2010
Postdoctoral Research Assistants (two posts) Oxford	Oxford	03/11/2010
Tutorial Fellowship and Titular University Lecturership (CUF) in Law	Oxfordshire	02/11/2010
Official Fellow and Tutor in English	Oxfordshire	02/11/2010
Marketing & Design Officer	Oxford	29/10/2010
Head of Impact and Innovation - Oxford	Oxford	25/10/2010

Figure 18 – Advertiser Vacancies

A table of advertiser vacancies is displayed here. The table is same as the one on the Job Vacancy Search Results Screen. It also has paginating strip in order to view paginated results. One can view details about the vacancy, search the results finer by location and category and export results into excel the same way he can do this from the search results screen

- Locations

This displays the company Location in Google map



- Monitor Advertiser or Report as Agency



Figure 19 – Monitor Advertiser or Report as Agency

From Advertiser Details Screen user can save new Saved Search in which the only constraint is the advertiser name which should match the displayed advertiser. The user can also report if the advertiser has been incorrectly categorized as direct employer.

- Statistics

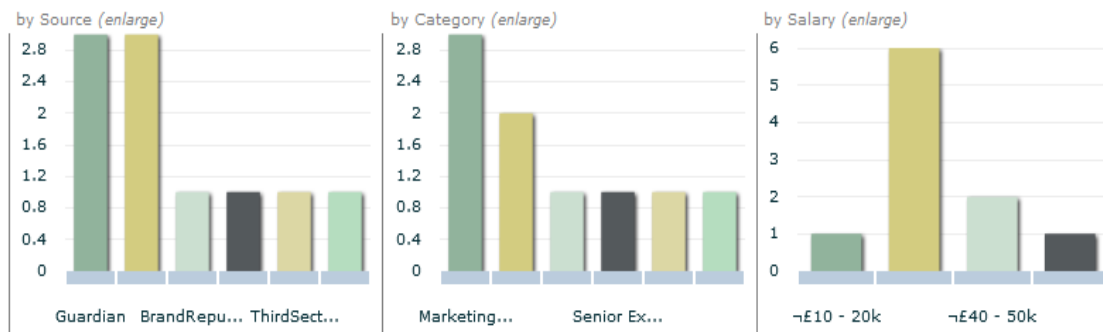


Figure 20 – Vacancies by Source, Category and Salary

The 3 different charts display vacancies by source, category and salary

- Yahoo News

This displays different news articles the system has picked up from yahoo news that are relevant to the advertiser.



4.5 Lead Management

For each user, this displays the vacancy monitor or saved searches, company monitor to monitor vacancies by company, no. of leads in different phases of recruitment etc.

The screenshot shows a web-based interface for Lead Management. At the top, there are navigation tabs: Lead Management, Job Search, Company Lookup, Lead Management Report, Lead Management Lead Report, My Insight, and Administration. The main content area is divided into several sections:

- VACANCY MONITOR – New jobs in the last 24 hours**: A grid of job categories and their counts. For example, 'CEO FD SD' has 0, 'IT' has 1, 'FD UK wide' has 0, 'nvq competitors' has 0, 'finance search' has 0, 'IT South East' has 0, 'IT SW' has 1, 'Social Care' has 1, 'teacher southeast' has 0, 'hfhfhfdhdgh' has 7, 'job descrip search' has 0, 'jhwjdjh' has 0, 'adjaldsldjalsl' has 0, 'AF Monster London' has 0, 'jldfslfh' has 10, 'accountant north west' has 0, 'FD' has 0, 'edf' has 0, and 'legal secretary' has 0, 'finance london 2' has 0.
- COMPANY MONITOR – New jobs in the last 24 hours**: A grid of company names and their counts. For example, 'Reach Local' has 0, 'Hitchener Wakeford' has 0, 'Carnival Orange' has 0, 'Sky Repair ...' has 0, 'Ellen Webb Plc' has 0, 'Orange' has 0, 'Crackerjacks' has 0, 'Halfords Ltd' has 0, 'Chapel ...' has 0, 'Alexander Lloyd' has 0, 'Web Recruit' has 0, 'Accenture' has 0, 'The Carphone ...' has 0, 'Aon Ltd' has 0, 'Coremetrics ...' has 0, 'Neptune Subsea ...' has 0, 'Chequepoint' has 0, 'Harris Interactive' has 0, and 'The Market ...' has 0.
- LEAD MANAGEMENT**: A section for managing leads, showing 'Unqualified Leads (194)' and 'Saved Jobs (16)'. Below these are lists of leads with columns for date, job title, and company name. For example, '04-May-2009 Technical Authors Linkwood Surveying', '12-Mar-2010 Management Accountant / Financial Controller Phones 4U Ltd', '14-Mar-2010 Family Assessment Workers Dudley Lodge', '18-Mar-2010 One-to-one Maths or English Tutors St Martins School', '18-Mar-2010 Finance Officer Sherwood Park Primary School', '19-Mar-2010 Management Accountant Northern Recruitment Group', '19-Mar-2010 Business Analyst Poolia UK Ltd', '19-Mar-2010 Web Designer / SEO Take That Ltd.', '19-Mar-2010 FX Product Controller Astbury Marsden & Partners', '19-Mar-2010 Multi Drop Drivers William Stewart Ltd', '20-Mar-2010 Commercial Analyst / Financial Analyst Vonq UK Ltd', '23-Mar-2010 Supply Chain Recruitment Directors Cork Griffiths Ltd', '23-Mar-2010 Trainee Recruitment Consultant Hays Personnel Contact Centre', '25-Mar-2010 Senior Java Software Engineer Cubic Transportation Systems Ltd', '26-Mar-2010 Warehouse Management Systems Analysts x 2 Asos', '29-Mar-2010 Web Developer & Webmaster ASP/CSS /HTML/SQL Lady Luck Media Ltd', '30-Mar-2010 Personal Injury Solicitor Griffith Smith', '31-Mar-2010 Private Client solicitor Burt Brill & Cardens Ltd', '06-Apr-2010 Corporate Accountant / Management Accountant - Part Qualified Gullivers Travel Associates', '06-Apr-2010 NET Developer Rileys Snooker Club Ltd', and '06-Apr-2010 Senior Software Developer (C) Albany Software Ltd'.
- Qualified Leads (10)**: A list of qualified leads with columns for date, job title, and company name. For example, '14-Dec-2009 Web Application Developer Calverley Antiques', '24-Dec-2009 Private Client Lawyer Hancock Caffin', '24-Dec-2009 Private Client Lawyer Hancock Caffin', '03-Feb-2010 Legal Executive/Paralegal O'Rourke Reid', '04-Feb-2010 National Account Manager - MP3 Samsung U.K. Ltd', '25-Mar-2010 Business Analyst - IT Operations, ASOS Asos', '26-Mar-2010 Senior Analyst Developer C# or ASP, Net Asos', '05-Jul-2010 Motor Claims Adviser - Fault, Personal Injury or Recovery Teams SUPPLIER AND INCIDENT', '27-Jul-2010 Research Associate, Risk Kings College', and '06-Jan-2011 Accounts Clerk (Purchase Ledger) Andrews Estate Agents Ltd'.
- Interviews (3)** and **Placements (8)**: Sections for tracking interview and placement activities.

Figure 21 – Lead Management

4.5.1 Lead Management Report

For a particular client organization and for a time range, this displays user activity in terms logins, searches etc., no. of leads in different phases for each user and also in total etc. as shown in Figure 22. This is available to the organization's decision maker as well as Innovantage's account managers or super admin.

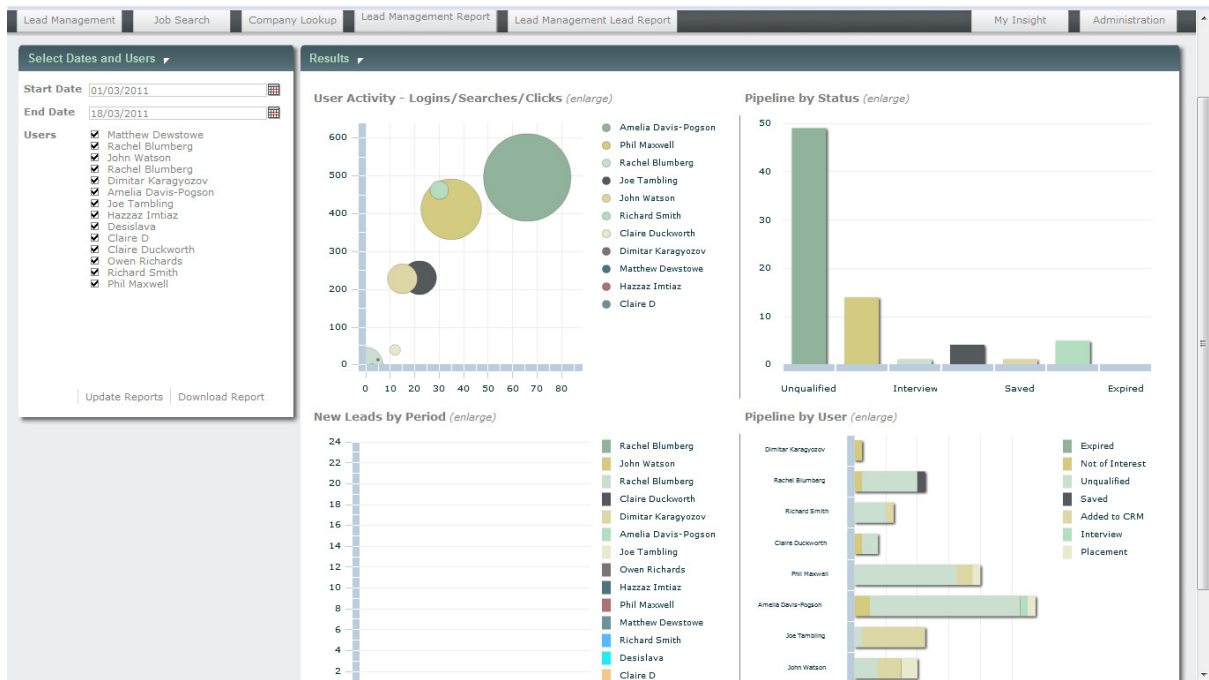


Figure 22 – Lead Management Report



5 Utilisation Scenarios

The utilization scenarios describe the typical events in the life of people who work in Innovantage and/or regular users of insight. This will be discussed considering the current as-is scenario and then the later to-be scenario after successful implementation of CUBIST software.

5.1 User and Decision Maker

5.1.1 Before CUBIST

- Steve, the recruiting agent, arrives at his office around 8:30 am.
- Steve is called by Bob, his manager at 8:45. Bob assigns him the task of searching for "Semantic Developer" roles around 50 miles from Norwich city centre area with postcode NR1. The roles should be medium to high experience level, proficient in at least one object oriented language, must have very good team working and communication ability, optionally may require team leading experience, at least a Bachelor degree in IT or Engineering. This is because of the latest CVs they have received, they found several people with that profile. Bob also wants Steve to search for advertisers who are in publishing industry and looking to move towards semantic technologies in their IT development.
- Since, Insight doesn't allow Steve to search by postcode and a miles radius around it, he performs a search for "Semantic Developer" in the quick search box, using his local knowledge, in the county of Norfolk, where Norwich is located. He selects from direct employers only, IT and Internet category, within last week, source all job boards and company websites and salary between £30k and £45k per annum assuming this would be the potential salary for a medium to high level developer with that skill.
- Insight doesn't allow Steve to search for level of education or specific level of experience. He can search for "B.Sc." or "M.Sc." degrees but it filters out a lot of desirable results.
- Steve can mention Java or C++ in the quick search box but he doesn't have a way to mention proficiency in any object oriented language which Bob wanted.
- Steve can mention "team working" but it also filters out a lot of desirable job results where similar profile is wanted but doesn't use those exact words.
- He performs the same search, but this time taking out "Semantic Developer" from quick search box and putting it into the Job Title All words and Job Description All words respectively and compare the results
- He notices the search results contain quite a few jobs from Boston which is an area in Norfolk, however most of these jobs are for Boston in USA. Insight doesn't resolve the location ambiguity, when the names are same between UK and any other country or even within UK. Even though, the jobs often specify the location as "Boston, MA" or "Boston, Massachusetts" or "Boston, USA".
- He checks the statistics, the percentage of jobs appearing from different locations within Berkshire, different industry sectors, different categories and the sources of those adverts.
- He clicks on the advertisers, posting these adverts. However, he notices some of these advertisers are not getting correctly resolved to the backend company directory as Insight is merely trying to match the advertiser to a company in the directory by a syntactic name match.
- He views all the jobs posted by each advertiser in different locations of its head office and site offices in a map widget, percentage of those jobs in different categories and so on.
- He checks the recent profit and sales margin of this advertiser, the main industry sector of this advertiser, details of the key personnel. He visits the published company website and checks out its about-us pages, key partners etc.
- He reads the recent news articles relevant to that advertiser published in yahoo picked up by insight. However a lot of news articles are irrelevant as it's just a keyword based search. For example, for an advertiser name "Flex", the keyword search has returned news articles related to the software tool "Flex".
- It took Steve around 3-4 hours to finally get a good understanding of what this advertiser is doing and that they are involved in online publishing and they may be inclined to semantic technologies.
- He gets the contact address, phone and contact details of key employees etc.



- He calls the IT development manager of that company advertiser and informs him of 3 potential candidates who can fill the role of a "Semantic Developer" and arranges probable interview dates.
- He calls the candidates, confirm if the dates are ok with them and inform the IT development manager.

5.1.2 After CUBIST

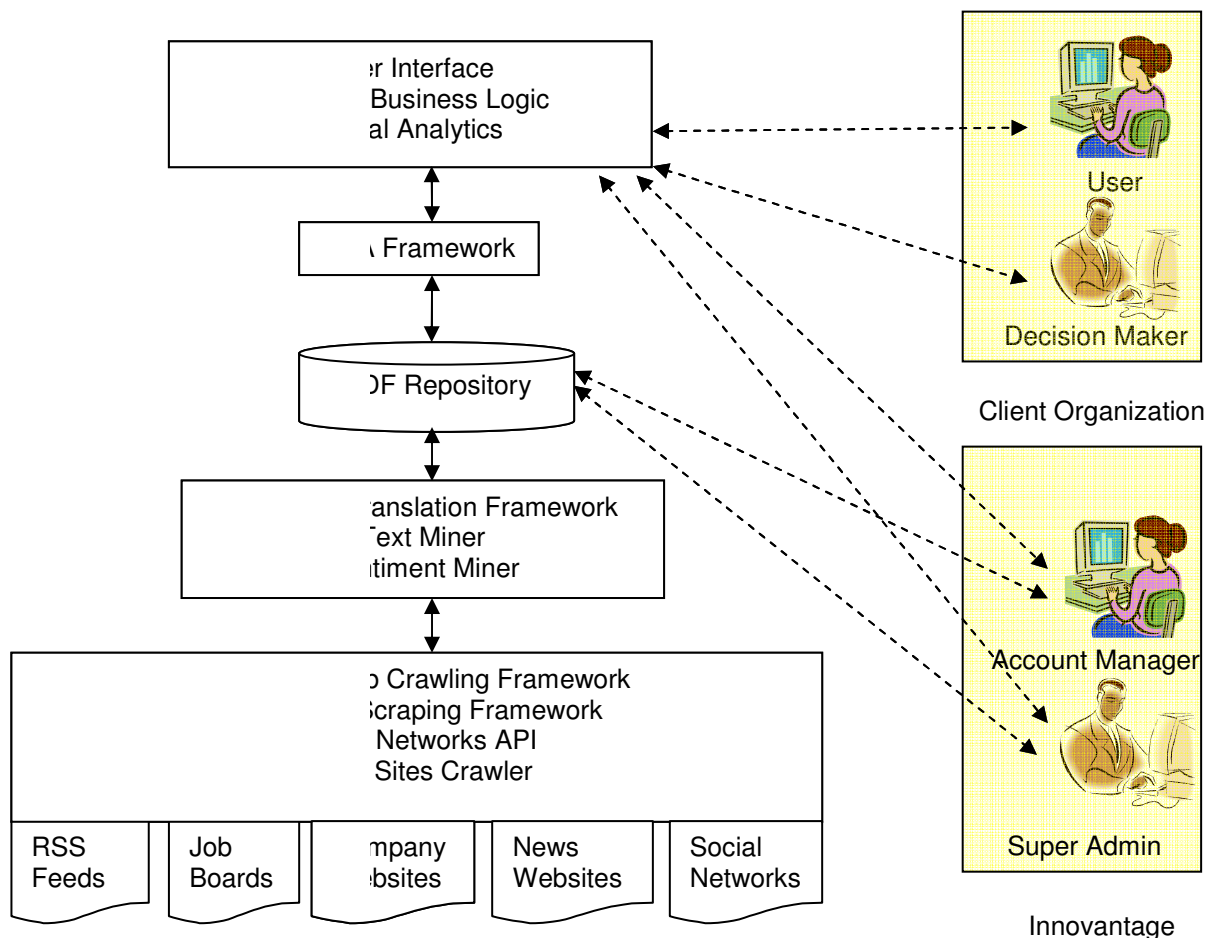


Figure 23 – Insight Architecture After CUBIST

- Steve now performs a geo-spatial query for the jobs around Norwich city centre or the postcode NR1 by specifying the exact radius, 50 miles.
- Steve performs searches by skills, qualification, job description or company information. He optionally queries for medium to high experience level programmers who have at least 5 years experience in any object oriented language. He also selects the education criteria minimum at a Bachelor level. In addition he selects the mandatory criteria to have "Semantic Developer" in the title or description of the job advert. The system returns all jobs with that phrase, that level of experience in any of object oriented languages such as Java, C++ etc. and which requires at least a Bachelor degree.
- He further sets the criteria for high team working and communication ability. The system returns all relevant jobs even when keywords like "team working" or "communication" may not have appeared in job title or description. Rather, extraction of facts and sentiments from job description, measuring semantic adjacency of key phrases, encoding them in RDF and



reasoning over them has enabled her to query the job and person specification at a much finer level.

- He notices the location ambiguity is now resolved. There are some jobs from Boston, Linconshire, UK but Boston, USA jobs have been filtered out.
- He can additionally query for jobs from only those company advertisers who are in publishing industry but who also have shown recent inclination to move towards semantic web development. Such facts about companies may appear in the company websites, external news sources, social networking sites etc. and have helped to build the company background profile. FCA also enables the system to discover new concepts within the extracted facts.
- He can also searches for jobs by a multi level category hierarchy, "IT and Internet -> Semantic Web". The jobs are not classed to a particular category only by the title, or by a number of keyphrases within the text anymore. Rather, extraction of entities and facts by natural language patterns, sentiments etc is helping to identify the job category more precisely.
- He clicks on the job advertisers and notices they are now all getting correctly resolved to a company entity in the backend directory. The disambiguation algorithm is not just taking syntactic adjacense in names but the location adjacense by postcodes as well as the industry or profile adjacense.
- He notices the company profile and facts picked up from social network sites are all relevant to this company.
- He notices the news articles picked up from different news sites or company forums are all relevant. He can select one or a set of those articles and query on those facts or view them using visual analytic widgets.

5.2 Account Manager and Super Admin

5.2.1 Before CUBIST

- Sara, the account manager, arrives at Innovantage around 8:30 am.
- Mark, her manager, calls her about a newly signed in client organization at 8:45.
- Sara calls the decision maker of that client organization Bob at 9 am, to ask about his experience so far using Insight. Sara also helps Bob to get the users usage statistics and how the different users in Bob's organization is using Insight.
- Bob sounds happy with the experience of Insight so far. He informs Sara about a particular role they are pursuing.
- Sara helps him select the right search criteria, in terms of location, job category, advertiser's industry sector etc.
- Sara helps Bob to enable certain jobboards and company websites and disable the rest inorder to focus his search.

5.2.2 After CUBIST

- Sara now helps Bob to perform his semantic search correctly.
- Sara helps Bob to enable certain external sources and disable the rest which ensures that facts extracted from those sources are not taken into account for queries or visual analytics.



6 Formal requirements

According to the Volere template adapted for CUBIST, Requirement Type can take on the following values

Purpose – very high level

Mandated – absolutely necessary;

Functional – what the product should do;

Data – what data (sources) are required;

Look and feel – appearance;

Usability and humanity – ergonomics;

Performance – response time, volumes of data to be handled, etc.;

Operational – partner with applications and platforms;

Maintainability and support – how the product should be maintained;

Security – how should data integrity and safety be maintained;

Legal – standards system must adhere to.

Priority can be mandatory or desirable.

Rationale is a short justification of the requirement.

Fit Criterion is a measure to test if the solution matches the requirement.

Description is a short statement of the intention of the requirement.

Requirement # is a unique id where the first letters are acronyms for the respective partner i.e. INN for Innovantage.

Req. #:	Req. Type:	Priority	Description:	Rationale:	Fit Criterion:
INN001	03. Functional Requirement	1. mandatory	use FCA to discover hidden relations within the data	This is one of the objectives of the DoW.	Test the use case prototypes
INN002	03. Functional Requirement	1. mandatory	Produce semantic visual analytic widgets for representation of data	This is one of the objectives of the DoW.	Test the use case prototypes
INN003	03. Functional Requirement	1. mandatory	store existing and inferred data in an RDF store	This is one of the objectives of the DoW.	query the RDF store
INN004	03. Functional Requirement	1. mandatory	Rule based extraction and text mining of facts (skills, qualification, job description, company information etc.) from job descriptions in RDF	job description contains detailed and important facts which need to be indexed and queried	query relevant RDF graphs and test the usecase prototype
INN005	03. Functional Requirement	1. mandatory	Radius job search to search for jobs around a town, county or postcode or part of a postcode by number of miles	Location search with mere city or county name is not very useful	UAT testing with Innovantage sales team with a range of radius searches
INN006	03. Functional Requirement	2. desirable	Multilevel job categorisation from	Current job categorisation is	query relevant RDF graphs and



			text mining the job description, rule based or unsupervised and also supervised or learning from user feedbacks considering a feature set.	based on a set of phrases and not very granular	test the usecase prototype
INN007	03. Functional Requirement	2. desirable	Extraction of sentiment phrases within job description	Sentiment phrases often contain important facts about the job which need to be indexed and queried	query relevant RDF graphs and test the usecase prototype
INN008	03. Functional Requirement	2. desirable	Extraction and Text mining recruitment facts and activities from financial news networks such as Google news, Bloomberg, Financial times, First 500, Best Places to Work etc.	Presenting matched news articles over certain companies, extraction of facts and reasoning over them	query relevant RDF graphs and test the usecase prototype
INN009	03. Functional Requirement	2. desirable	Extraction and Text mining of facts about company profiles and news from social networks such as Twitter, Facebook	social networks are highly popular and their client base is rapidly growing necessitating fact mining from them	query relevant RDF graphs and test the usecase prototype
INN010	03. Functional Requirement	2. desirable	Ability to subscribe to RSS feeds such as Onrec, Ukrecruiter, Google alerts etc. and Text mining of profiles and facts about companies from them	Many breaking and recent company news appear first on them	query relevant RDF graphs and test the usecase prototype
INN011	03. Functional Requirement	2. desirable	Learning from user feedback for skills, qualification, job description, company information etc. within job description	The user would be interested to participate in collaborative tagging	query relevant RDF graphs and test the usecase prototype
INN012	02. Mandated Constraint	1. mandatory	Must be web based	Installing software in each users computer is not an option	Test with Innovantage sales team
INN013	08. Operational Requirement	2. desirable	Works and looks similar with major browsers (with flash support). No mobile browsers targeted	Users use Firefox, Safari, Internet Explorer, Chrome	CUBIST looks the same in all 3 browsers; works for 5 test queries.
INN014	10. Security Requirement	1. mandatory	Only system admin & developers have write access to data	Data should not be changed by anyone other than trusted admin	
INN015	07. Performance Requirement	2. desirable	Most queries must have results displayed to user in less than 10 seconds	Web based interfaces need quick response times, or they	Test with Innovantage sales team



				appear to be broken	
INN016	05. Look and Feel	2. desirable	Look and Feel of the UI in general needs to be lively, funky which includes colour of the panels and fonts, font needs to be appropriate	Should have a user friendly interface	Test with Innovantage sales team
INN017	05. Look and Feel	2. desirable	Start page can have a basic search interface on left pane and current jobs on right pane, i.e. reed.co.uk.	Should have a user friendly interface	Test with Innovantage sales team
INN018	03. Functional Requirement	1. mandatory	User should search and view job vacancies matching complicated criterions: Title of the job vacancy, Description, Advertiser, Location, Date posted, Sector, Source, Job category etc. Search is essentially conducted in the visual analytics frontend with drilling down functionalities	core functionality in recruitment	UAT testing with Innovantage sales team with a range of searches fulfilling various criteria
INN019	03. Functional Requirement	2. desirable	Advertisers extracted from the job vacancy sources are to be matched with those from a Company directory and corresponding company results displayed i.e. The company details, jobs advertised by that company etc.	users often interested in the advertiser background information	UAT testing with Innovantage sales team with a range of searches fulfilling various criteria