Voice of the Customer: Better CRM Through Text and BI Integration

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Introduction

Seth Grimes –

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Contributing Editor, *IntelligentEnterprise.com*.

Channel Expert, *B-Eye-Network.com*.

Founding Chair, Text Analytics Summit, *textanalyticsnews.com*.

Instructor, The Data Warehousing Institute, *tdwi.org*.

Disclaimer: *I am not paid to promote any vendor.*

Key Message -- #1

Voice of the Customer (VOC) is a time-tested business concept that has gained new life through the application of text analytics.

- VOC researchers seek to understand the totality customer needs and opinions, whether explicitly stated or indirectly implied. They probe both individual views and collective, market thinking.
- VOC complements and extends traditional CRM.

Key message #1: Business intelligence – with the addition of text analytics – provide a powerful tool for VOC work.

Key Message -- #2

If you are not analyzing text, you're missing opportunity...

- 360° views
- Single version of the truth

or running unacceptable risk...

- Industries such as travel and hospitality and retail live and die on customer experience. – *Clarabridge CEO Sid Banerjee*

** in many applications/businesses but not all.

This is the "Unstructured Data" challenge

Key Message -- #3

Text analytics can add lift to your BI initiatives...

> Organizations embracing text analytics all report having an epiphany moment when they suddenly knew more than before." – *Philip Russom, the Data Warehousing Institute*

And it can do a lot more.

Text Analytics is an answer to the "Unstructured Data" challenge

Key Message -- #4

You may need to expand your view of what BI is about.

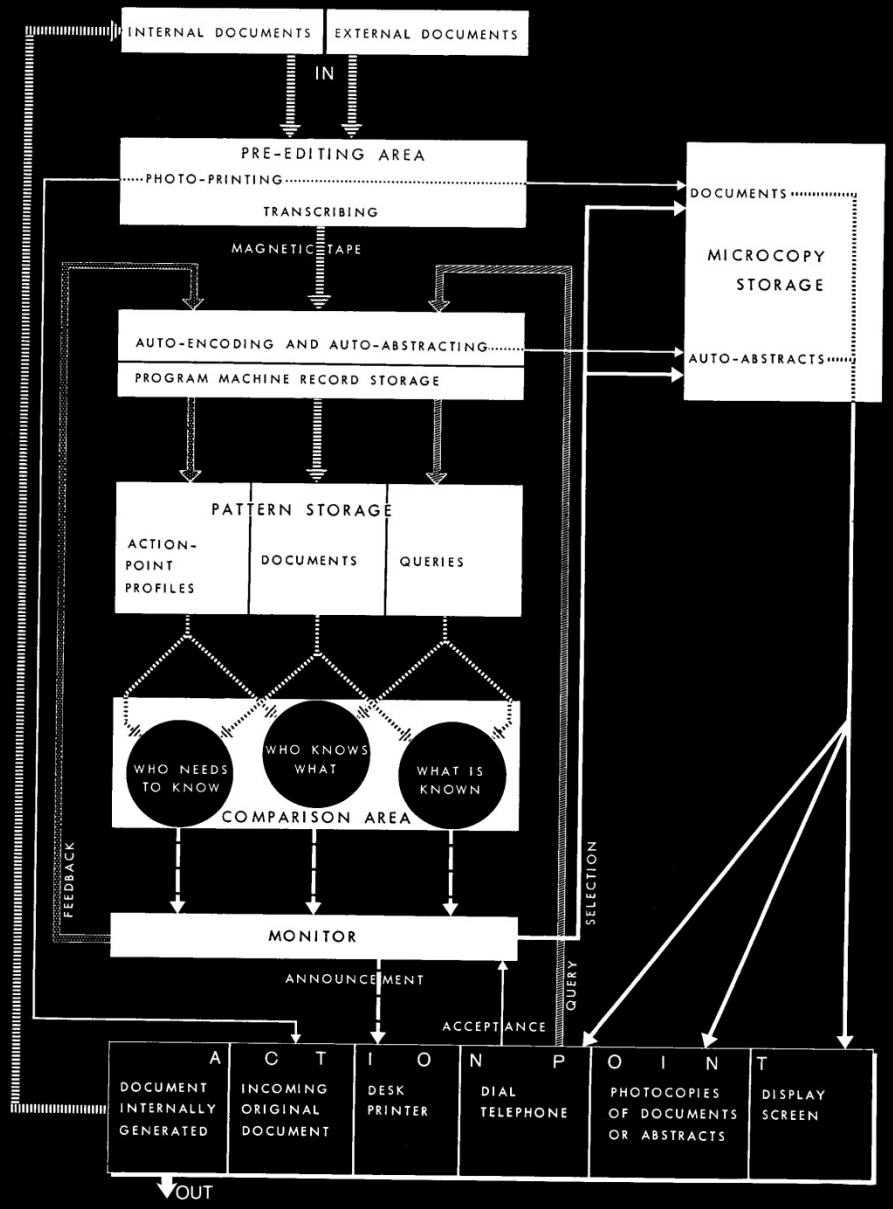

Figure 1 **A Business Intelligence System**

Key Message -- #4

In this paper, business is a collection of activities carried on for whatever purpose, be it science, technology, commerce, industry, law, government, defense, et cetera. The communication facility serving the conduct of a business (in the broad sense) may be referred to as an intelligence system. The notion of intelligence is also defined here, in a more general sense, as "the ability to apprehend the interrelationships of presented facts in such a way as to guide action towards a desired goal."

– *Hans Peter Luhn,* A Business Intelligence System, *IBM Journal, October 1958*

The "Unstructured Data" Challenge

"The bulk of information value is perceived as coming from data in relational tables. The reason is that data that is structured is easy to mine and analyze."

– *Prabhakar Raghavan, Yahoo Research, former CTO of enterprise-search vendor Verity (now part of Autonomy)*

Yet 80% of enterprise information is in "unstructured" form (IDC, others). The value equation is out of balance: it reflects actuality rather than potential.

The "Unstructured Data" Challenge

Traditional BI feeds off:

```
"SUMLEV","STATE","COUNTY","STNAME","CTYNAME","YEAR","POPESTIMATE",
50,19,1,"Iowa","Adair County",1,8243,4036,4207,446,225,221,994,509
50,19,1,"Iowa","Adair County",2,8243,4036,4207,446,225,221,994,509
50,19,1,"Iowa","Adair County",3,8212,4020,4192,442,222,220,987,505
50,19,1,"Iowa","Adair County",4,8095,3967,4128,432,208,224,935,488
50,19,1,"Iowa","Adair County",5,8003,3924,4079,405,186,219,928,495
50,19,1,"Iowa","Adair County",6,7961,3892,4069,384,183,201,907,472
50,19,1,"Iowa","Adair County",7,7875,3855,4020,366,179,187,871,454
50,19,1,"Iowa","Adair County",8,7795,3817,3978,343,162,181,841,439
50,19,1,"Iowa","Adair County",9,7714,3777,3937,338,159,179,805,417
```

The "Unstructured Data" Challenge

Traditional BI feeds off:

```
"SUMLEV","STATE","COUNTY","STNAME",
50,19,1,"Iowa","Adair County",1,824
50,19,1,"Iowa","Adair County",2,824
50,19,1,"Iowa","Adair County",3,821
50,19,1,"Iowa","Adair County",4,809
50,19,1,"Iowa","Adair County",5,800
50,19,1,"Iowa","Adair County",6,796
50,19,1,"Iowa","Adair County",7,787
50,19,1,"Iowa","Adair County",8,779
50,19,1,"Iowa","Adair County",9,771
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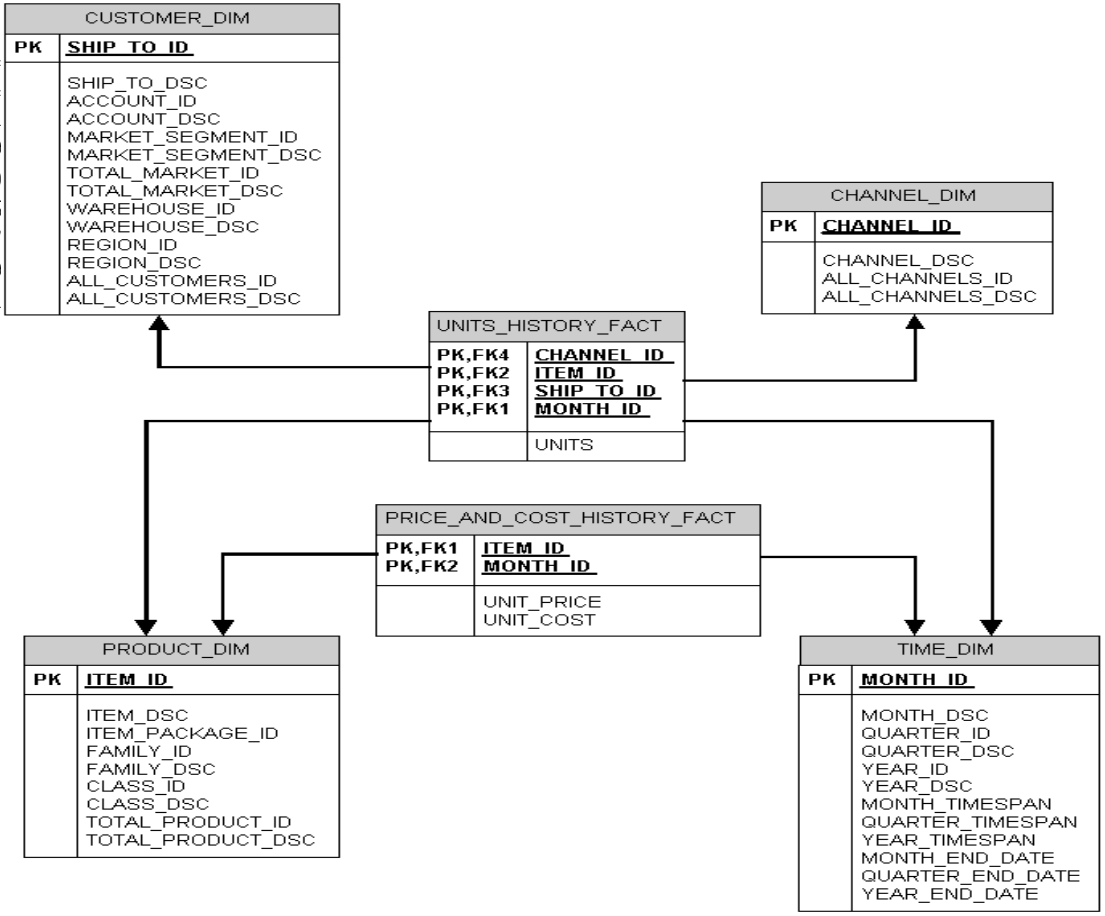
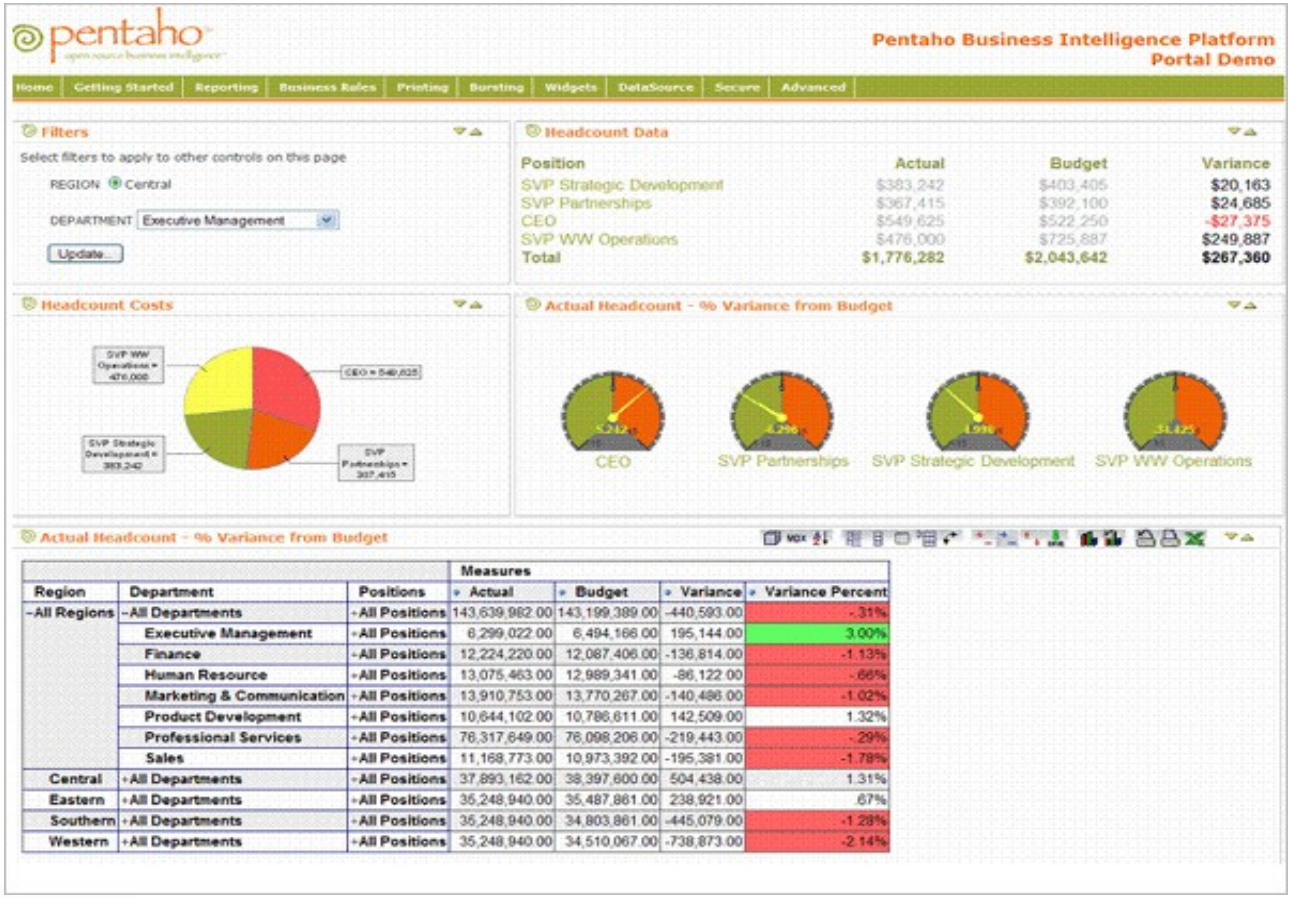


It runs off:

The "Unstructured Data" Challenge

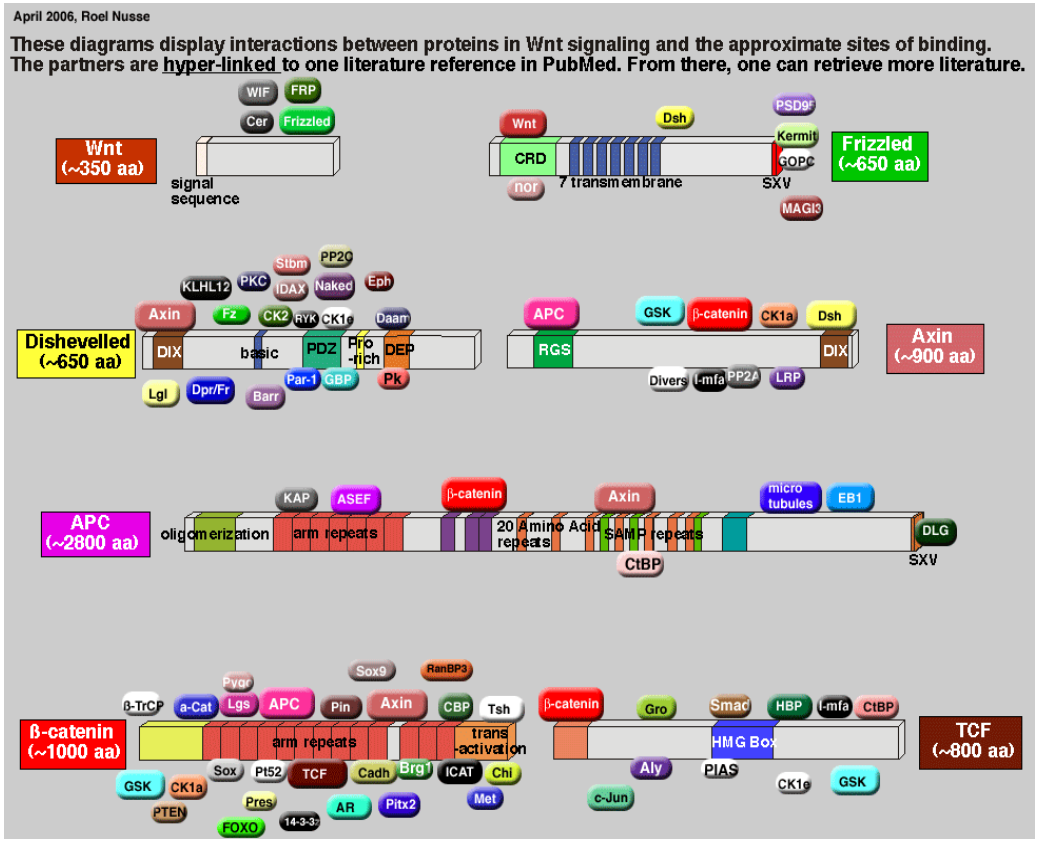
Traditional BI produces:



http://www.pentaho.com/products/dashboards/

The "Unstructured Data" Challenge

Some information doesn't come from a data file.



www.stanford.edu/%7ernusse/wntwindow.html

Axin and Frat1 interact with dvl and GSK, bridging Dvl to GSK in Wnt-mediated regulation of LEF-1.

Wnt proteins transduce their signals through dishevelled (Dvl) proteins to inhibit glycogen synthase kinase 3beta (GSK), leading to the accumulation of cytosolic beta-catenin and activation of TCF/LEF-1 transcription factors. To understand the mechanism by which Dvl acts through GSK to regulate LEF-1, we investigated the roles of Axin and Frat1 in Wnt-mediated activation of LEF-1 in mammalian cells. We found that Dvl interacts with Axin and with Frat1, both of which interact with GSK. Similarly, the Frat1 homolog GBP binds Xenopus Dishevelled in an interaction that requires GSK. We also found that Dvl, Axin and GSK can form a ternary complex bridged by Axin, and that Frat1 can be recruited into this complex probably by Dvl. The observation that the Dvl-binding domain of either Frat1 or Axin was able to inhibit Wnt-1-induced LEF-1 activation suggests that the interactions between Dvl and Axin and between Dvl and Frat may be important for this signaling pathway. Furthermore, Wnt-1 appeared to promote the disintegration of the Frat1-Dvl-GSK-Axin complex, resulting in the dissociation of GSK from Axin. Thus, formation of the quaternary complex may be an important step in Wnt signaling, by which Dvl recruits Frat1, leading to Frat1-mediated dissociation of GSK from Axin.

www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=PubMed&cmd=Retrieve&list_uids=10428961&dopt=Abstract

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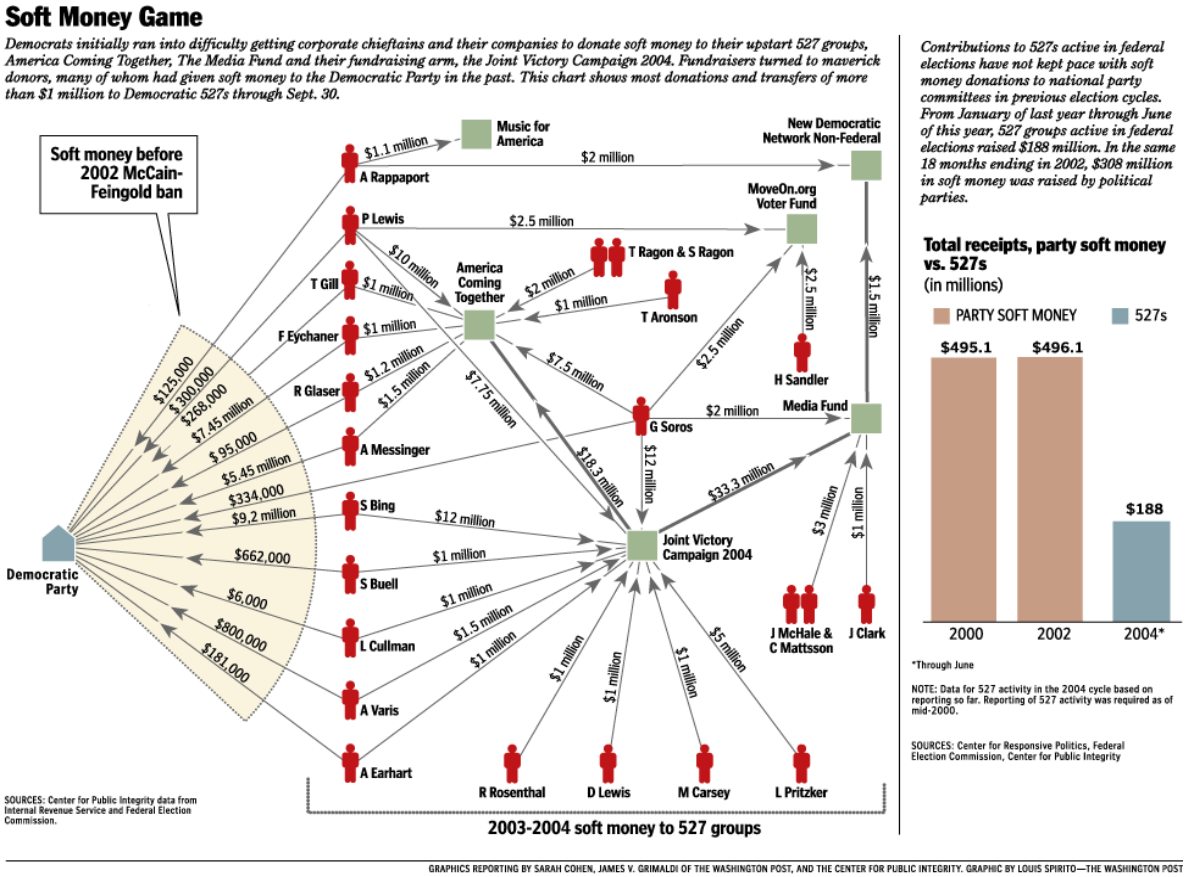
The "Unstructured Data" Challenge

Some is best shown as other than a dashboard.



www.washingtonpost.com/wp-srv/politics/daily/graphics/527Diagram_101704.html

Key Message -- #4

So what's BI – the 1958 definition and today's?

In this paper, business is a collection of activities carried on for whatever purpose, be it science, technology, commerce, industry, law, government, defense, et cetera. The communication facility serving the conduct of a business (in the broad sense) may be referred to as an intelligence system. The notion of intelligence is also defined here, in a more general sense, as "the ability to apprehend the **interrelationships of presented facts** in such a way as **to guide action towards a desired goal**."

– *Hans Peter Luhn,* A Business Intelligence System*, IBM Journal, October 1958*

Voice of the Customer

Our desired goals:

- Satisfied customers.
- New customers.
- More profitable customers.
- Better products, fewer defects.

Some of the ingredients are in transactional and operational systems.

- Retail and service transactions.
- Billing records.
- Web-site logs.
- CRM systems.

Some are not, or are not being studied...

Voice of the Customer

Consider:

E-mail, news & blog articles, forum postings, and other social media.

Contact-center notes and transcripts.

Surveys, feedback forms, warranty claims.

And every kind of corporate documents imaginable.

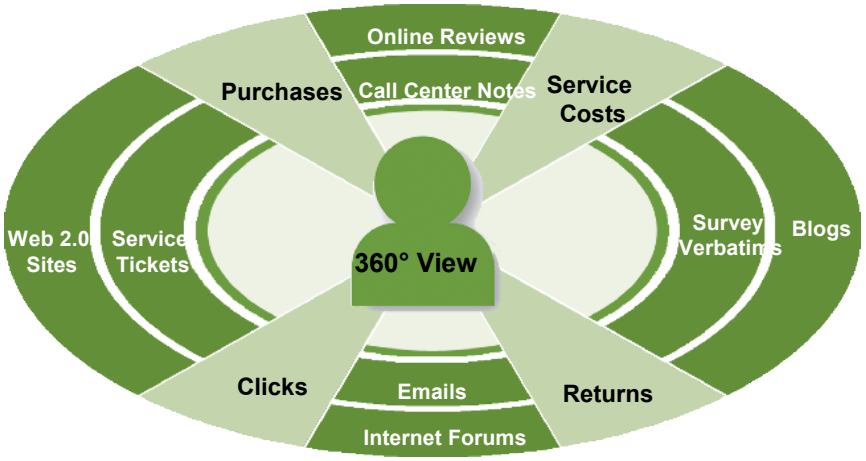
These sources may contain "traditional" data.

The Dow fell 46.58, or 0.42 percent, to 11,002.14. The Standard & Poor's 500 index fell 1.44, or 0.11 percent, to 1,263.85, and the Nasdaq composite gained 6.84, or 0.32 percent, to 2,162.78.

Text and BI Integration

Why integrate analytics?

- 360° views.
- Single version of the truth.



Clarabridge's version: text + data

Search

Search is not the answer. I don't (usually) want to find a document; I want to find a fact, the answer to a question:

- What was the population of Paris in 1848?
- What's the best price for new laptop that I'll use for business trips and around the office?
- What do people think of the *Iron Man* movie?
- Who are the top 4 sales people for each product line, region, and quarter for the last two years?

Search

Q&A may involve hidden knowledge:

What was the population of Paris in 1848?

Concepts and complexity:

What's the best price for new laptop that I'll use for business trips and around the office?

Opinion:

What do people think of the *Iron Man* movie?

Calculation and structuring:

Who were the top 4 sales people for each product line, region, and quarter for the last two years?

Search

Search involves –

- Words & phrases: search terms & natural language.
- Qualifiers: include/exclude, and/or, not, etc.

Answers involve –

- Entities: names, e-mail addresses, phone numbers
- Concepts: abstractions of entities.
- Facts and relationships.
- Abstract attributes, e.g., “expensive,” “comfortable”
- Opinions, sentiments: attitudinal data.
- ... and sometimes BI objects.

Search

Search is not enough.

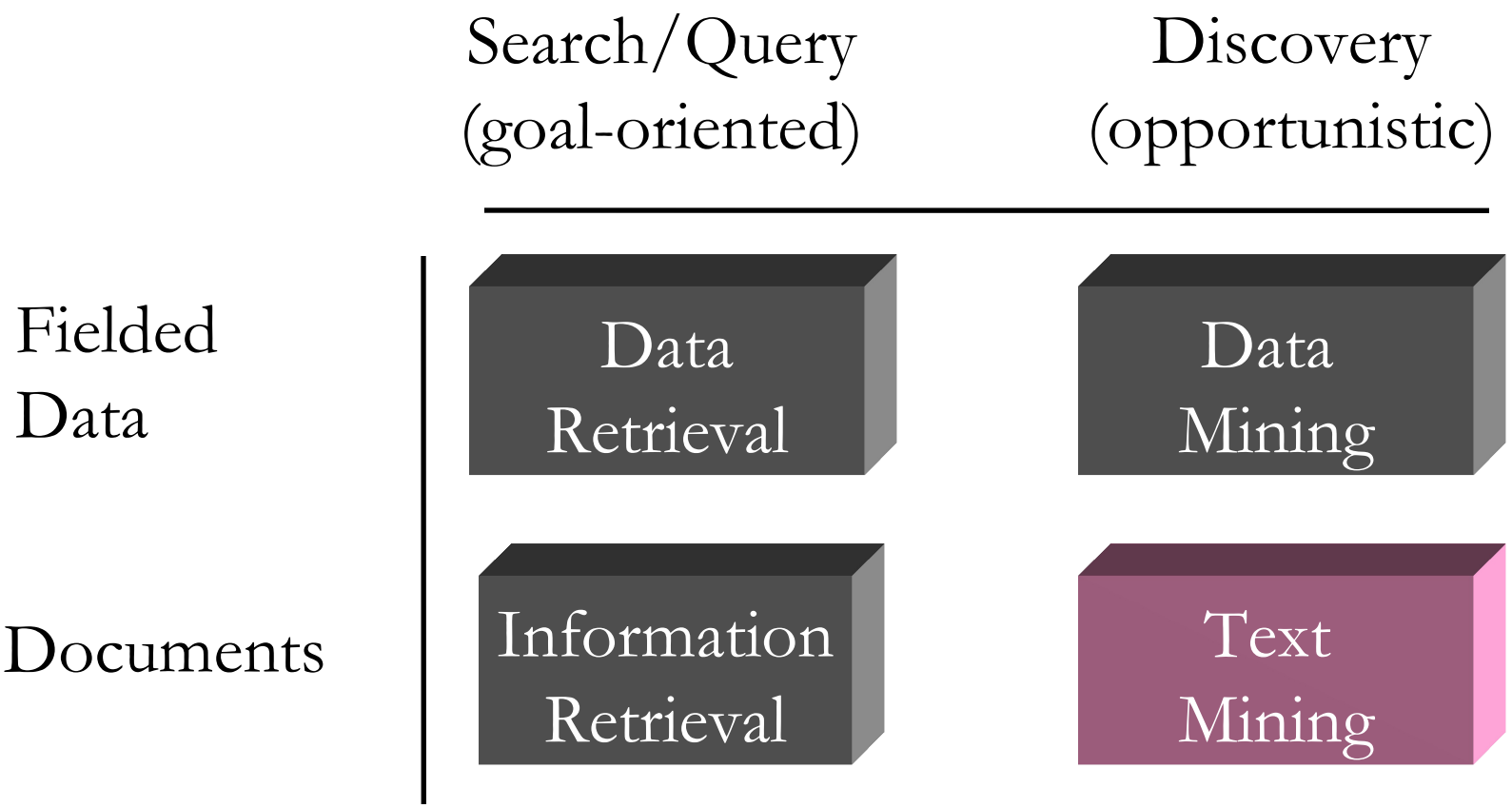
*Search helps you find things you already know about. It doesn't help you **discover** things you're unaware of.*

*Search results often lack **relevance**.*

*Search finds documents, not **knowledge**.*

Search finds information, but it doesn't enhance your analyses.

Text Mining

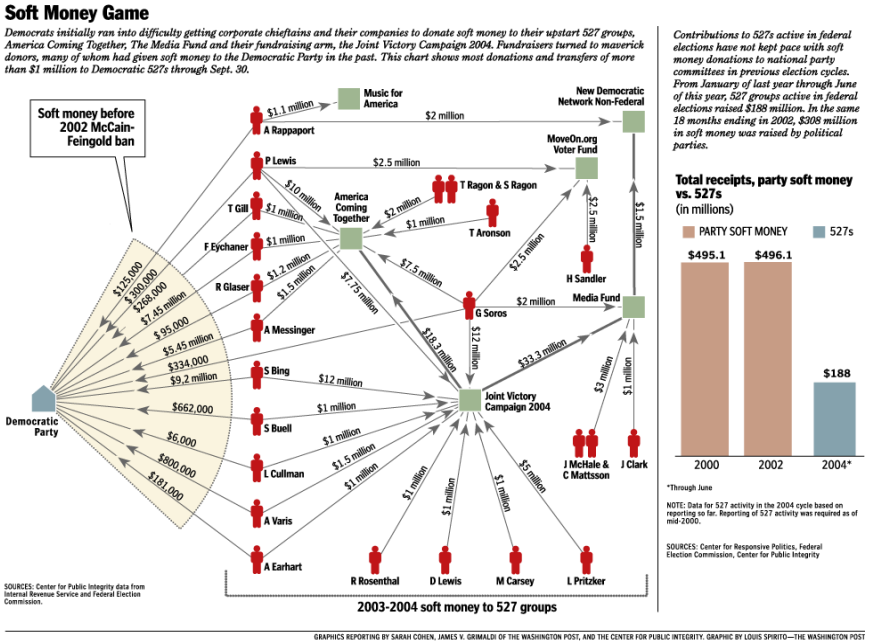


Based on Je Wei Liang, *www.database.cis.nctu.edu.tw/seminars/2003F/TWM/slides/p.ppt*

Text Mining

Text Mining = Data Mining of textual sources.

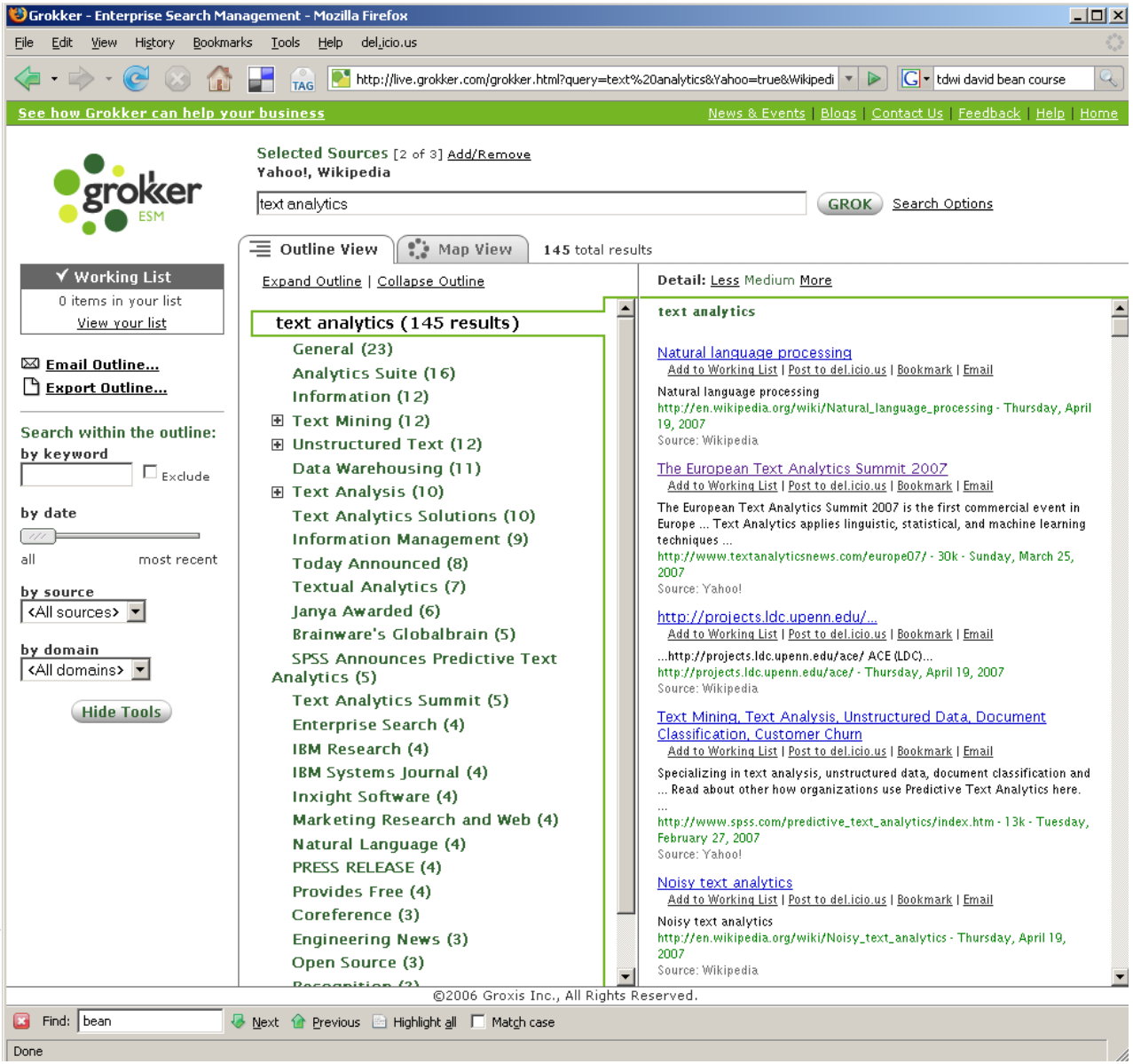
- Clustering and classification.
- Link Analysis.
- Prediction.
- Association rules.
- ~~Regression.~~
- ~~Forecasting~~.



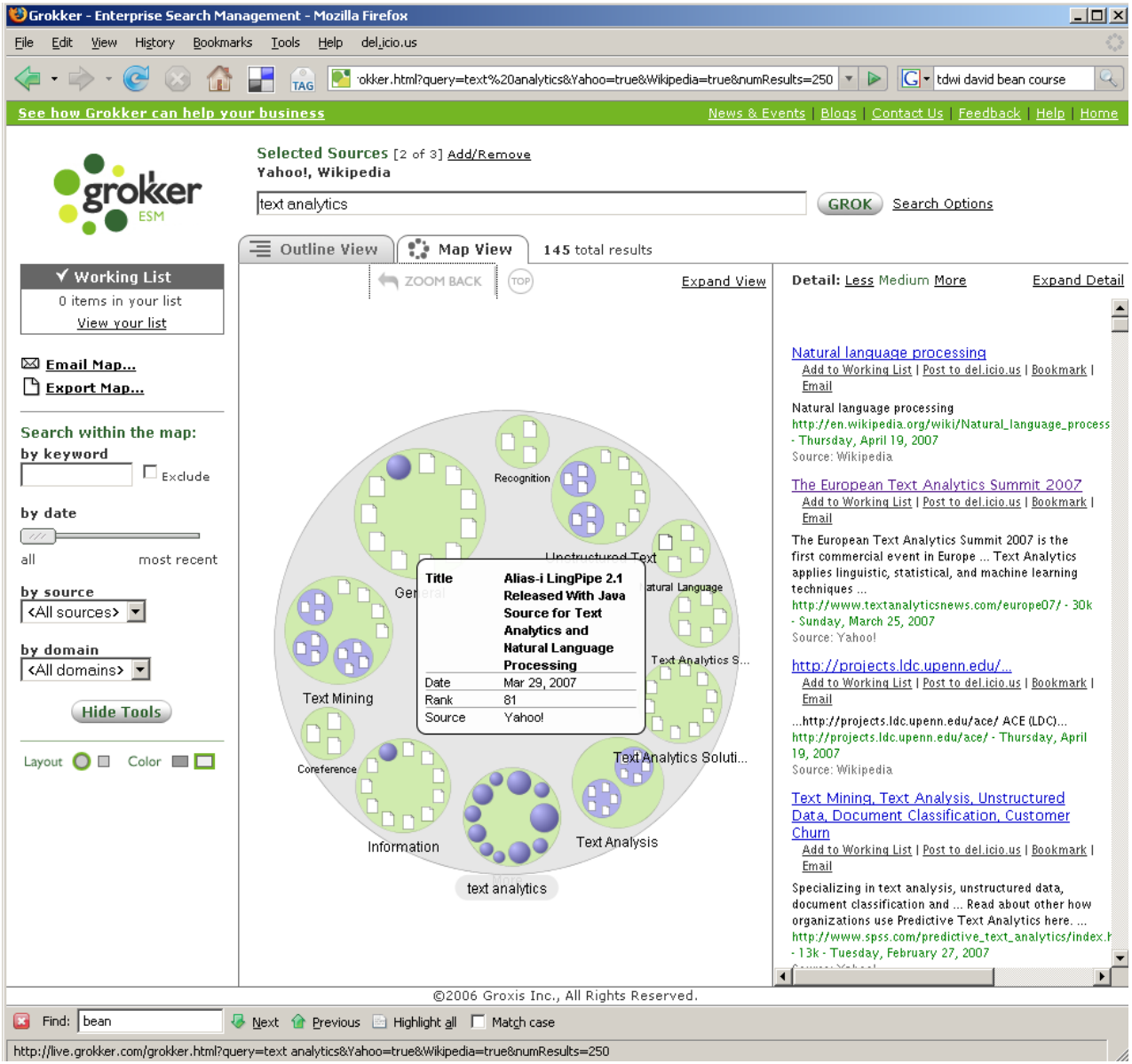
Text Mining = Knowledge Discovery in Text.

Dynamic, clustered search results from Grokker …

live.grokker.com/grokker.html?query=text%20analytics&Yahoo=true&Wikipedia=true&numResults=250

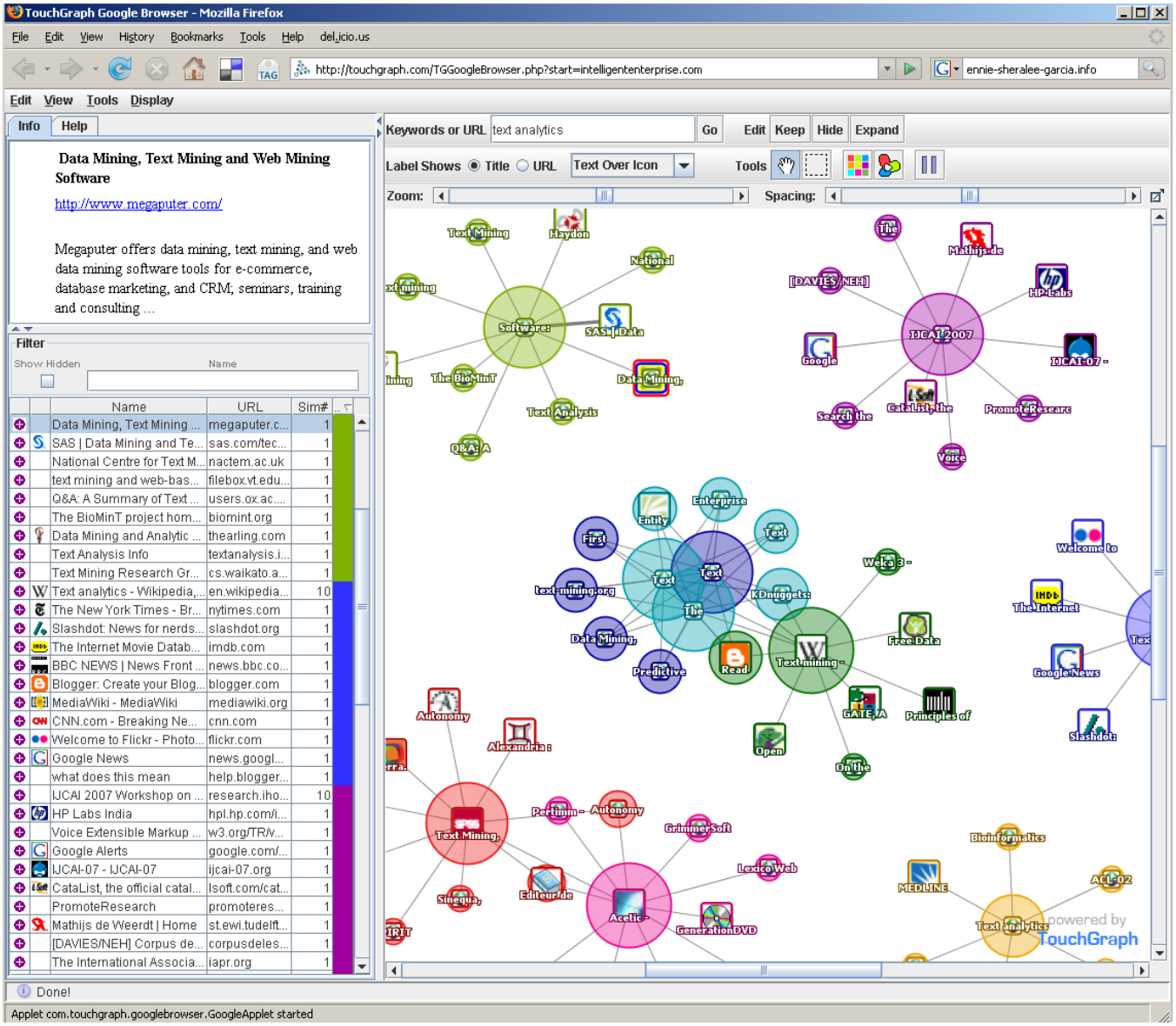


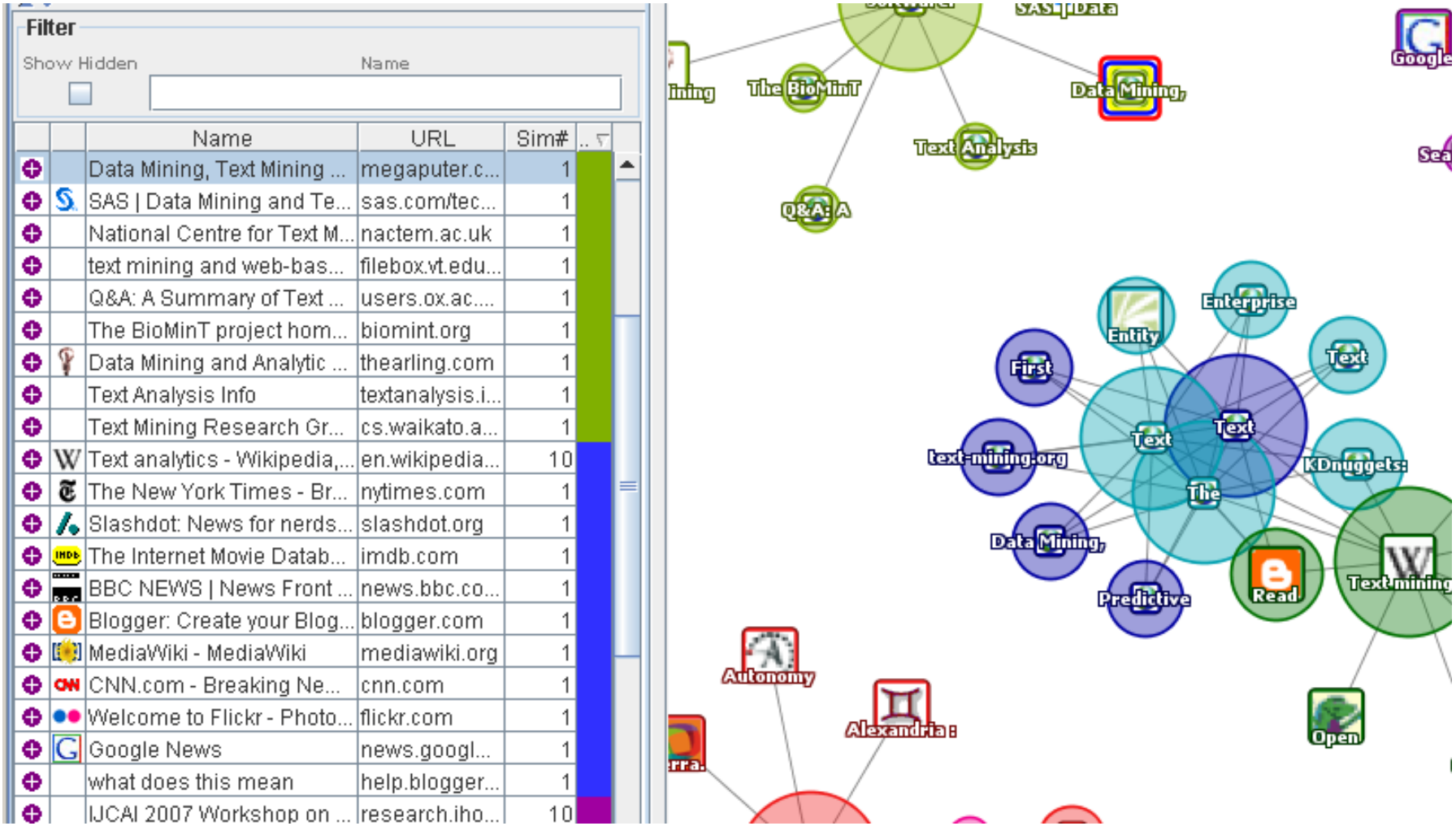
…with a zoomable display



A dynamic network viz.: the Touch-Graph Google-Browser applet

touchgraph.com/TGGoogleBrowser.php?start=text%20analytics





Text Analytics

Text (and media?) mining **automates** what researchers, writers, scholars,… and all the rest of us have been doing for years. Text mining –

Applies linguistic and/or statistical techniques to extract concepts and patterns that can be applied to categorize and classify documents, audio, video, images.

Transforms "unstructured" information into data for application of traditional analysis techniques via modelling.

Unlocks meaning and relationships in large volumes of information that was previously unprocessable by computer.

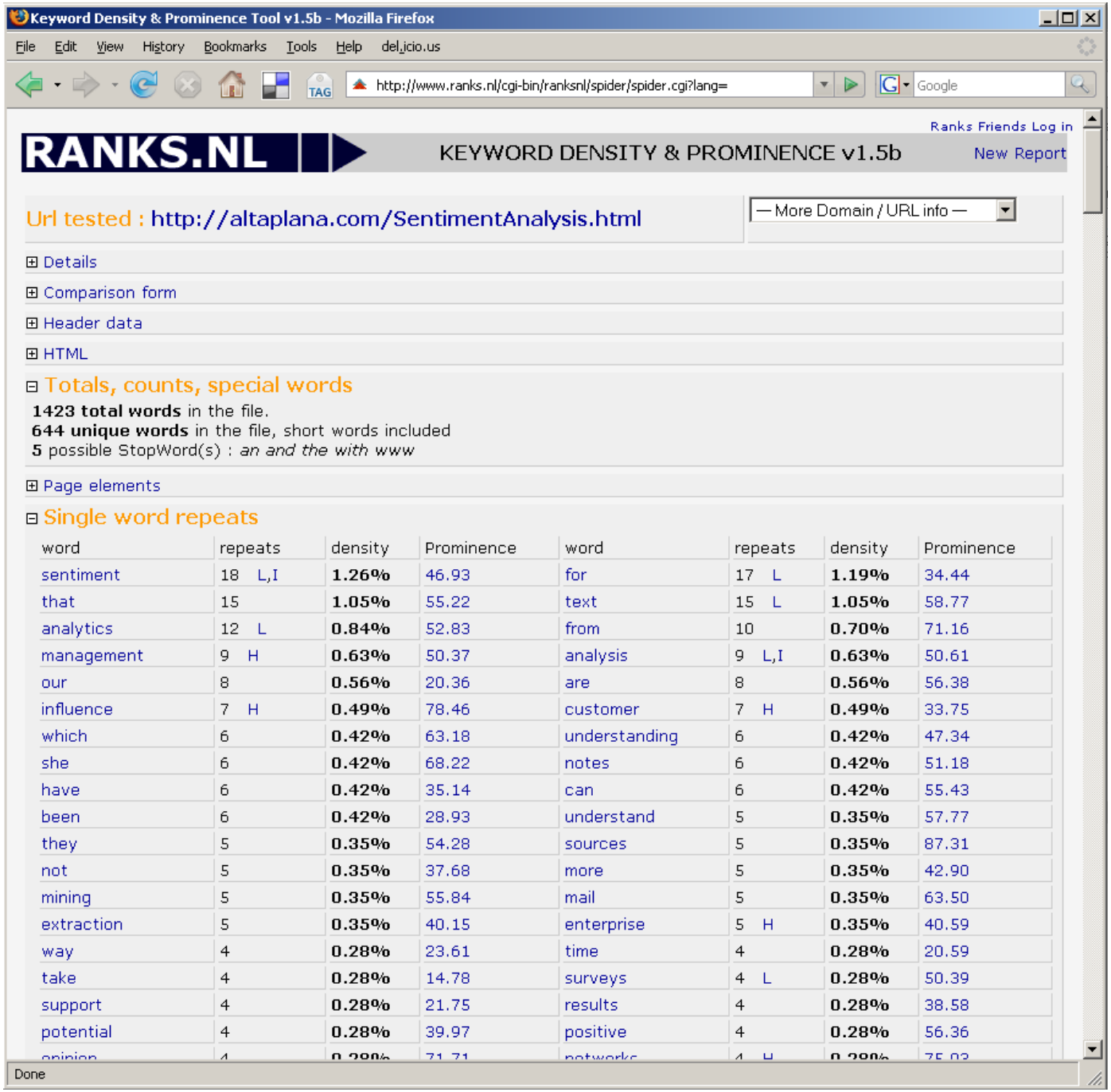
Text Analytics

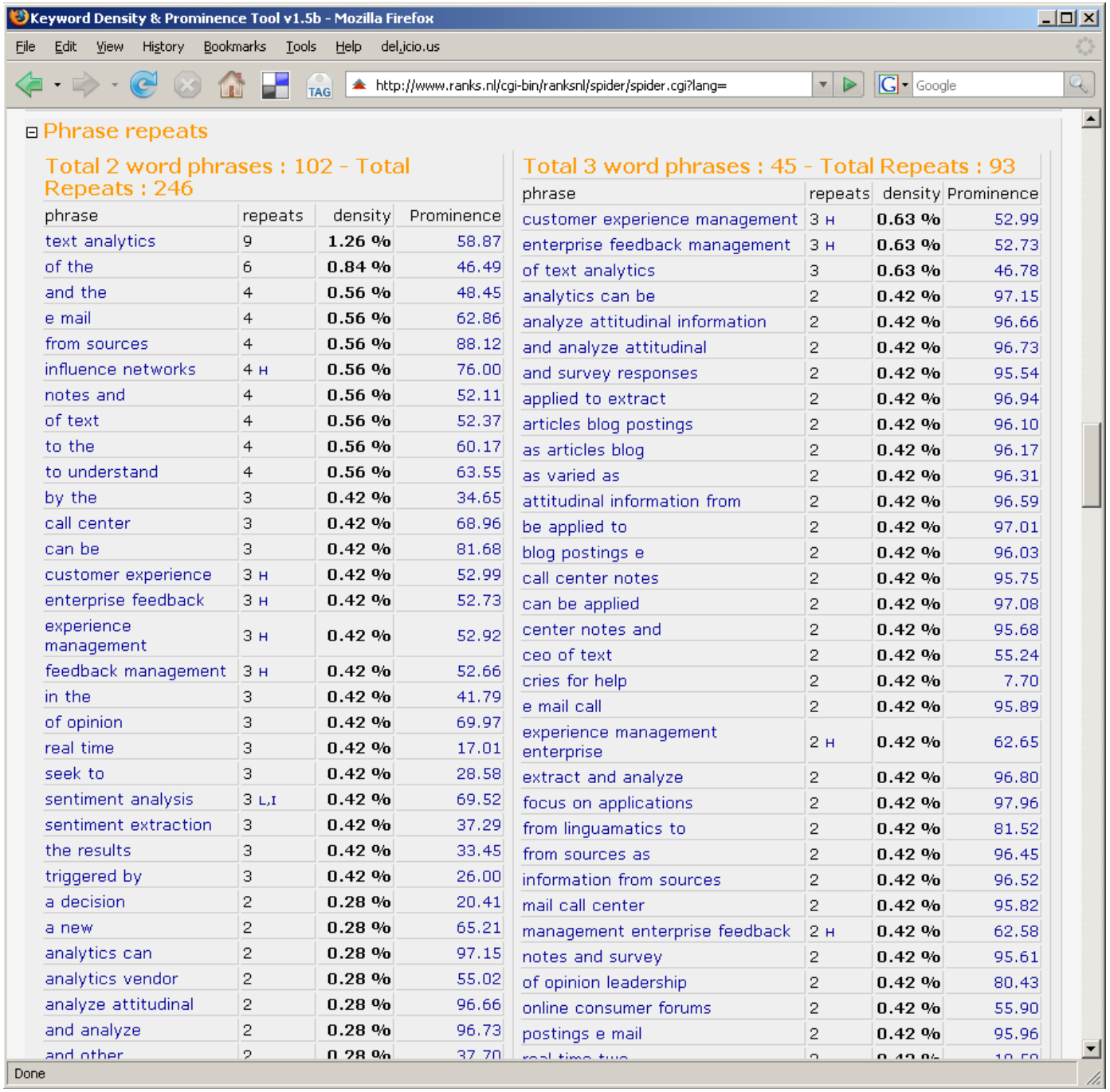
To digress… Is text really unstructured?

No! If it were, you wouldn't be able to understand this sentence.

Text is instead ***unmodelled****.*

We'll look for that inherent structure, but first, we'll do a lexical analysis of a text file...


Keyword Density & Prominence Tool v1.5b - Mozilla Firefox
File Edit View History Bookmarks Tools Help del.icio.us
http://www.ranks.nl/cgi-bin/ranksnl/spider/spider.cgi?lang=
Google
Ranks Friends Log in
RANKS.NL
KEYWORD DENSITY & PROMINENCE v1.5b
New Report
Url tested : http://altaplana.com/SentimentAnalysis.html
— More Domain / URL info —
Details
Comparison form
Header data
HTML
Totals, counts, special words
1423 total words in the file.
644 unique words in the file, short words included
5 possible StopWord(s) : an and the with www
Page elements
Single word repeats
word repeats density Prominence word repeats density Prominence
sentiment 18 L,I 1.26% 46.93 for 17 L 1.19% 34.44
that 15 1.05% 55.22 text 15 L 1.05% 58.77
analytics 12 L 0.84% 52.83 from 10 0.70% 71.16
management 9 H 0.63% 50.37 analysis 9 L,I 0.63% 50.61
our 8 0.56% 20.36 are 8 0.56% 56.38
influence 7 H 0.49% 78.46 customer 7 H 0.49% 33.75
which 6 0.42% 63.18 understanding 6 0.42% 47.34
she 6 0.42% 68.22 notes 6 0.42% 51.18
have 6 0.42% 35.14 can 6 0.42% 55.43
been 6 0.42% 28.93 understand 5 0.35% 57.77
they 5 0.35% 54.28 sources 5 0.35% 87.31
not 5 0.35% 37.68 more 5 0.35% 42.90
mining 5 0.35% 55.84 mail 5 0.35% 63.50
extraction 5 0.35% 40.15 enterprise 5 H 0.35% 40.59
way 4 0.28% 23.61 time 4 0.28% 20.59
take 4 0.28% 14.78 surveys 4 L 0.28% 50.39
support 4 0.28% 21.75 results 4 0.28% 38.58
potential 4 0.28% 39.97 positive 4 0.28% 56.36
Done



Phrase repeats

Total 2 word phrases : 102 - Total Repeats : 246

phrase	repeats	density	Prominence
text analytics	9	**1.26 %**	58.87
of the	6	**0.84 %**	46.49
and the	4	**0.56 %**	48.45
e mail	4	**0.56 %**	62.86
from sources	4	**0.56 %**	88.12
influence networks	4 H	**0.56 %**	76.00
notes and	4	**0.56 %**	52.11
of text	4	**0.56 %**	52.37
to the	4	**0.56 %**	60.17
to understand	4	**0.56 %**	63.55
by the	3	**0.42 %**	34.65
call center	3	**0.42 %**	68.96
can be	3	**0.42 %**	81.68
customer experience	3 H	**0.42 %**	52.99
enterprise feedback	3 H	**0.42 %**	52.73
experience management	3 H	**0.42 %**	52.92
feedback management	3 H	**0.42 %**	52.66
in the	3	**0.42 %**	41.79
of opinion	3	**0.42 %**	69.97
real time	3	**0.42 %**	17.01
seek to	3	**0.42 %**	28.58
sentiment analysis	3 L,I	**0.42 %**	69.52
sentiment extraction	3	**0.42 %**	37.29
the results	3	**0.42 %**	33.45
triggered by	3	**0.42 %**	26.00
a decision	2	**0.28 %**	20.41
a new	2	**0.28 %**	65.21
analytics can	2	**0.28 %**	97.15
analytics vendor	2	**0.28 %**	55.02
analyze attitudinal	2	**0.28 %**	96.66
and analyze	2	**0.28 %**	96.73
and other	2	**0.28 %**	37.70

Total 3 word phrases : 45 - Total Repeats : 93

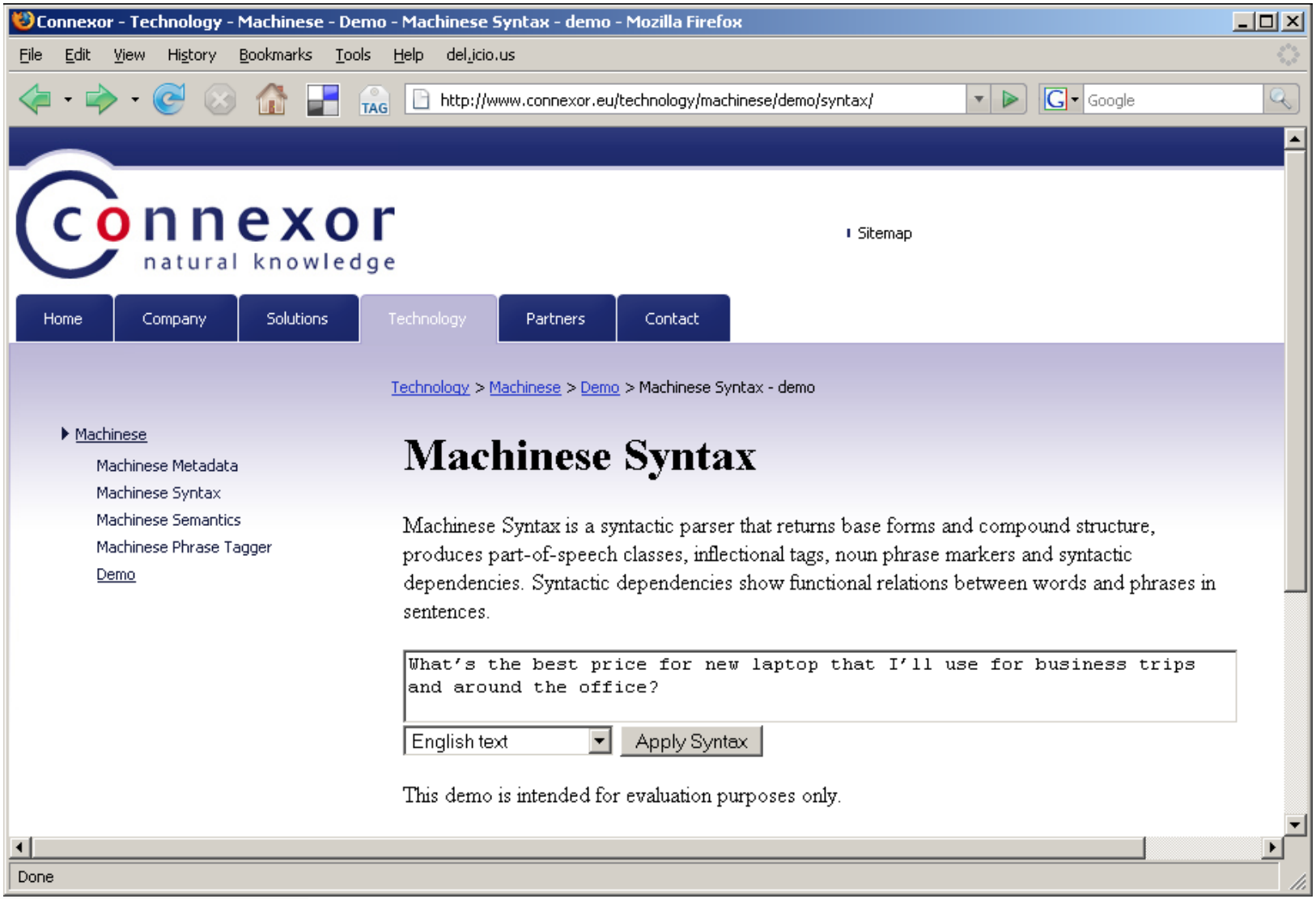
phrase	repeats	density	Prominence
customer experience management	3 H	**0.63 %**	52.99
enterprise feedback management	3 H	**0.63 %**	52.73
of text analytics	3	**0.63 %**	46.78
analytics can be	2	**0.42 %**	97.15
analyze attitudinal information	2	**0.42 %**	96.66
and analyze attitudinal	2	**0.42 %**	96.73
and survey responses	2	**0.42 %**	95.54
applied to extract	2	**0.42 %**	96.94
articles blog postings	2	**0.42 %**	96.10
as articles blog	2	**0.42 %**	96.17
as varied as	2	**0.42 %**	96.31
attitudinal information from	2	**0.42 %**	96.59
be applied to	2	**0.42 %**	97.01
blog postings e	2	**0.42 %**	96.03
call center notes	2	**0.42 %**	95.75
can be applied	2	**0.42 %**	97.08
center notes and	2	**0.42 %**	95.68
ceo of text	2	**0.42 %**	55.24
cries for help	2	**0.42 %**	7.70
e mail call	2	**0.42 %**	95.89
experience management enterprise	2 H	**0.42 %**	62.65
extract and analyze	2	**0.42 %**	96.80
focus on applications	2	**0.42 %**	97.96
from linguamatics to	2	**0.42 %**	81.52
from sources as	2	**0.42 %**	96.45
information from sources	2	**0.42 %**	96.52
mail call center	2	**0.42 %**	95.82
management enterprise feedback	2 H	**0.42 %**	62.58
notes and survey	2	**0.42 %**	95.61
of opinion leadership	2	**0.42 %**	80.43
online consumer forums	2	**0.42 %**	55.90
postings e mail	2	**0.42 %**	95.96
real time two	2	**0.42 %**	19.59

Text Analytics

Lesson: "Structure" may not matter.

- Shallow parsing and statistical analysis can be enough to arrive at the *Whatness* of a text, for instance, to support classification. (But that's not BI.)
- It can help you get at meaning, for instance, by studying cooccurrence of terms.

Now a syntactic analysis of a bit of text, a sentence...



Connexor - Technology - Machinese - Demo - Machinese Syntax - demo - Mozilla Firefox

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http://www.connexor.eu/technology/machinese/demo/syntax/

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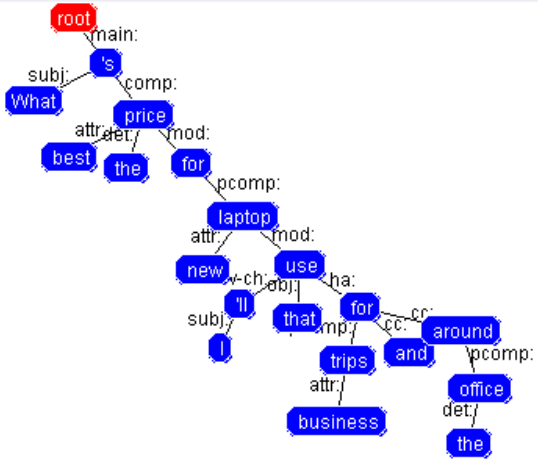
  - Machinese Metadata
  - Machinese Syntax
  - Machinese Semantics
  - Machinese Phrase Tagger
  - Demo

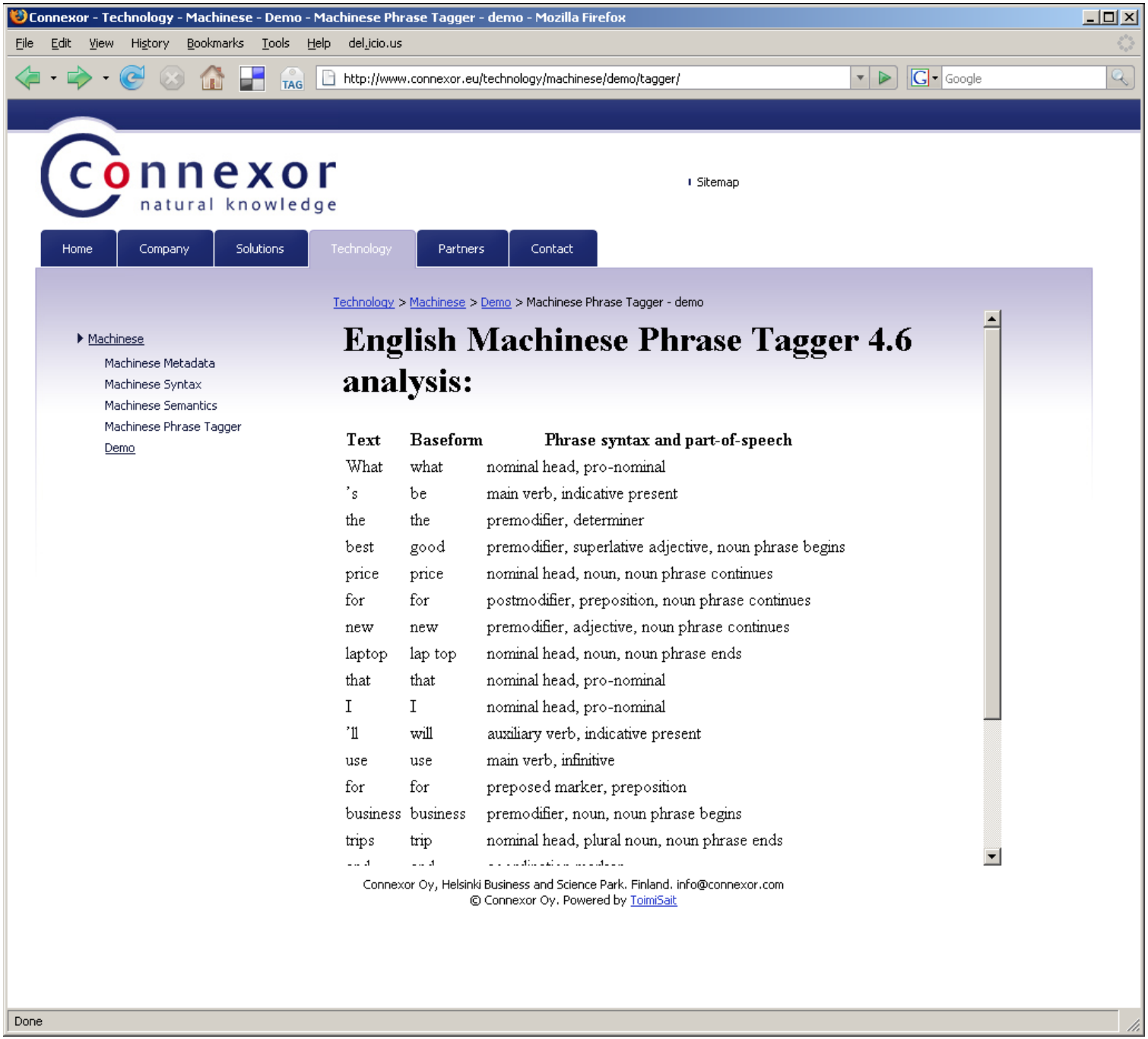
Analysis of Machinese Syntax for English:



Note: The Connexor Machinese demos are intended for evaluation purposes only.

Connexor Oy, Helsinki Business and Science Park. Finland. info@connexor.com

Applet Dtree started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connexor
natural knowledge
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Machinese
Machinese Metadata
Machinese Syntax
Machinese Semantics
Machinese Phrase Tagger
Demo
English Machinese Phrase Tagger 4.6 analysis:
Text Baseform Phrase syntax and part-of-speech
What what nominal head, pro-nominal
's be main verb, indicative present
the the premodifier, determiner
best good premodifier, superlative adjective, noun phrase begins
price price nominal head, noun, noun phrase continues
for for postmodifier, preposition, noun phrase continues
new new premodifier, adjective, noun phrase continues
laptop lap top nominal head, noun, noun phrase ends
that that nominal head, pro-nominal
I I nominal head, pro-nominal
'll will auxiliary verb, indicative present
use use main verb, infinitive
for for preposed marker, preposition
business business premodifier, noun, noun phrase begins
trips trip nominal head, plural noun, noun phrase ends
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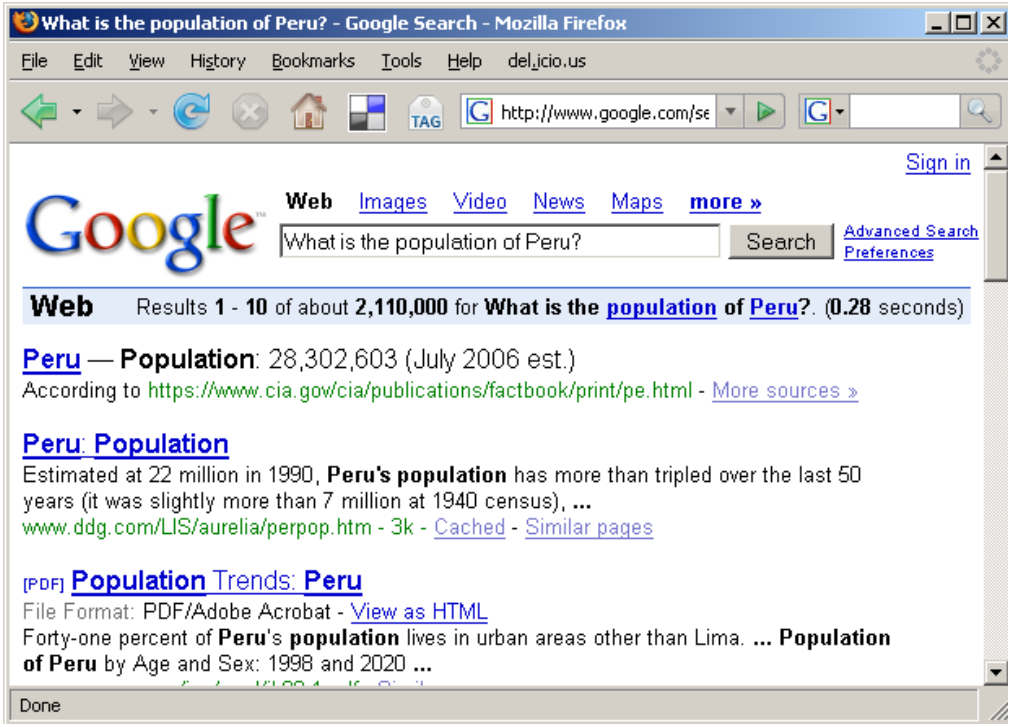
Done

Text Analytics

So the form may be unstructured but the content isn't. Text analytics – unified analytics – should present findings that suit the information and the user.



Text Analytics

Typical steps in text analytics include –

Retrieve documents for analysis.

Create a categorization/taxonomy from the extracts or acquire and apply a domain-specific taxonomy.

Apply statistical techniques to classify documents, look for patterns such as associations and clusters.

Apply statistical &/ linguistic &/ structural techniques to **identify, tag, and extract** entities, concepts, relationships, and events (features) within document sets.

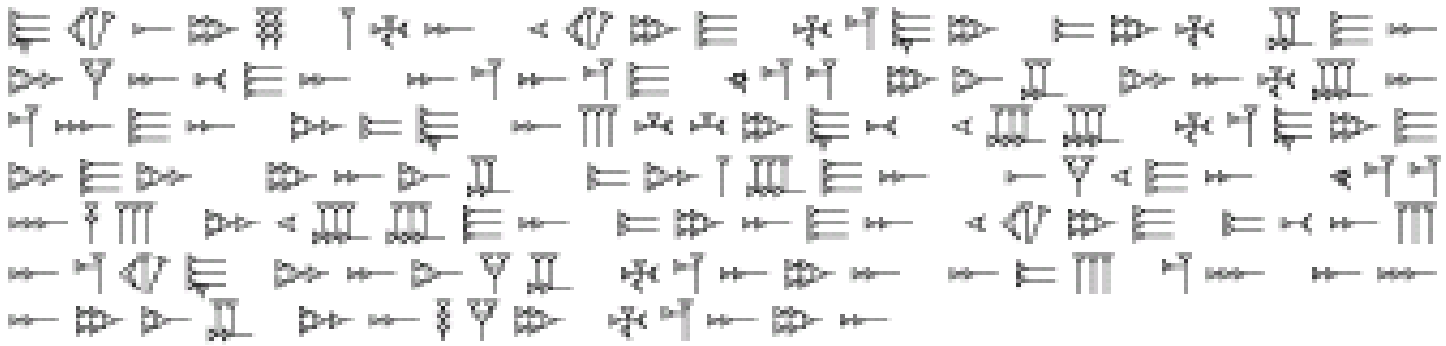
- tagging = text augmentation

Information Extraction

Syntactic/linguistic analysis is key to semantic understanding and difficult stuff like sentiment.

Regular expressions and term co-occurrence, also simple statistical signatures, are not enough.

Ugaritic Cuneiform Script



Information Extraction

Consider –

The Dow fell 46.58, or 0.42 percent, to 11,002.14. The Standard & Poor's 500 index fell 1.44, or 0.11 percent, to 1,263.85, and the Nasdaq composite gained 6.84, or 0.32 percent, to 2,162.78.

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Example from Luca Scagliarini, Expert System.

The bag/vector of words approach falls short.

Information Extraction

We want concepts and not just entities.

What concepts are found in these similar examples?

Smaller cars generally get better gas mileage than larger cars.

Some larger hybrids consume less fuel than some smaller vehicles with standard gasoline engines.

Ford is an American automobile manufacturer and Nissan is Japanese.

Information Extraction

What concepts are found in these domain-related statements?

Smaller cars generally get better gas mileage than larger cars.

Some larger hybrids/hybrids consume less fuel than some smaller vehicles with standard gasoline engines.

Ford is an American automobile manufacturer and Nissan is Japanese.

Vehicle is a *concept* with *conceptual* size and energy consumption attributes and a *conceptual* engine type. Energy consumption itself has a relative measure. Nationality is another concept. What's Ford?

Information Extraction

What's Ford? –

"Ford is an American automobile manufacturer and Nissan is Japanese."

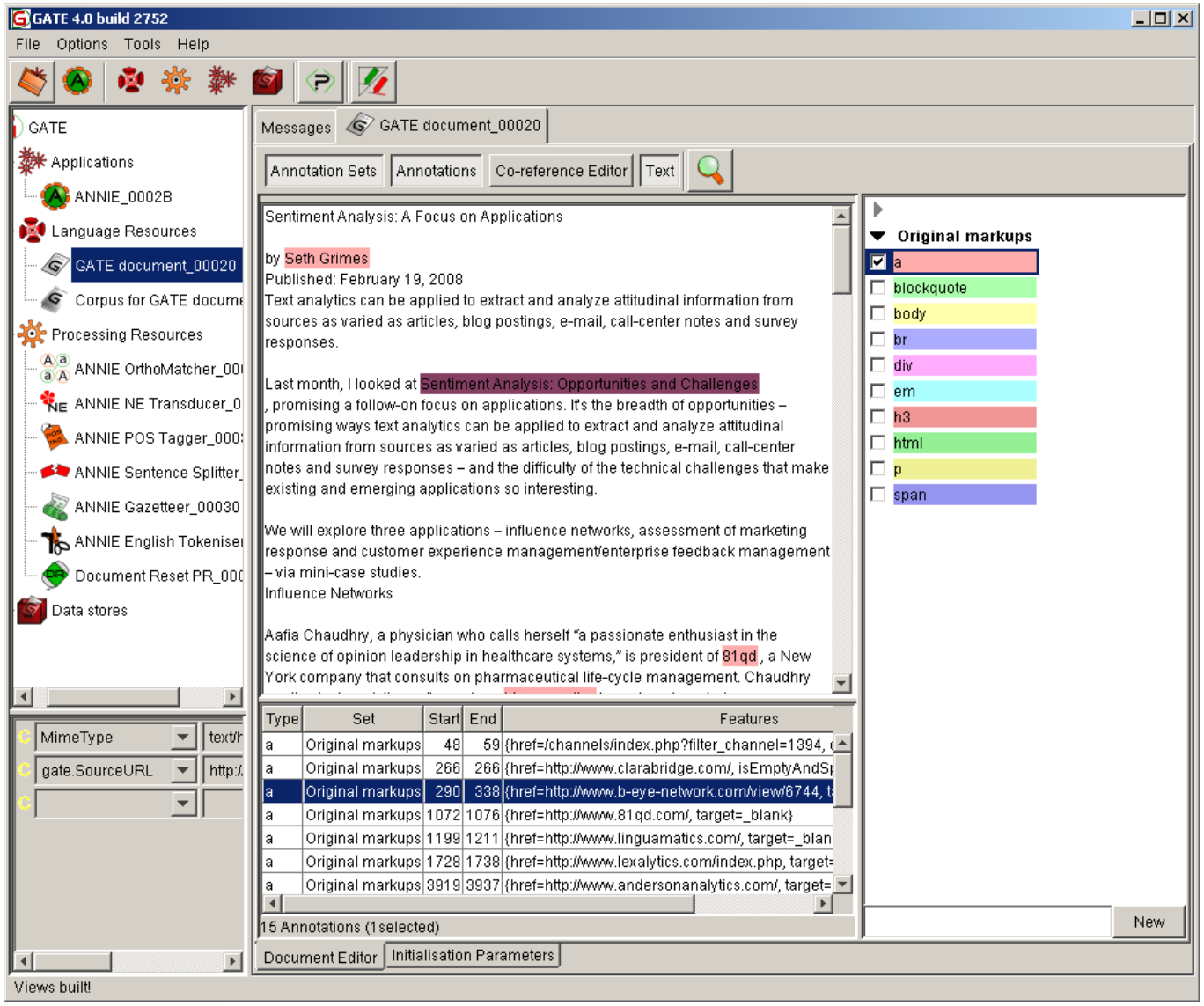
- An American president?
- A company that both makes and sells cars and other stuff?
- A person who founded a car company?
- A shallow place you cross a river?

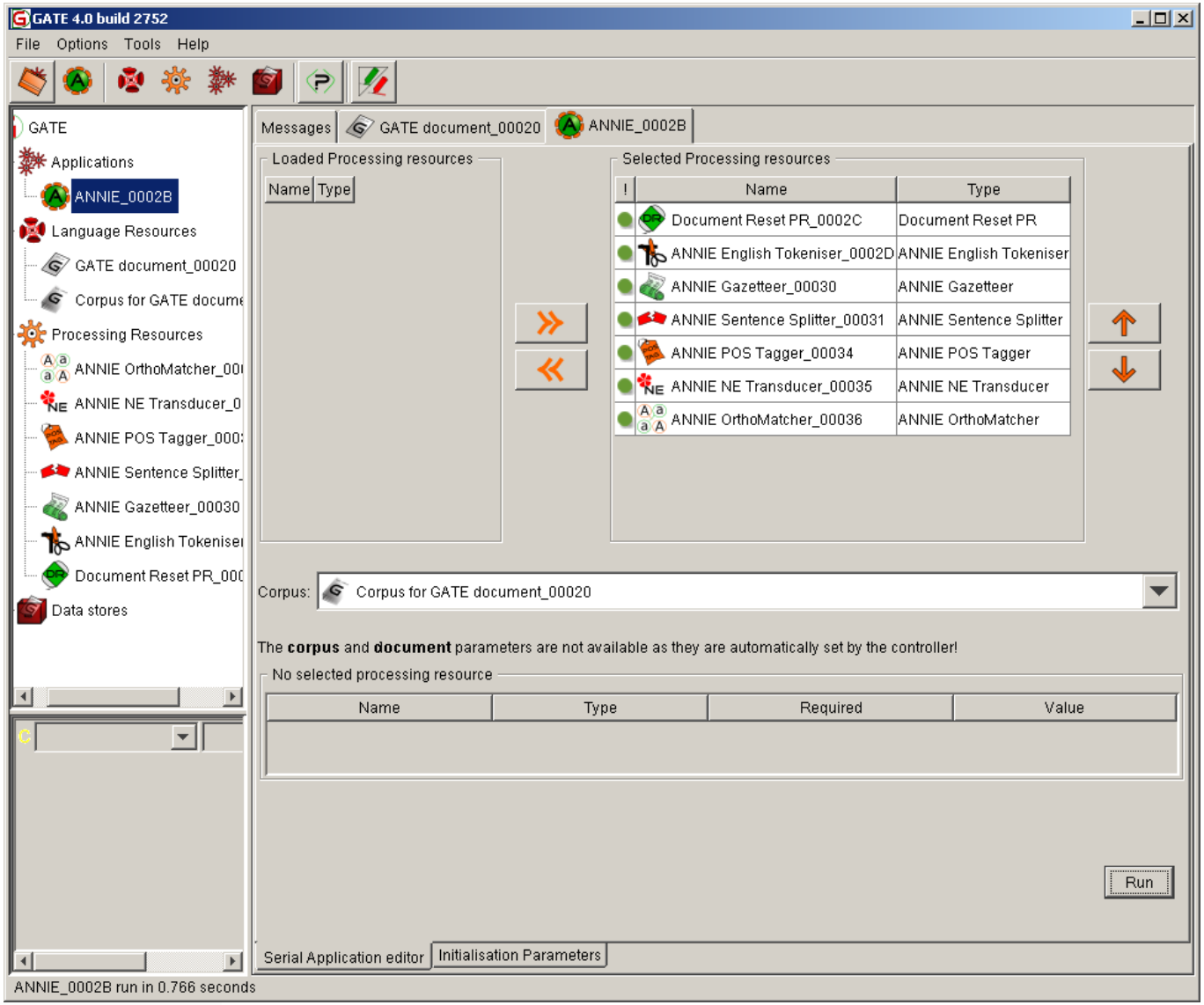
Ford is an entity whose meaning a) is contextually derived; b) may be disambiguated, and c) is more than what is plainly read in our source text.

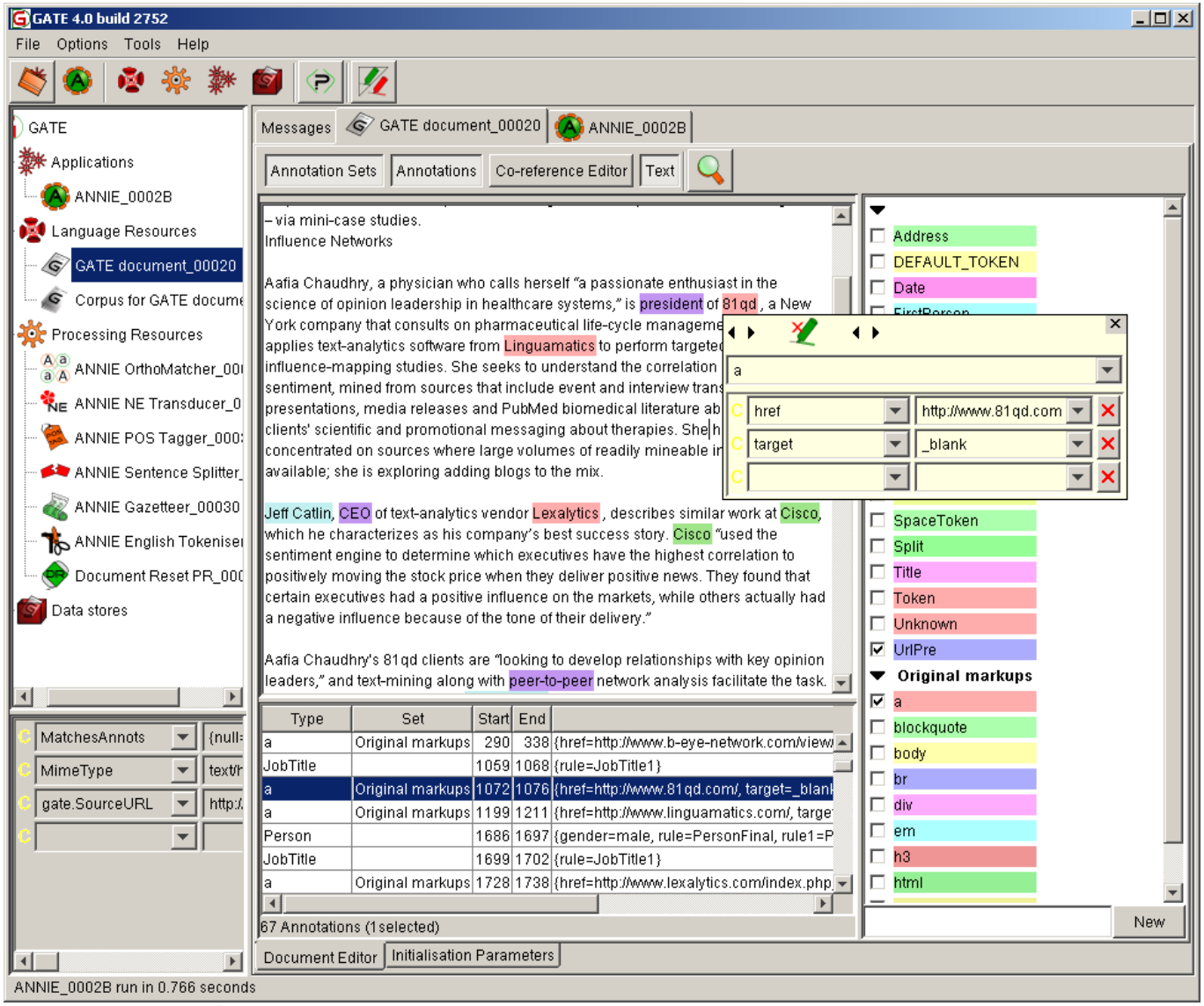
Information Extraction

For "traditional" BI on text, key in on extracting information to databases.

- Entities and concepts (features) are like dimensions in a standard BI model. Both classes of object are hierarchically organized and have attributes.
- We can have both discovered and predetermined classifications (taxonomies) of text features.
- Text-sourced information is **very** high dimensionality.



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Processing Resources
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Annotation Sets
Annotations
Co-reference Editor
Text
– via mini-case studies.
Influence Networks
Aafia Chaudhry, a physician who calls herself "a passionate enthusiast in the science of opinion leadership in healthcare systems," is president of 81qd, a New York company that consults on pharmaceutical life-cycle manageme
applies text-analytics software from Linguamatics to perform targete
influence-mapping studies. She seeks to understand the correlation
sentiment, mined from sources that include event and interview trans
presentations, media releases and PubMed biomedical literature ab
clients' scientific and promotional messaging about therapies. She h
concentrated on sources where large volumes of readily mineable in
available; she is exploring adding blogs to the mix.
Jeff Catlin, CEO of text-analytics vendor Lexalytics, describes similar work at Cisco, which he characterizes as his company's best success story. Cisco "used the sentiment engine to determine which executives have the highest correlation to positively moving the stock price when they deliver positive news. They found that certain executives had a positive influence on the markets, while others actually had a negative influence because of the tone of their delivery."
Aafia Chaudhry's 81qd clients are "looking to develop relationships with key opinion leaders," and text-mining along with peer-to-peer network analysis facilitate the task.
Type Set Start End
a Original markups 290 338 {href=http://www.b-eye-network.com/view
JobTitle 1059 1068 {rule=JobTitle1}
a Original markups 1072 1076 {href=http://www.81qd.com/, target=_blank
a Original markups 1199 1211 {href=http://www.linguamatics.com/, targe
Person 1686 1697 {gender=male, rule=PersonFinal, rule1=P
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67 Annotations (1 selected)
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http://www.81qd.com
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New

Unified Analytics

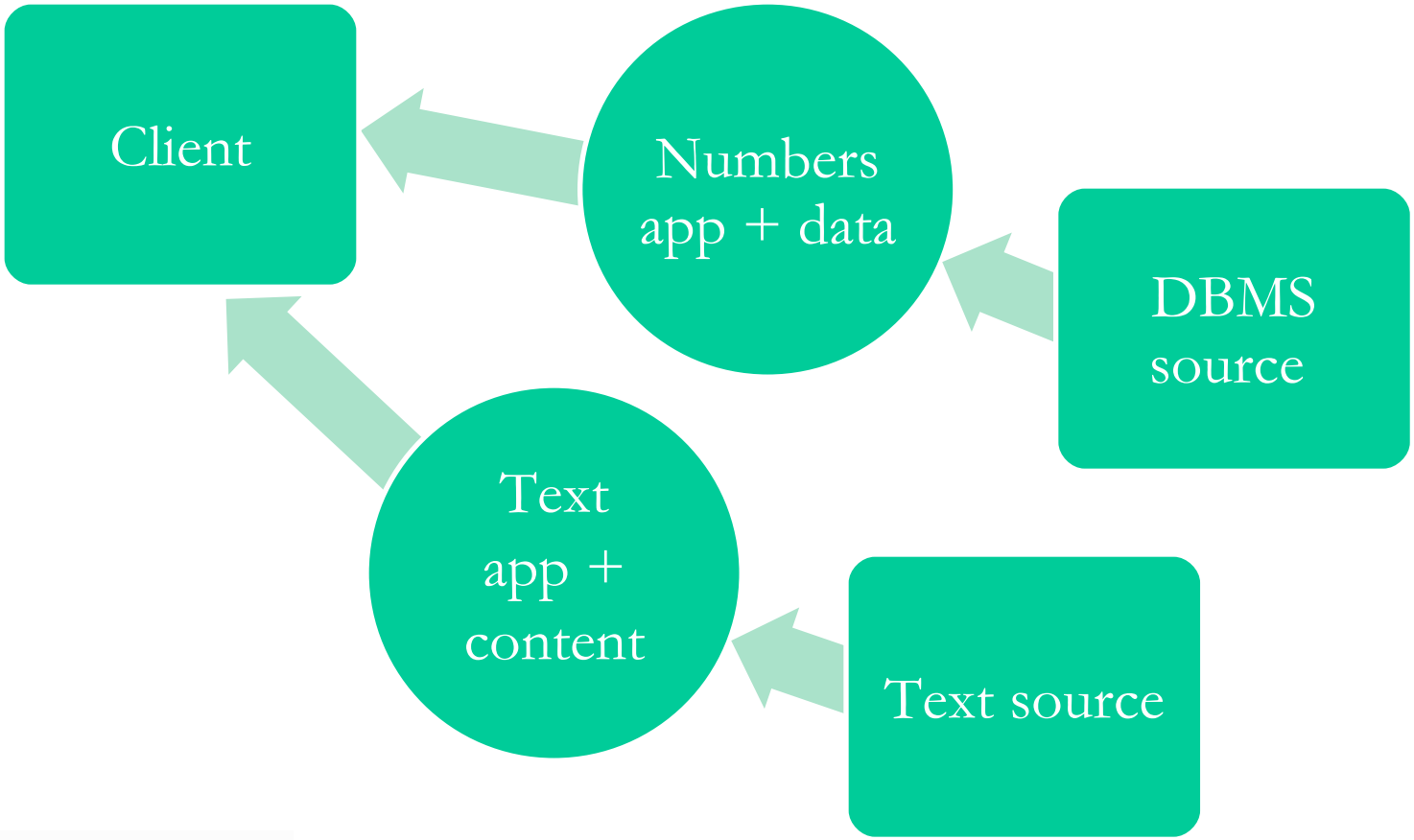
Our goal is integrating text into existing BI work: "unified analytics."

How/what can you integrate?

- Results from parallel or stove-piped systems.
- Components, via some form of API or framework.
- Data, via defined, commonly understood formats and meanings.
  - What's the latter form of integration called?

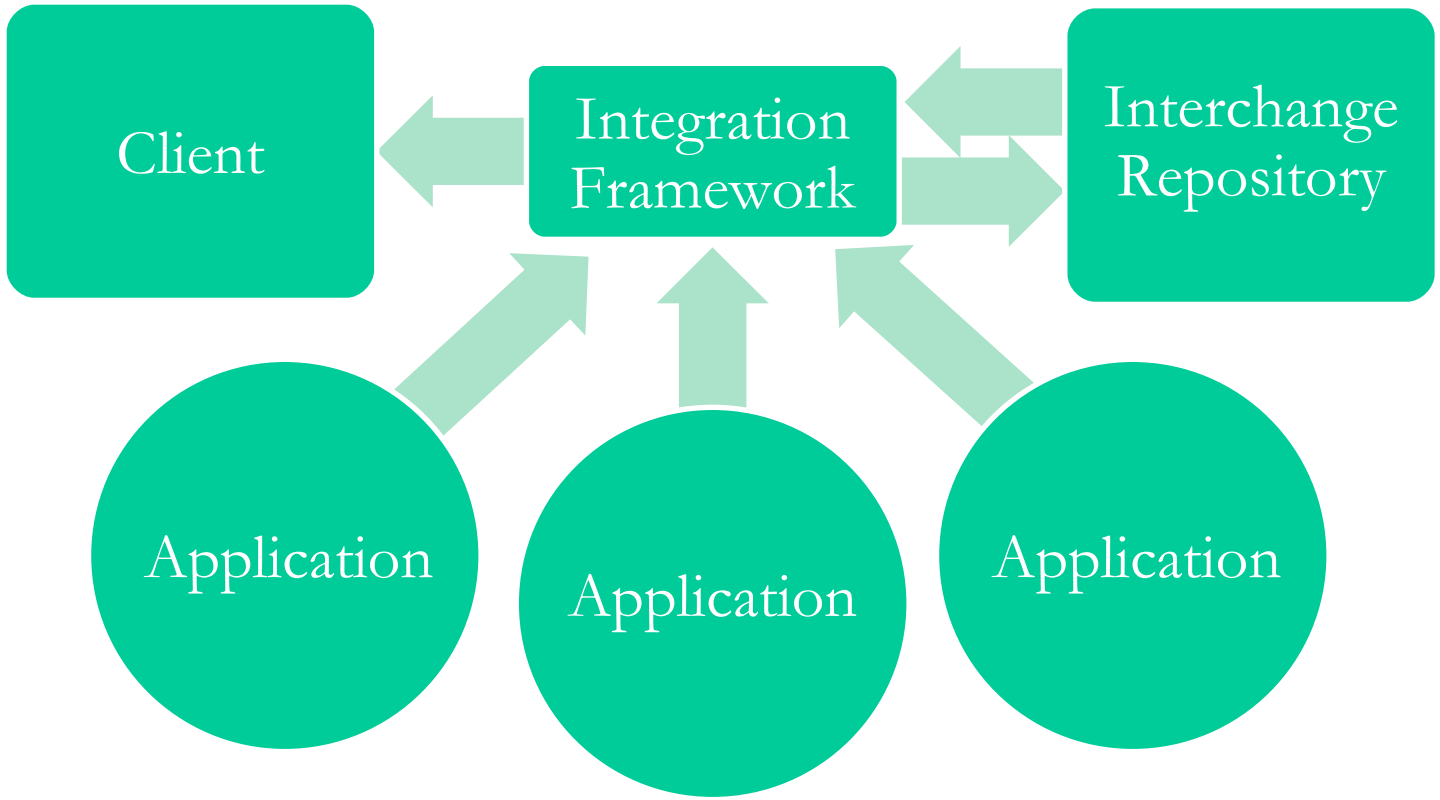
Unified Analytics

Integrating results: not of great interest.



Unified Analytics

Component integration via a framework.



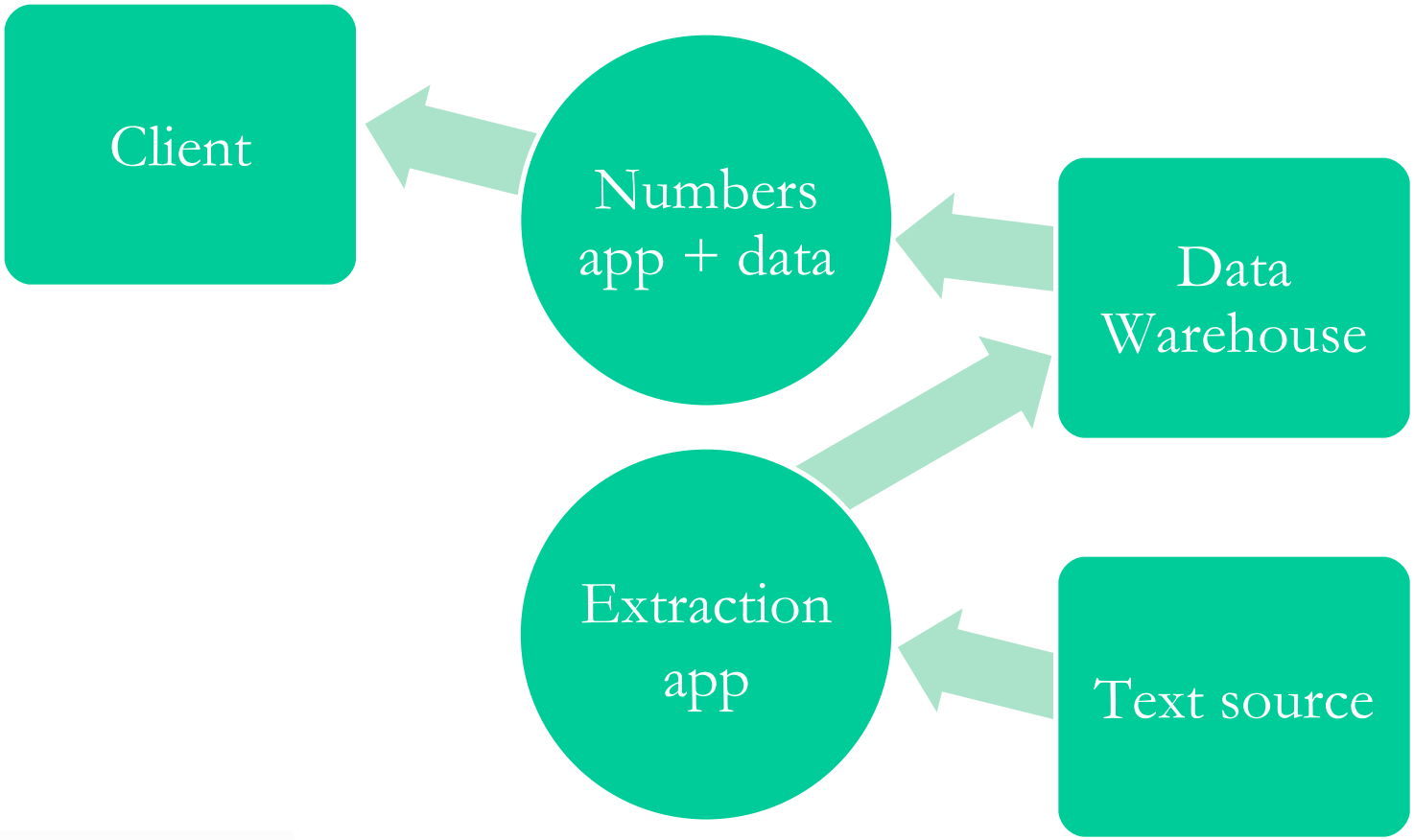
Unified Analytics

The Unstructured Information Management Architecture is an integration framework created by IBM, then released to open source (Apache).

UIMA is an architectural and software framework that supports creation, discovery, composition, and deployment of a broad range of analysis capabilities and the linking of them to structured information services, such as databases or search engines. The UIMA framework provides a run-time environment in which developers can plug in and run their UIMA component implementations, along with other independently-developed components, and with which they can build and deploy UIM applications. The framework is not specific to any IDE or platform.

Unified Analytics

Data integration via information extraction.



Information Extraction

XML-annotated text is an intermediate format.

```
<?xml version='1.0' encoding='windows-1252'?>
<GateDocument>
<!-- The document's features-->

<GateDocumentFeatures>
      <Feature>
            <Name className="java.lang.String">MimeType</Name>
            <Value className="java.lang.String">text/html</Value>
      </Feature>
      <Feature>
            <Name className="java.lang.String">gate.SourceURL</Name>
            <Value className="java.lang.String">http://altaplana.com/SentimentAnalysis.html</Value>
      </Feature>
</GateDocumentFeatures>
<!-- The document content area with serialized nodes -->

<TextWithNodes><Node id="0" />Sentiment<Node id="9" /> <Node id="10" />Analysis<Node id="18" />:<Node
id="19" /> <Node id="20" />A<Node id="21" /> <Node id="22" />Focus<Node id="27" /> <Node id="28"
/>on<Node id="30" /> <Node id="31" />Applications<Node id="43" />
<Node id="44" />
<Node id="45" />by<Node id="47" /> <Node id="48" />Seth<Node id="52" /> <Node id="53" />Grimes<Node
id="59" />
<Node id="60" />Published<Node id="69" />:<Node id="70" /> <Node id="71" />February<Node id="79" />
<Node id="80" />19<Node id="82" />,<Node id="83" /> <Node id="84" />2008<Node id="88" />
<Node id="89" />Text<Node id="93" /> <Node id="94" />analytics<Node id="103" />
                                                                    <material cut>
</TextWithNodes>
```

Information Extraction

XML-annotated text...

```
<!-- The default annotation set -->
<AnnotationSet>
                                                                    <material cut>
      <Annotation Id="67" Type="Token" StartNode="48" EndNode="52">
            <Feature>
                  <Name className="java.lang.String">length</Name>
                  <Value className="java.lang.String">4</Value>
            </Feature>
            <Feature>
                  <Name className="java.lang.String">category</Name>
                  <Value className="java.lang.String">NNP</Value>
            </Feature>
            <Feature>
                  <Name className="java.lang.String">orth</Name>
                  <Value className="java.lang.String">upperInitial</Value>
            </Feature>
            <Feature>
                  <Name className="java.lang.String">kind</Name>
                  <Value className="java.lang.String">word</Value>
            </Feature>
            <Feature>
                  <Name className="java.lang.String">string</Name>
                  <Value className="java.lang.String">Seth</Value>
            </Feature>
      </Annotation>
                                                                    <material cut>
</AnnotationSet>
</GateDocument>
```

Information Extraction

From an annotated document, we can extract "features," by (semantic) type, to a database.

First, we might wish to deal with the high dimensionality –

- Term clustering: What can be grouped?
- Feature selection: What's relevant or interesting?

Example: E-mail

Let's look at an e-mail message –

Date: Sun, 13 Mar 2005 19:58:39 -0500
From: Adam L. Buchsbaum <alb@research.att.com>
To: Seth Grimes <grimes@altaplana.com>
Subject: Re: Papers on analysis on streaming data

seth, you should contact divesh srivastava, divesh@research.att.com regarding at&t labs data streaming technology.

adam

Example: E-mail

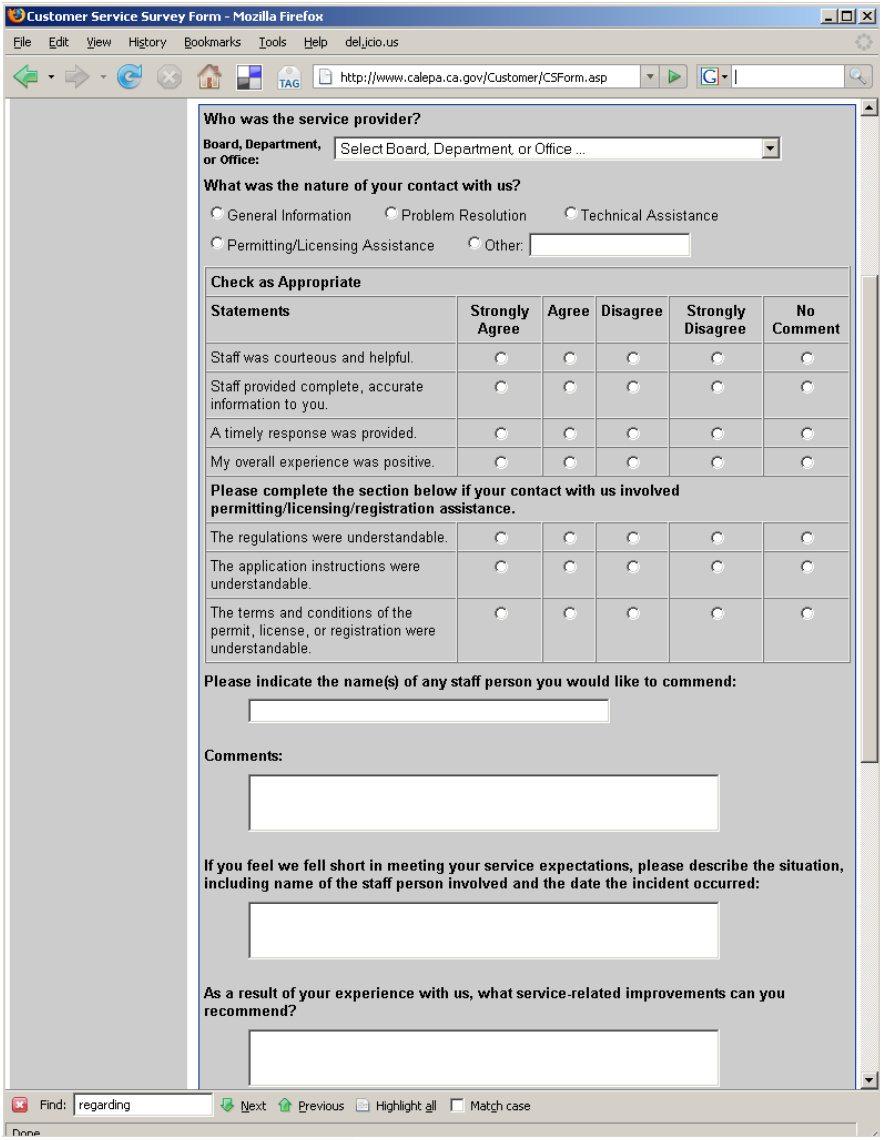
An e-mail message is "semi-structured."

- Semi=half. What's "structured" and what's not?
- Is augmentation/tagging and entity extraction enough?
- What categorization might you create from that example message?

From semi-structured text, it's especially easy to extract metadata.

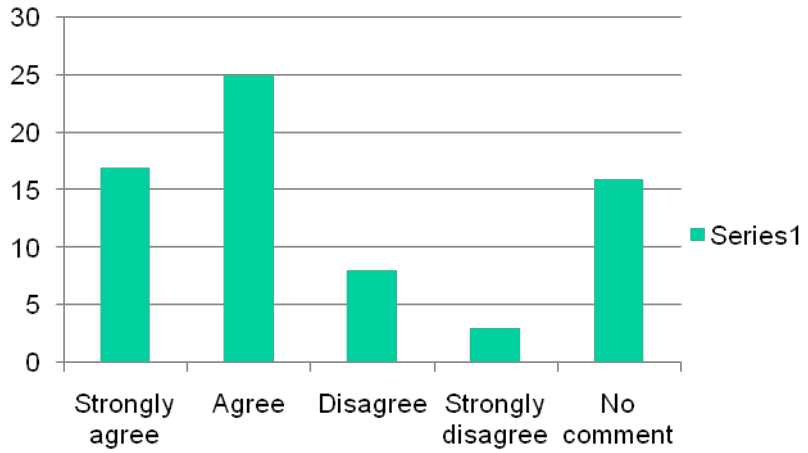
There are many forms of s-s information...

Example: Survey



Example: Survey

In analyzing surveys, we typically look at frequencies and distributions:

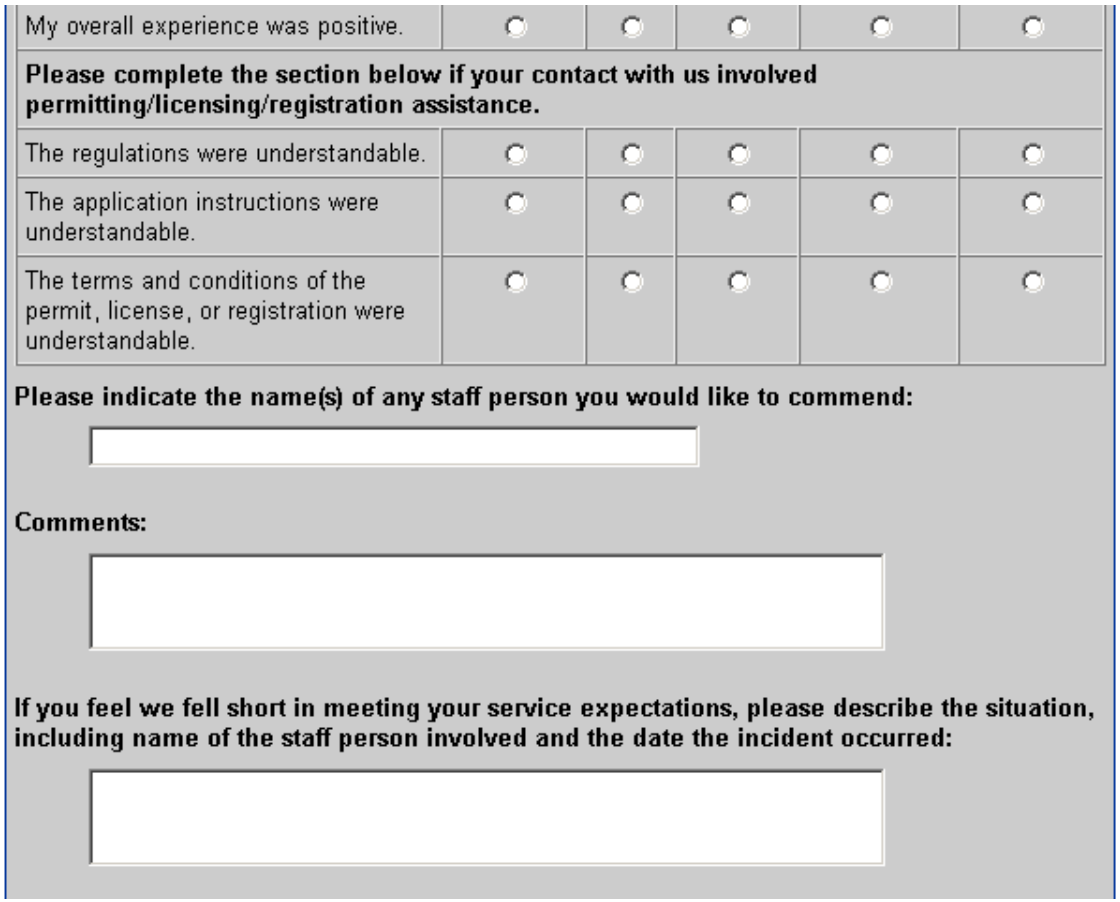


There may be fields that indicate what product/service/person the coded rating applies to.

Comments may be linked to coded ratings.

Example: Survey

The respondent is invited to explain his/her attitude:



My overall experience was positive.	○	○	○	○	○
Please complete the section below if your contact with us involved permitting/licensing/registration assistance.					
The regulations were understandable.	○	○	○	○	○
The application instructions were understandable.	○	○	○	○	○
The terms and conditions of the permit, license, or registration were understandable.	○	○	○	○	○

Please indicate the name(s) of any staff person you would like to commend:

Comments:

If you feel we fell short in meeting your service expectations, please describe the situation, including name of the staff person involved and the date the incident occurred:

Example: Survey

A survey of this type, like an e-mail message, is "semi-structured."

- Exploit what is structured in interpreting and using the free text.
- Generally, textual source information doesn't come in without *some* form of envelope, of metadata that describes the information and its provenance.
- It's still hard to automate interpretation of the free text, that is, to do more than count words and note cooccurrence. Sentiment extraction comes into play.

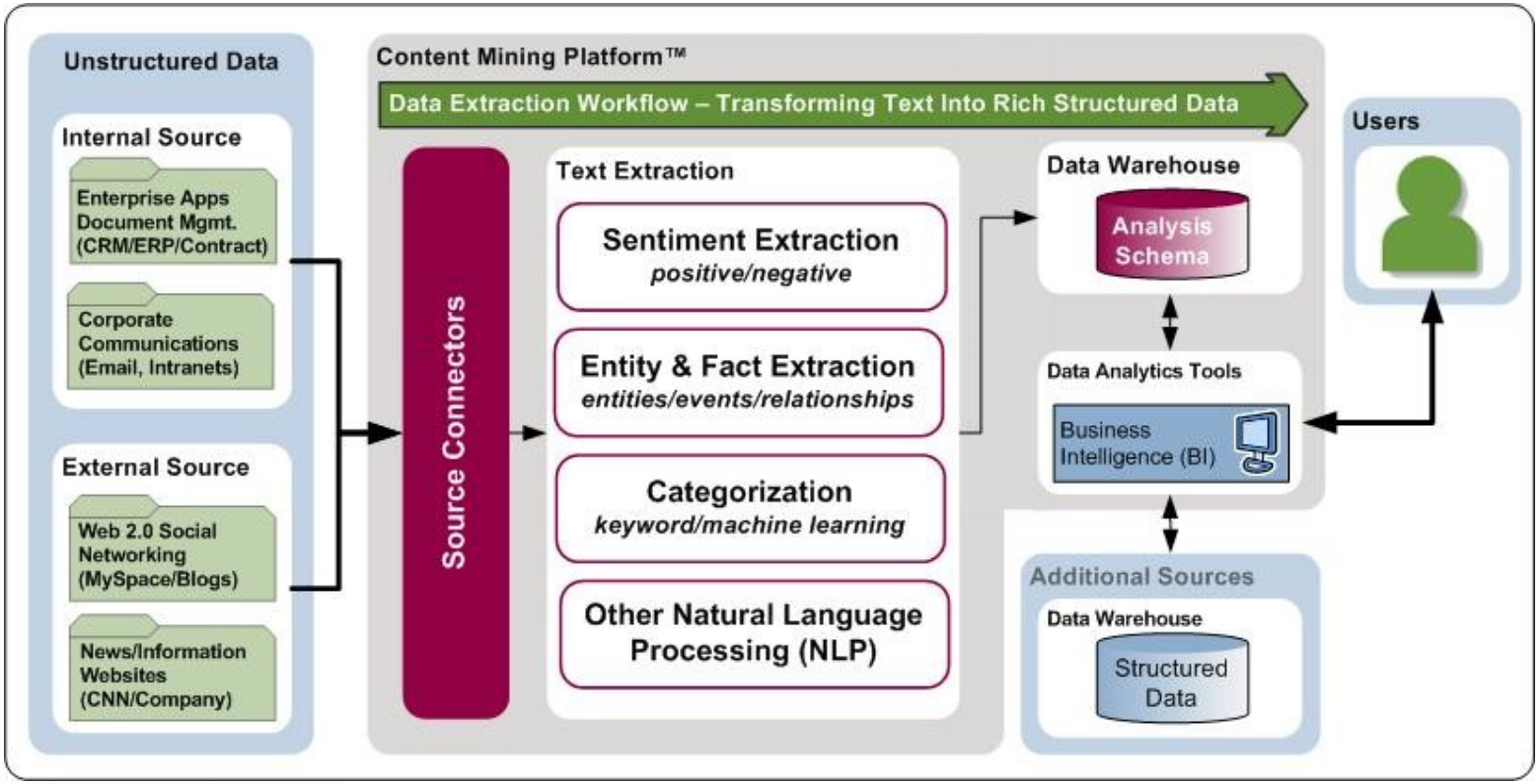
Unified Analytics

Text analytics is good for…

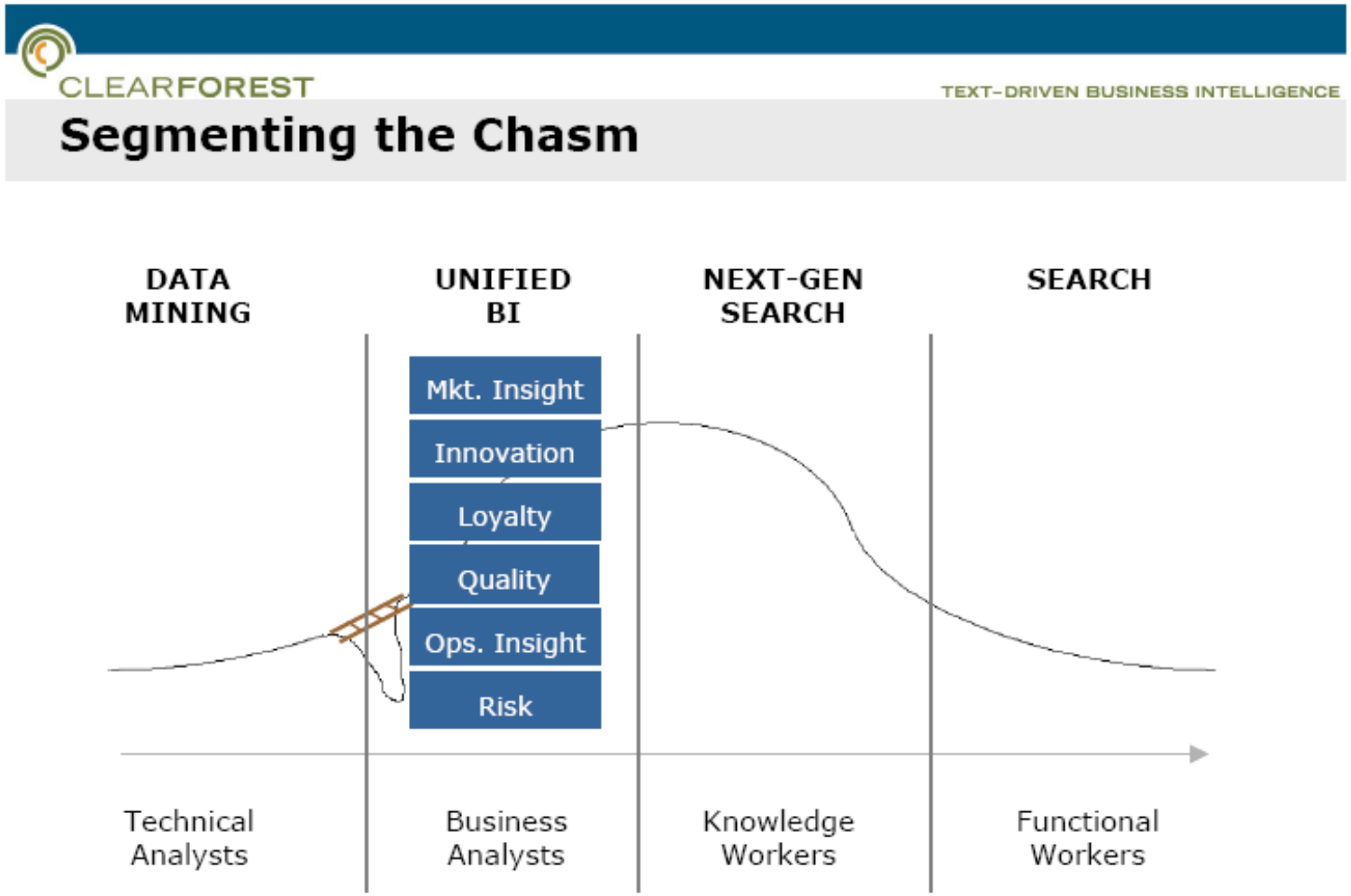
- Creating machine-exploitable models in/of information stores that were previously resistant to machine understanding,
- Exploiting discovered or predefined structures to detect patterns: categories, linkages, etc.,
- Applying the derived patterns to classify and support other automated processing according to document-extracted concepts and to establish relationships, and
- Boosting traditional BI to create unified, 360° analytics.

Unified Analytics

Clarabridge's Content Mining Platform implements this architecture –



Unified Analytics



Voice of the Customer

Our desired goals:

- Satisfied customers.
- New customers.
- More profitable customers.
- Better products, fewer defects.

Ingredients include:

- Retail and service transactions; billing records.
- Web-site logs.
- CRM systems.
- Customer e-mail, letters, and comment/inquiry forms.
- Warranty claims.
- Contact-center notes and transcripts.
- Forum postings, blogs, and news articles.

Sentiment Extraction

"Getting beyond sentiment to actionable information, to 'cause,' is what our customers want. But first, you've got to get sentiment right."

-- Michelle DeHaaff, marketing VP at Attensity

Sentiment Extraction

Sentiment (opinion) extraction –

- Applications include:
  - Reputation management.
  - Competitive intelligence.
  - Quality improvement.
  - Trend spotting.
- Sources include:
  - Wikis, blogs, forums, and newsgroups.
  - Media stories and product reviews.
  - Contact-center notes and transcripts.
  - Customer feedback via Web-site forms and e-mail.
  - Survey verbatims.

Sentiment Extraction

We need to –

- Identify and access candidate sources.
- Extract sentiment to databases.
- Correlate expressed sentiment to measures such as –
  - Sales by product, location, time, etc.
  - Defects by part, circumstances, etc.
- And information such as –
  - Customer information and customer's transactions.
- Correlation depends on semantic agreement: are we talking about the same things?

Voice of the Customer

Customer Relationship Management (CRM)

- Sources: transactional and operational
- Targets: sales and support

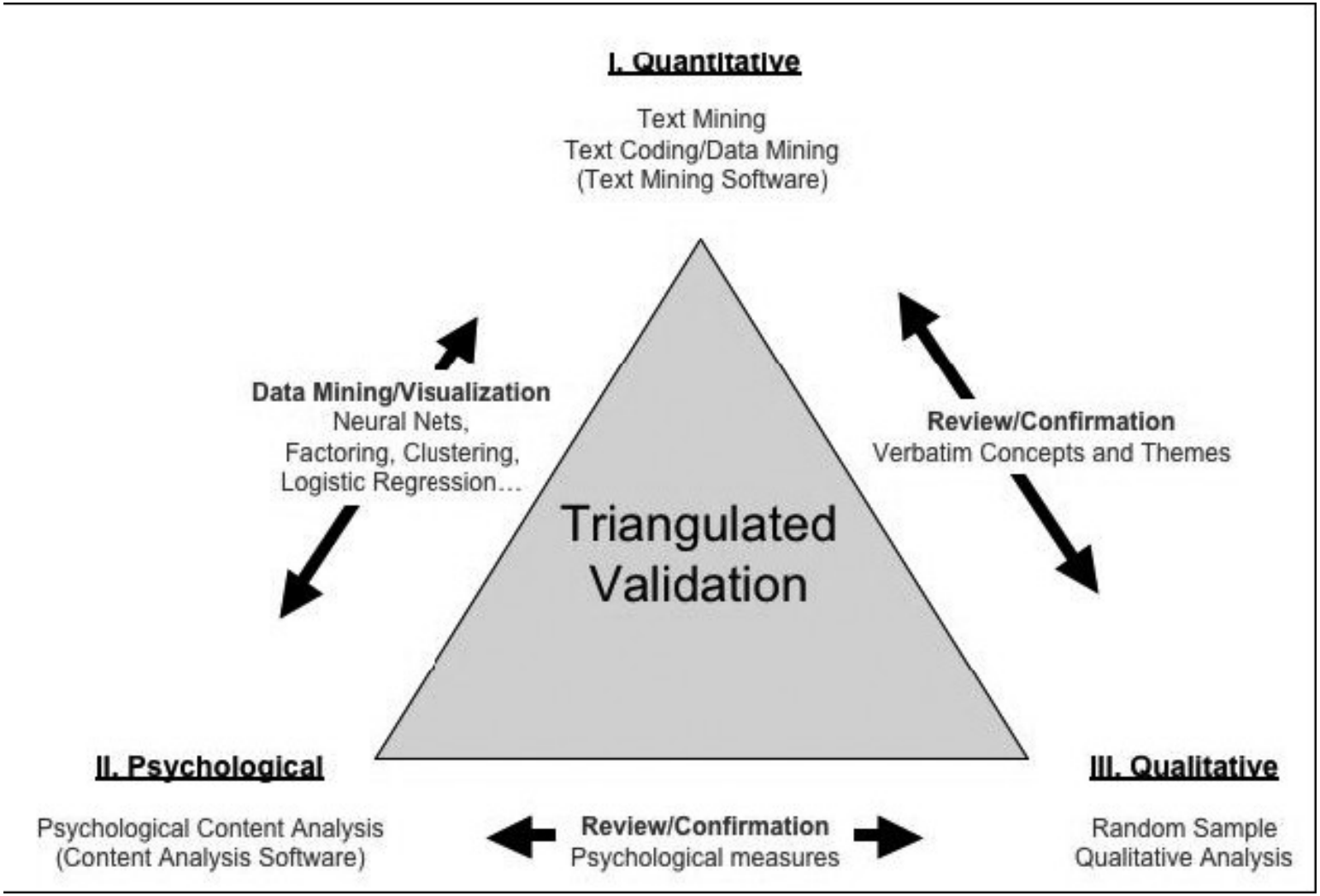
Customer Engagement Management (CEM)

- Additional sources capture *attitudinal* info
- Additional targets: product and service quality issues, product design and management, contact routing

Voice of the Customer

For analyses sourced with customer information, Anderson Analytics recommends a triangulated analytical model...

Voice of the Customer



www.andersonanalytics.com/index.php?mact=News,cntnt01,getfile,1&cntnt01filename=SCIP0208TomAndersonArticle.pdf&cntnt01returnid=46&page=46

Voice of the Customer

Additional concepts and tools apply...

"Net Promoter is a discipline by which companies profitably grow by focusing on their customers. A successful Net Promoter program includes 5 elements: 1) metrics proven to link to growth; 2) leadership practices that instill customer focus, passion, and values; 3) organizational strategies to ensure adoption; 4) integration with core business processes, and 5) operational systems to support the initiative."

"One simple question - Would you recommend us to a friend or colleague? - allows companies to track promoters and detractors and produces a clear measure of an organization's performance through its customers' eyes."

-- *http://www.netpromoter.com/netpromoter/index.php*

Unified Analytics

Approaches build on familiar BI tools and approaches...

Adding data and text mining...

Relying on semantics interpretation...

To help enterprises hear the Voice of the Customer...

And enrich their BI programs for other text-rich applications.

Questions?

Discussion?

Thanks!

Seth Grimes

Alta Plana Corporation

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Alta Plana