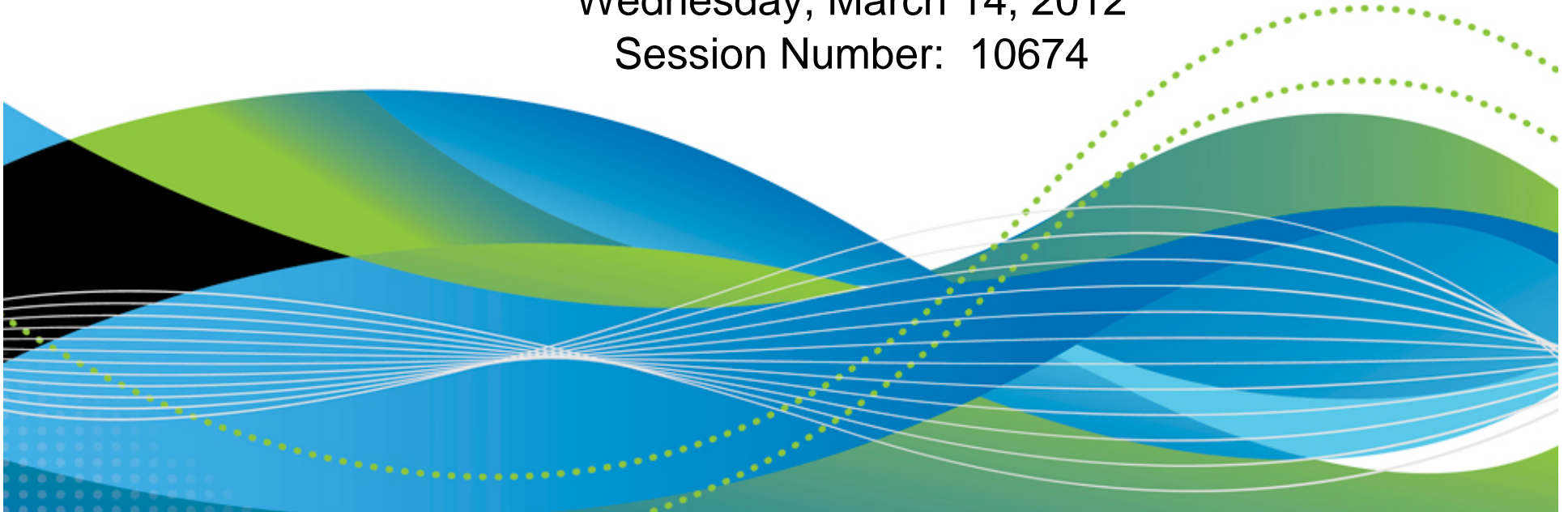


Search? Analytics? Big Data? Which to Use? So Many Choices!

Thyra Rauch
IBM

Wednesday, March 14, 2012
Session Number: 10674



The Next Grand Challenge



JEPARDY!  **The IBM Challenge**

YouTube Search Browse Upload

IBM Watson: The Next Grand Challenge
ibm

What is Watson?
The Next Grand Challenge

0:06 / 4:48 CC 360p

<http://www.youtube.com/watch?v=VjHMYuGkzIU>

Emily Dickinson		99%	
Walt Whitman		60%	
Barnard		10%	



SHARE
Technology • Connections • Results

Enterprise content: your organization's DNA

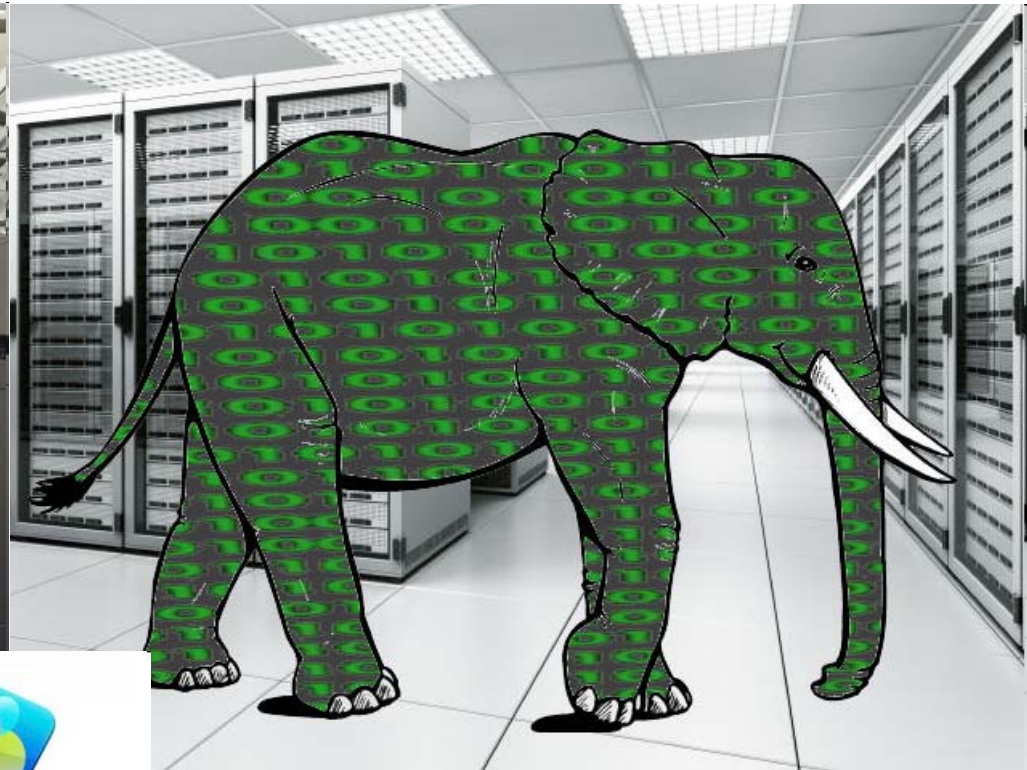
How will you unlock its potential?

Like DNA strands that contain genetic code, **enterprise content** holds the key to enhanced business insight, agility and performance



Enterprise content management

Data, Data, and More Data



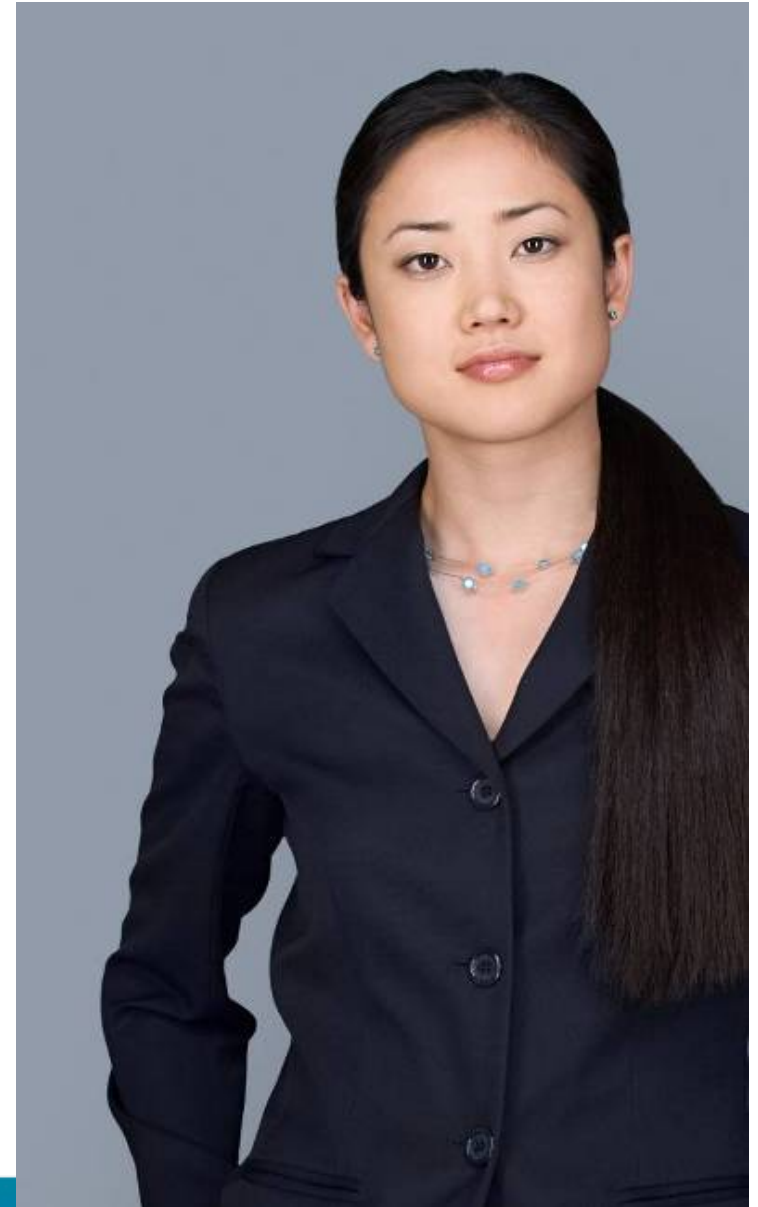
To achieve competitive edge

Organizations need to be smarter, faster



- **77% of CEOs** say they do not have real-time information to make key business decisions
- **1 in 3 business leaders** frequently make business decisions based on information they don't have, or don't trust
- **1 in 2 business leaders** say they don't have access to the information they need to do their jobs

Companies that invest in business insight outperform their peers, showing 33% higher revenue growth, 12 times more profit growth, and 32% higher return on invested capital.





To enhance customer intimacy and employee collaboration

Business is becoming more social

- **69% of executives** report gaining measurable business benefits from social technologies
- **52% of organizations** plan to increase investment in social media and collaboration tools in 2010

“Social media has shifted control of the corporate message away from the organization and towards consumers and other stakeholders, and running away and hiding is no longer the safe option.”



Social business drives an **unprecedented need** for insight from natural language conversations

500 billion impressions

annually made about products and services **

770 million people

worldwide visited a social networking site *

44x information growth by 2020 ***



Public Social Media



Conversations about quality, experience, price, value, service ...

- Forums and Newsgroups
- Wikis, Blogs and Microblogs
- Social Networks
- Social Media News Aggregators



Corporate Social Business

Conversations about strategy, projects, issues, risks, outcomes ...



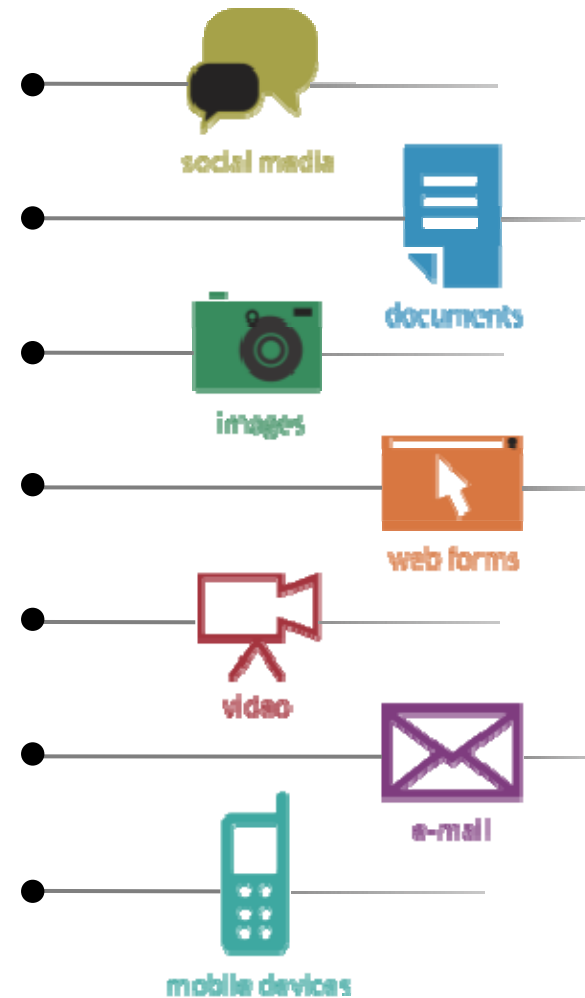
In addition to conversations about quality, experience, price, value, service ...

- Wikis, RSS and Forums
- Email and Collaborative Content
- Call Center Notes and Recordings
- Customer and Employee Surveys
- Reports, Minutes and Research

Sources: * comScore, Social Networking Phenomenon
 ** Empowered, a book by Josh Bernoff / Ted Schadler
 *** IDC Digital Universe Study, May 2010

Separate the **signal** from the noise

Leveraging content requires the ability to **search, assess** and **analyze** large volumes of **text** in order to understand and determine relevant **insight** quickly ... from multiple information sources **inside and outside the firewall**.





Truly **understanding natural language** is the next great computing challenge

- Over **80%** of information today is unstructured and based on **natural language**
- The impact of **Systems of Engagement** both inside and outside the firewall is dramatic ... such masses of information **not easily understandable** by humans
- Legacy approaches have all failed; **“searching” not the right approach**
- A new approach is needed, leveraging **content analysis** and natural language processing



The Next Grand Challenge



JEPARDY!  **The IBM Challenge**

YouTube Search Browse Upload

IBM Watson: The Next Grand Challenge
ibm

What is Watson?
The Next Grand Challenge

0:06 / 4:48 CC 360p

<http://www.youtube.com/watch?v=VjHMYuGkzIU>

Emily Dickinson		99%	
Walt Whitman		60%	
Barnard		10%	

Real language is real hard

Chess

- A finite, mathematically well-defined search space
- Limited number of moves and states
- Grounded in **explicit**, **unambiguous** mathematical **rules**

Human Language

- Ambiguous, **contextual** and implicit
- Contains slang, riddles, idioms, abbreviations, acronyms and more
- Grounded only in **human cognition**
- Seemingly infinite number of ways to express the same concepts and meaning



The hard part: understanding natural language with confidence and accuracy

- Where was Einstein born?

Unstructured

One day, from among his city views of Ulm, Otto chose a watercolor to send to Albert Einstein as a remembrance of Einstein's birthplace.

Structured

Person	Born In
A. Einstein	Ulm

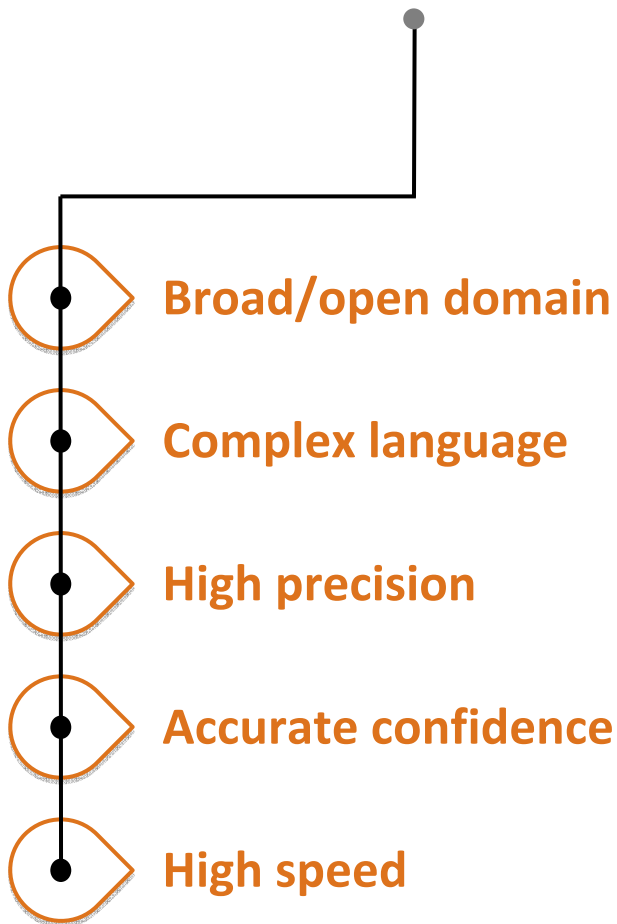
- Welch ran this?

If leadership is an art then surely Jack Welch has proved himself a master painter during his tenure at GE.

Person	Organization
J. Welch	GE

The Jeopardy! Challenge

5 key dimensions to drive the technology



\$200

If you're standing, it's the direction you should look to check out the wainscoting

\$800

In cell division, mitosis splits the nucleus & cytokinesis splits this liquid *cushioning* the nucleus

\$1000

Of the 4 countries in the world that the U.S. does not have diplomatic relations with, the one that's farthest north

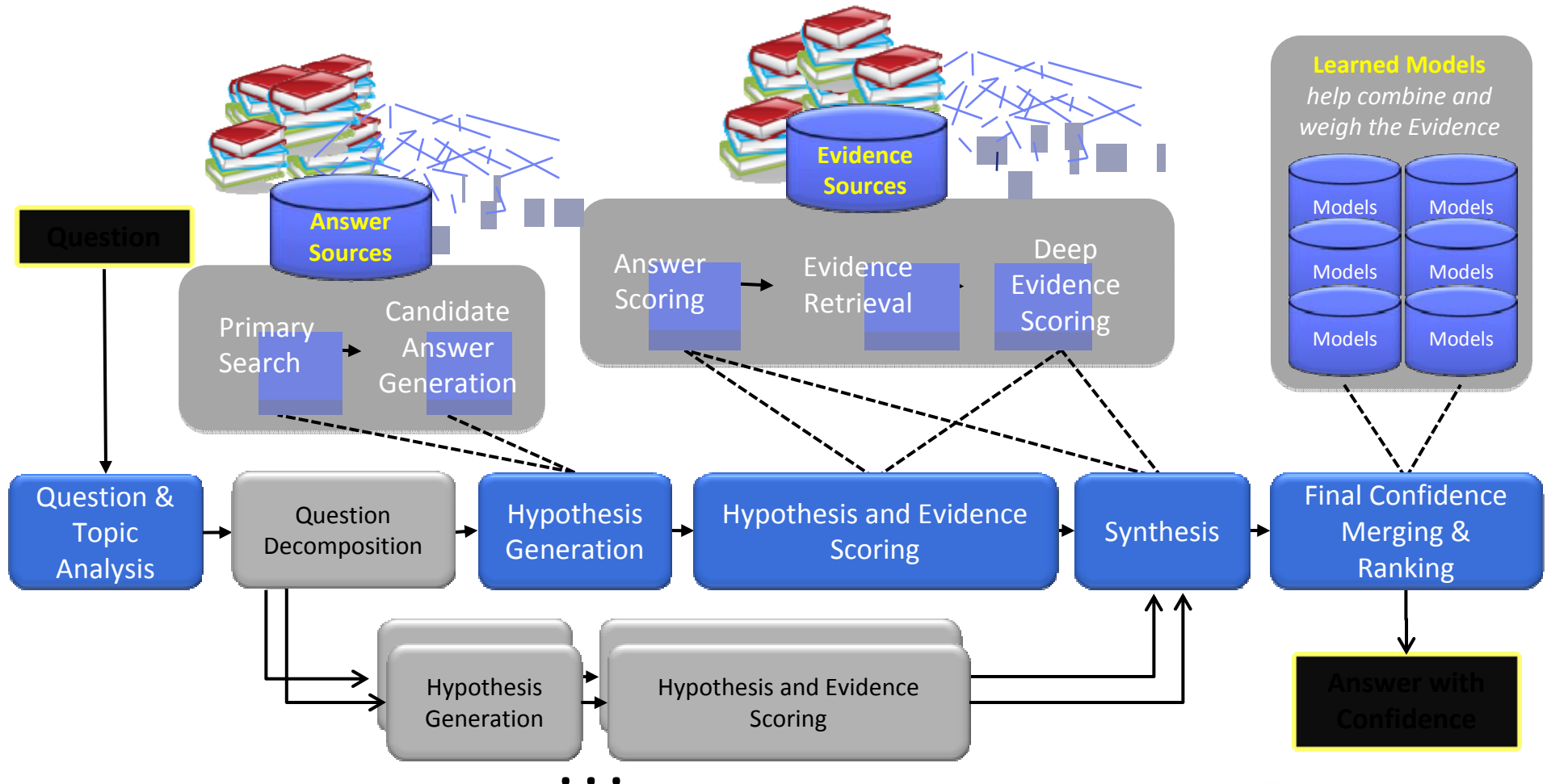
The Big Idea: Evidence-Based Reasoning over Natural Language Content

- **Deep Analysis** of clues / questions and stored knowledge (content)
 - Search for many possible answers based on different interpretations of question
 - Possible answers depend on stored and available knowledge (content)
- **Find, Analyze and Score Evidence** from many different sources (not just one document)
 - For each possible answer using many advanced NLP and reasoning algorithms
- **Combine Evidence** and compute a confidence value for each possibility using statistical machine learning
 - Ranks possible answers based on confidence
 - If confidence is above the threshold – then buzz in to answer



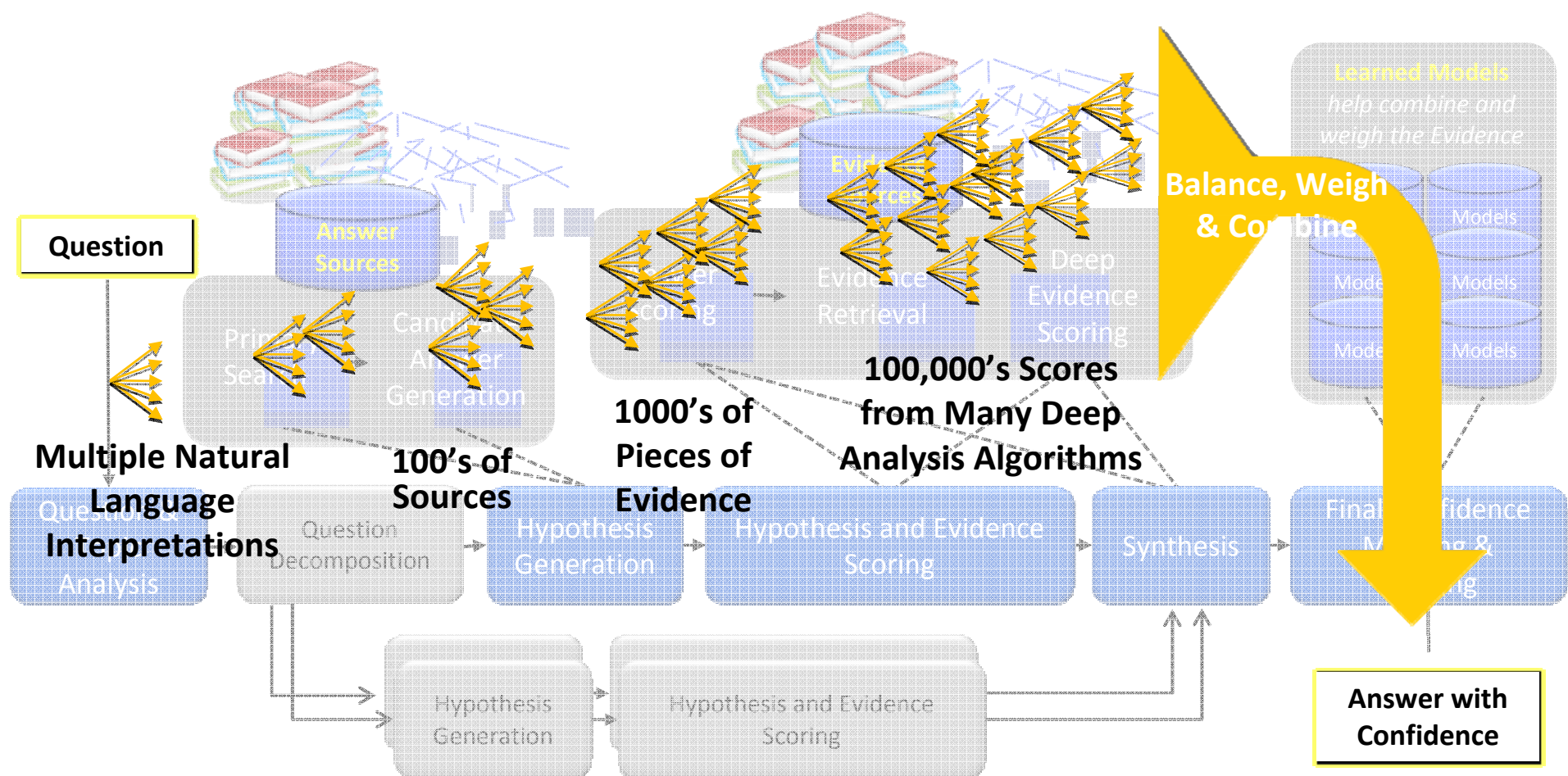
The technology behind IBM Watson

How it Really Works with Content



The technology behind IBM Watson

How it Really Works with Content



Isn't this just like search?

Question:
What happens if my shoelaces become untied?

Search only results:

- Based on **keyword popularity** and search engine optimized
- Lots of **shopping suggestions**
- Results prove **it didn't understand the question**
- Can include **profanity**

shoelaces - Google Search - Microsoft Internet Explorer

Address: <http://www.google.com/search?q=shoelaces&hl=en&fnr=1&sa=X&aq=f&aqi=g4g-s1g4g-s1&aqi=80q=>

Search: What happens if my shoelaces become untied?

About 365,000 results

Everything

- Images
- Videos
- News
- Shopping
- More

Any time

- Past hour
- Past 24 hours
- Past week
- Past year
- More search tools

Sponsored Links

- Buy Shoe Laces - Over 2000 Shoelaces To Choose From.** Sponsored Links
At Low Prices. Order Online Today.
www.shoelacesexpress.com
- Buy Shoe Laces Here**
Buy any kind of shoe laces Dress, Casual, Athletic, Boots.
www.heelingtouch.com
- lan's Shoelace Site - Where to Buy Shoelaces**
Dec 9, 2010 ... Bundles of Shoelaces People often ask me where to buy shoelaces on-line. I've searched various on-line merchants to bring together a good ...
www.fieggen.com/shoelace/shoelaces.php - Cached - Similar
- lan's Shoelace Site - Shoe Lacing Methods**
Feb 5, 2011 ... This method "lengthens" ends because it consumes the least ...
www.fieggen.com/shoelace/lacingmethod... - Cached - Similar

Sponsored Links

- Custom Laces and Lanyards**
Direct from the manufacturer - Low Minimums - Great Pricing and Service
www.shoeflydesigns.net
- Shoelaces All Types**
Flat \$.89 , Round \$1.79, Curly \$2.49
Free Shipping on Orders \$50 and Up
www.feetpeoplestore.com
- Shoelaces**
100+ Shoelaces at Great Prices.
Shop, Compare and Save at Pronto.
shoelace.pronto.com

Something different

- socks
- cloths
- trousers
- boot laces

What would happen if my shoelace got caught in an escalator ...
What would happen if my shoelace got caught in an escalator? ... I use to cringe when it was trendy for mall rats to walk around with their shoes untied. ... My lesson was to become on constant escalator alert. ...
boards.straightdope.com/sdmb/showthre... - Cached - Similar

lan's Shoelace Site - Frequently Asked Questions
Dec 9, 2010 ... Q: Why do my shoe laces come untied? Q: Why do my shoe laces slip? Q: Why won't my shoe laces stay tied? A: If tied correctly, ...
www.fieggen.com/shoelace/faq.htm - Cached - Similar

What kind of spirit is responsible for untying my shoelaces ...
Feb 6, 2011 ... It happens all the time. Is it my guardian angel t... ... I'd LAUGH if a demon haunted you and your house one day ... "The leprechaun is said to be a solitary creature, whose principal occupation is making ... A wedgie, untied shoelaces, a missing key, a chair moved, then some thumping sounds and whom ...
answers.yahoo.com/question/index%3Fq... - Cached - Similar

Why do my shoelaces keep coming untied? - shoelaces | Ask MetaFilter
Oct 24, 2004 ... Why do my shoelaces keep coming untied? I double-knot them. ... Perhaps your shoelaces are just too slick; I've had that happen a few times, ... power of the double-knot but is still easy to untie when you want to. ...
ask.metafilter.com/11200/Why-do-my-sh... - Cached - Similar

It just took me ten minutes to untie my shoelaces. - Page 2
Jan 5, 2011 ... It just took me ten minutes to untie my shoelaces. ... If I saw a hobo with a sign that said IVE GOT NO PROFANITY THUMBS, ...
www.godlikeproductions.com/forum1/mes... - Cached - Similar

Why don't my shoes stay tied?
I notice if my laces are corded then they will come untied over and over. This could also

Note: This is mocked up from two separate search query approaches

SHARE in Atlanta 2012

Watson and IBM ECM Today

- **Natural Language Processing (NLP)** is the cornerstone to translate interactions between computers and human (natural) languages
 - Watson uses **IBM Content Analytics** to perform critical NLP functions
- **Unstructured Information Management Architecture (UIMA)** is an open framework for processing text and building analytic solutions
 - Several IBM ECM products leverage UIMA text analytics processing:
 - IBM Content Analytics
 - OmniFind Enterprise Edition
 - IBM Classification Module
 - IBM eDiscovery Analyzer

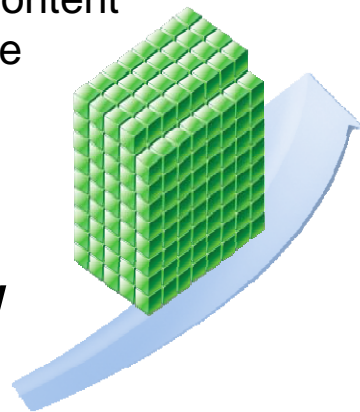
Information is at the Center of a New Wave of Opportunity... And Organizations Need Deeper Insights



44x

as much Data and Content Over Coming Decade

2020
35 zettabytes



Velocity
Variety
Volume

2009
800,000 petabytes

80%

Of world's data is unstructured



1 in 3

Business leaders frequently make decisions based on information they don't trust, or don't have

1 in 2

Business leaders say they don't have access to the information they need to do their jobs

83%

of CIOs cited "Business intelligence and analytics" as part of their visionary plans to enhance competitiveness

60%

of CEOs need to do a better job capturing and understanding information rapidly in order to make swift business decisions

The Challenge: Bring Together a Large Volume and Variety of Data to Find New Insights



Multi-channel customer sentiment and experience analysis



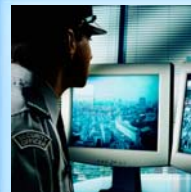
Detect life-threatening conditions at hospitals in time to intervene



Predict weather patterns to plan optimal wind turbine usage, and optimize capital expenditure on asset placement



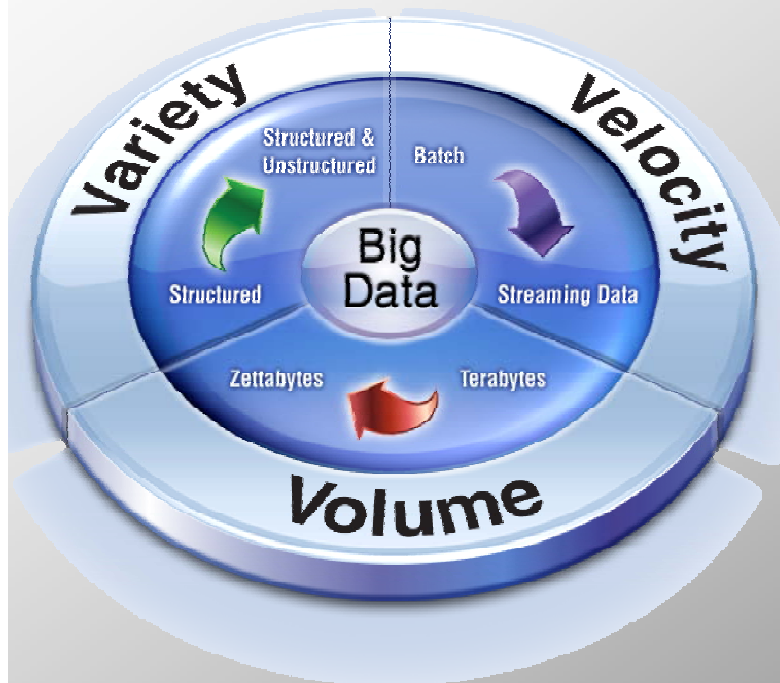
Make risk decisions based on real-time transactional data



Identify criminals and threats from disparate video, audio, and data feeds

The Big Data Opportunity

Extracting insight from an immense volume, variety and velocity of data, in context, beyond what was previously possible.



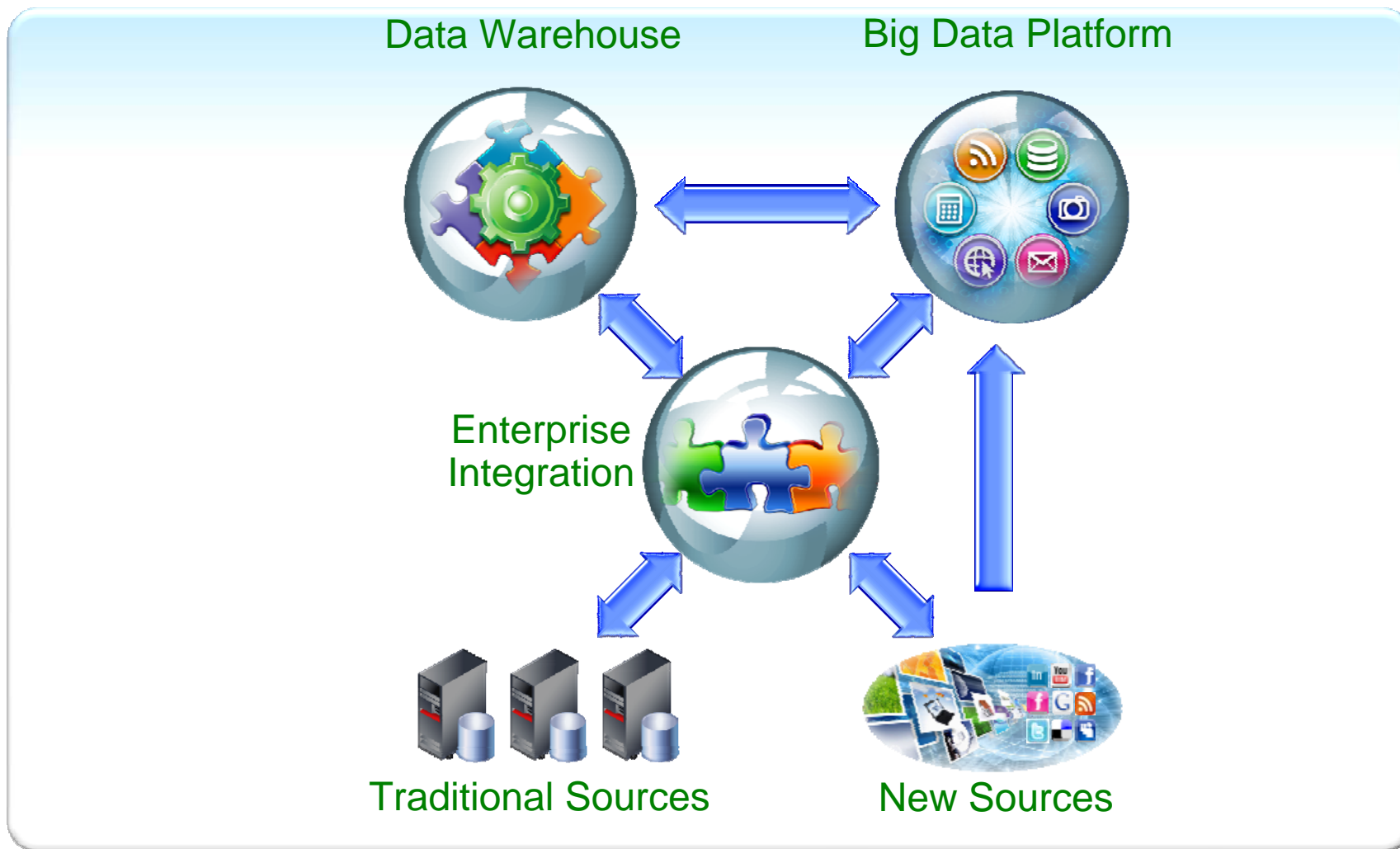
Variety: Manage the complexity of multiple relational and non-relational data types and schemas

Velocity: Streaming data and large volume data movement

Volume: Scale from terabytes to zettabytes

Big Data Shouldn't Be a Silo

Must be an integrated part of your enterprise information architecture



The Solution – IBM's Big Data Platform

Bring together any data source, at any velocity, to generate insight

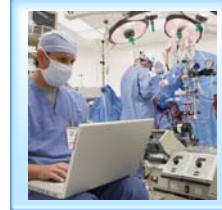


- Analyzing a variety of data at enormous volumes
- Insights on streaming data
- Large volume structured data analysis



IBM Big Data Platform

- Variety
- Velocity
- Volume

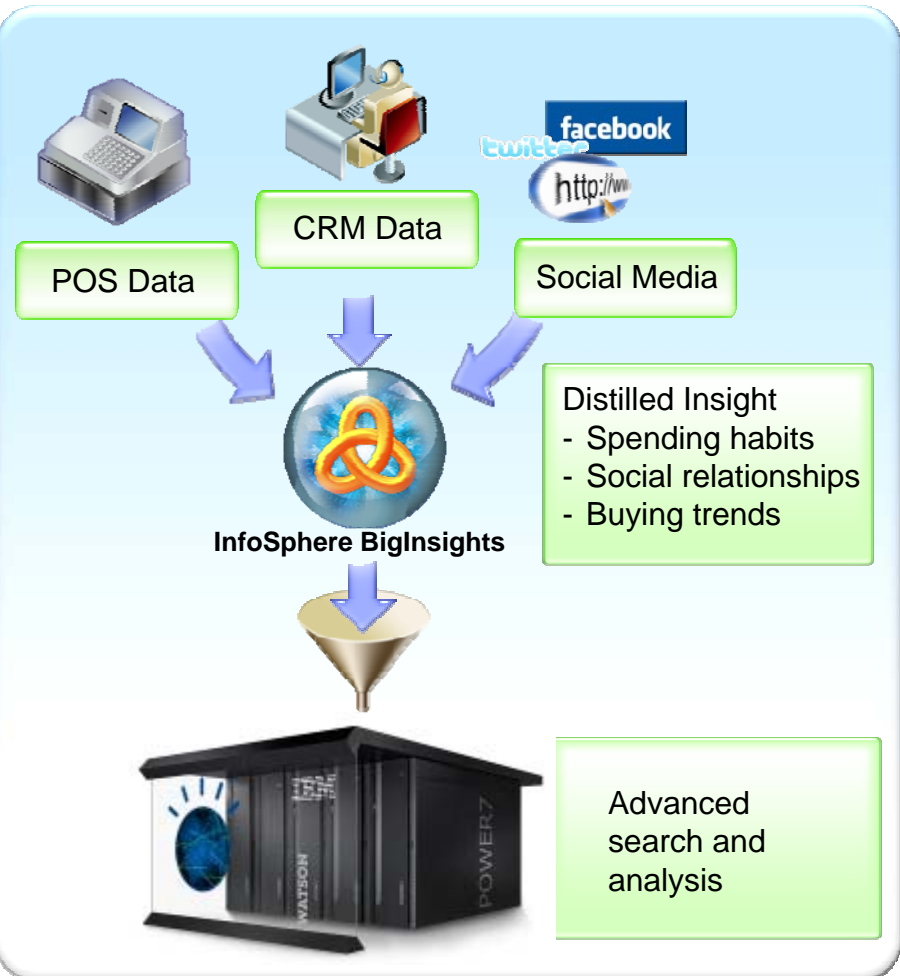
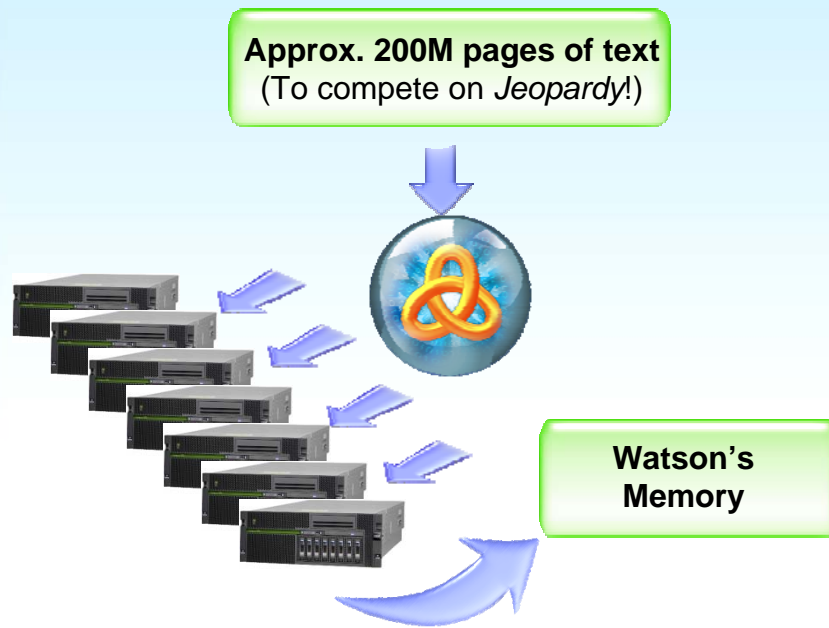


Big Data and Watson

Big Data technology is used to build Watson's knowledge base

Watson can consume insights from Big Data for advanced analysis

Watson uses the Apache Hadoop open framework to distribute the workload for loading information into memory.



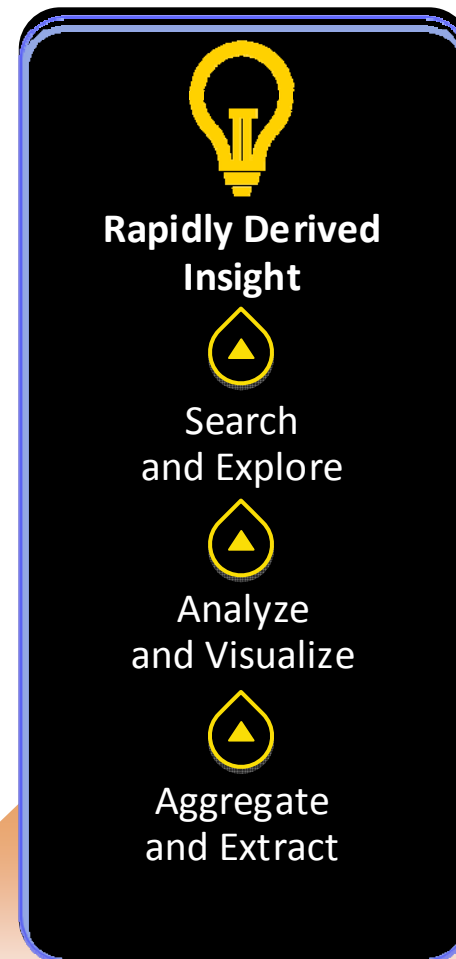
Some Current Products

- InfoSphere Streams
- InfoSphere BigInsights
- IBM Netezza
- Cognos Consumer Insights (CCI)
- IBM SPSS
- IBM Content Analytics (ICA)
- IBM Content and Predictive Analytics (ICPA)

IBM Content Analytics is a platform to derive rapid insight



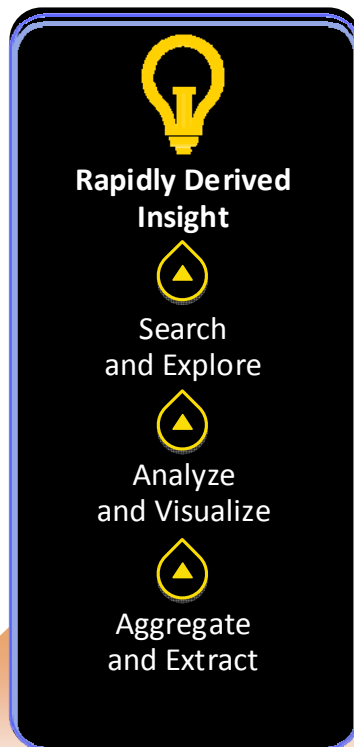
- Transform raw information into **business insight quickly** without building models or deploying complex systems.
- Derive insight in **hours** or **days** ... not weeks or months.
- **Easy to use** for all knowledge workers to **search** and **explore** content.
- **Flexible** and **extensible** for deeper insights.



Enabling the power of **rapid insight**

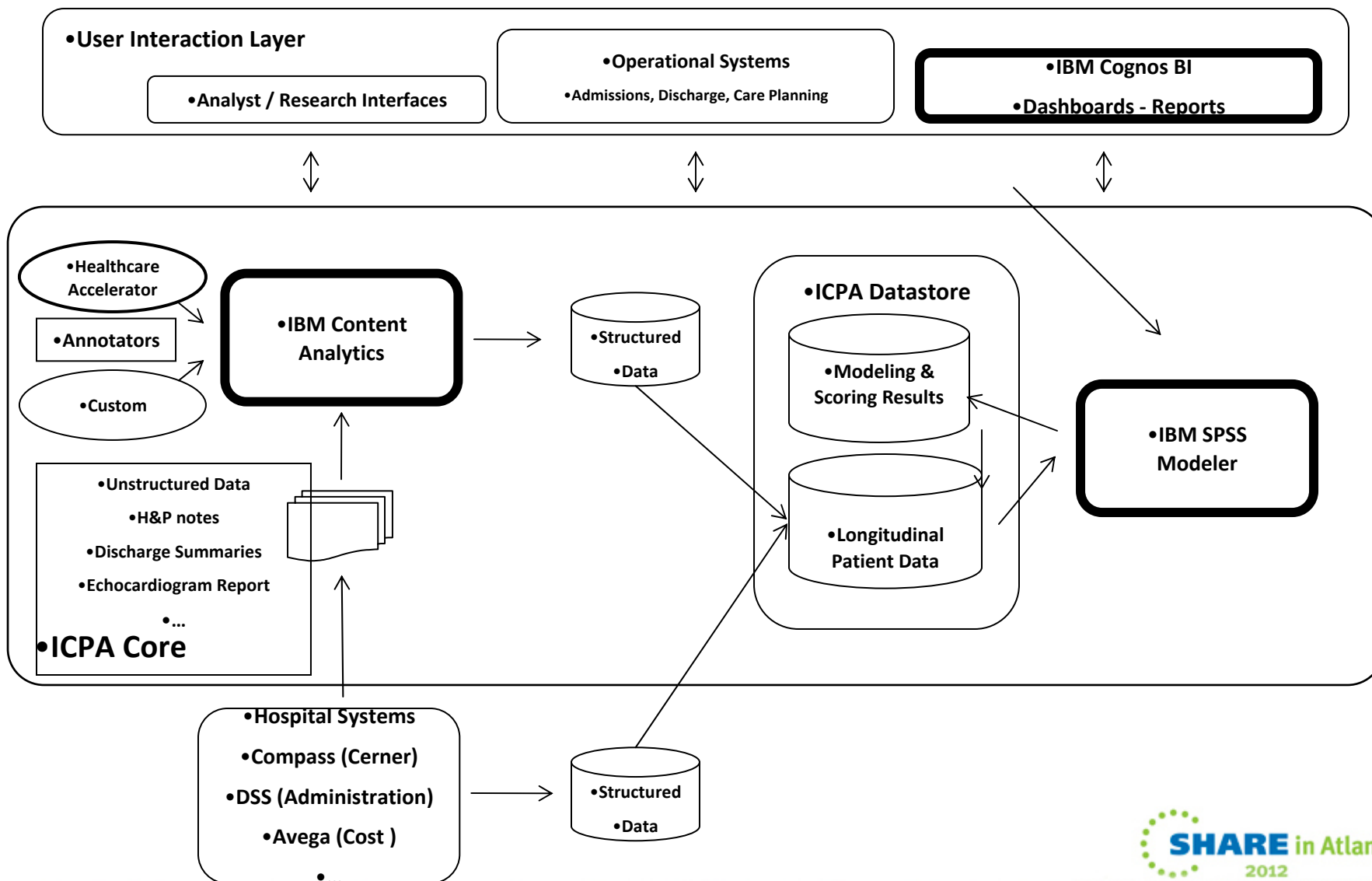


IBM Content Analytics

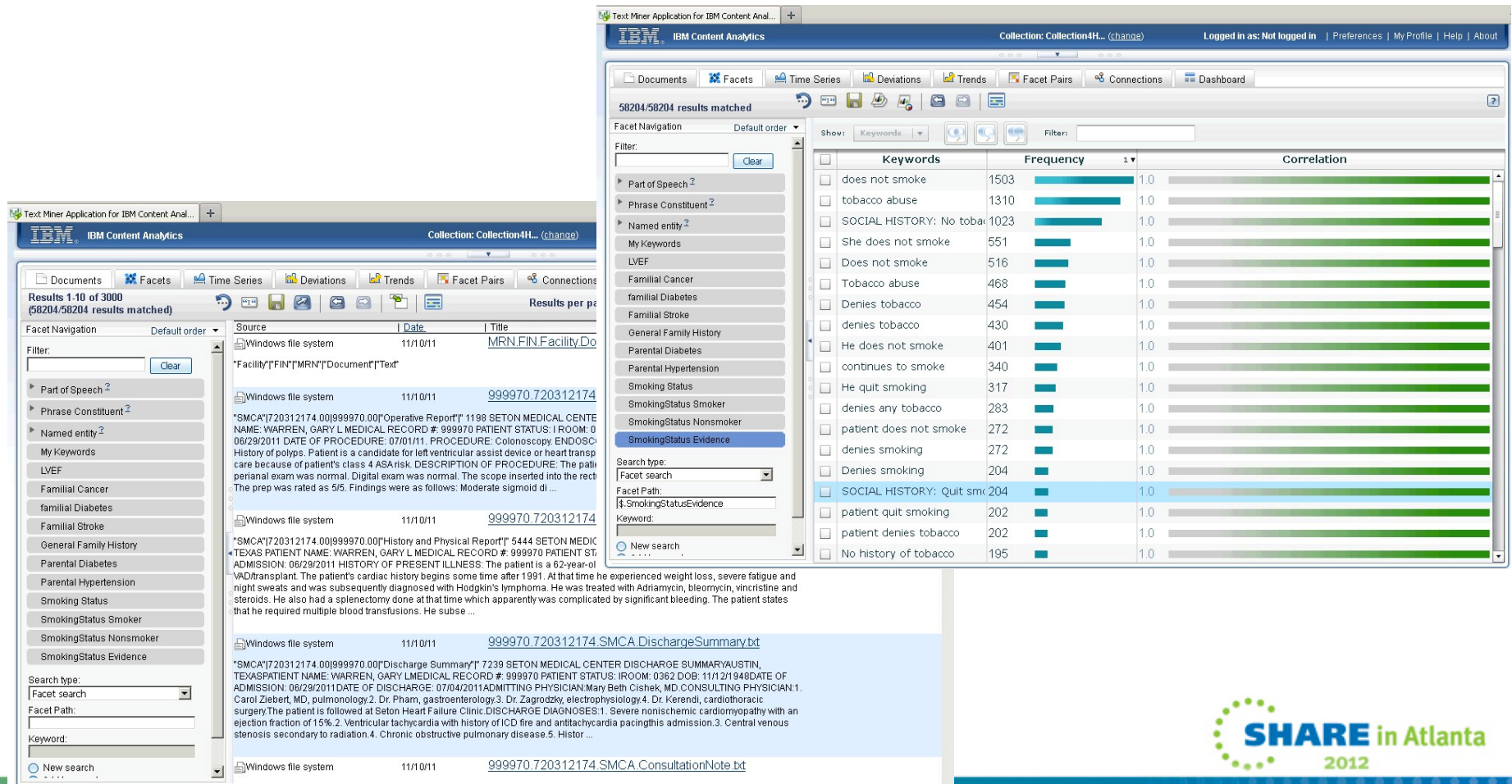


- Find relevant enterprise content quickly and securely
- Assess enterprise content to decommission the unnecessary and govern the content that matters
- Customize rapid insight to industry and customer specific needs
- Enable deeper insights through integration to other systems and solutions

ICPA



- **ICPA Text Miner Facet /Document View**
- **Deploy NLP Model and index the documents and surface the NLP concepts as Text Miner facets for more efficient documents filtering for visual validation**



The screenshot displays the IBM Content Analytics Text Miner interface. The top navigation bar includes 'Documents', 'Facets', 'Time Series', 'Deviations', 'Trends', 'Facet Pairs', 'Connections', and 'Dashboard'. The main content area is split into two views: 'Facets' on the left and 'Documents' on the right.

Facet View (Left): Shows a list of facets under 'Facet Navigation'. The 'Filter' section is empty. The facets list includes: Part of Speech², Phrase Constituent², Named entity², My Keywords, LVEF, Familial Cancer, Familial Diabetes, Familial Stroke, General Family History, Parental Diabetes, Parental Hypertension, Smoking Status, SmokingStatus Smoker, SmokingStatus Nonsmoker, and SmokingStatus Evidence.

Document View (Right): Shows a table of search results. The table has columns for 'Source', 'Date', and 'Title'. The results include:

Source	Date	Title
Windows file system	11/1/011	MRN.FIN.Facility.Do
Windows file system	11/1/011	999970.720312174
Windows file system	11/1/011	999970.720312174
Windows file system	11/1/011	999970.720312174.SMCA.DischargeSummary.bt
Windows file system	11/1/011	999970.720312174.SMCA.ConsultationNote.bt

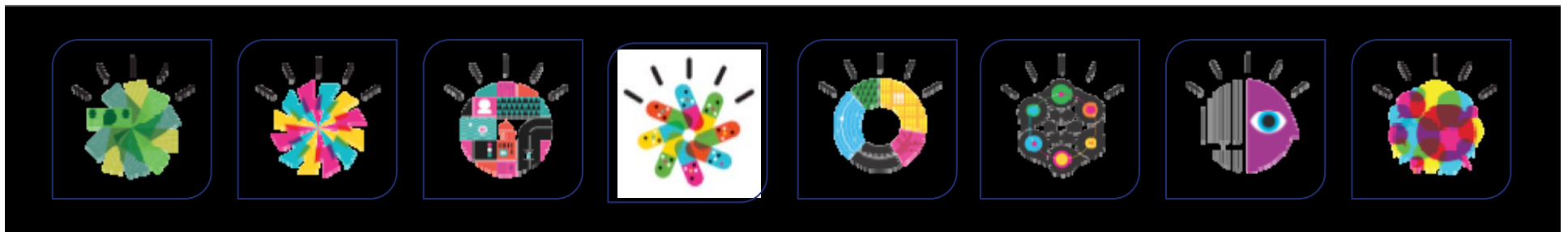
Below the document list, a search type dropdown is set to 'Facet search'. The 'Facet Path' is '\$.SmokingStatus:Evidence' and the 'Keyword' is 'No history of tobacco'.

Keywords Table (Right): A table showing keyword frequency and correlation. The table has columns for 'Keywords', 'Frequency', and 'Correlation'.

Keywords	Frequency	Correlation
does not smoke	1503	1.0
tobacco abuse	1310	1.0
SOCIAL HISTORY: No toba	1023	1.0
She does not smoke	551	1.0
Does not smoke	516	1.0
Tobacco abuse	468	1.0
Denies tobacco	454	1.0
denies tobacco	430	1.0
He does not smoke	401	1.0
continues to smoke	340	1.0
He quit smoking	317	1.0
denies any tobacco	283	1.0
denies smoking	272	1.0
Denies smoking	204	1.0
SOCIAL HISTORY: Quit smc	204	1.0
patient quit smoking	202	1.0
patient denies tobacco	202	1.0
No history of tobacco	195	1.0

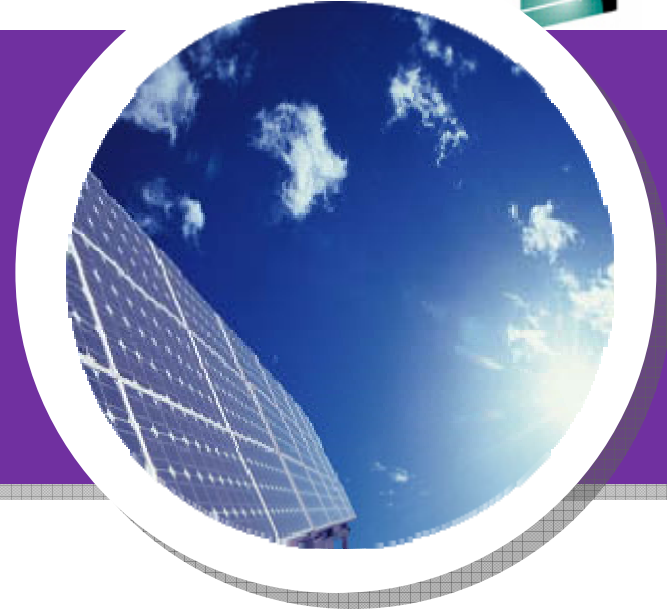
What are Companies Doing?

- **Engineering:** Analyzing such things as wind data, radiation, heat
- **Business:** Analyzing such things as social media – likes and dislikes, customer activity, spending habits
- **Healthcare:** Analyzing streams of data from medical devices (such as in neonatal units) or looking at hospital discharges and predicting re-admittance





Optimize capital investments based on **6 Petabytes** of information



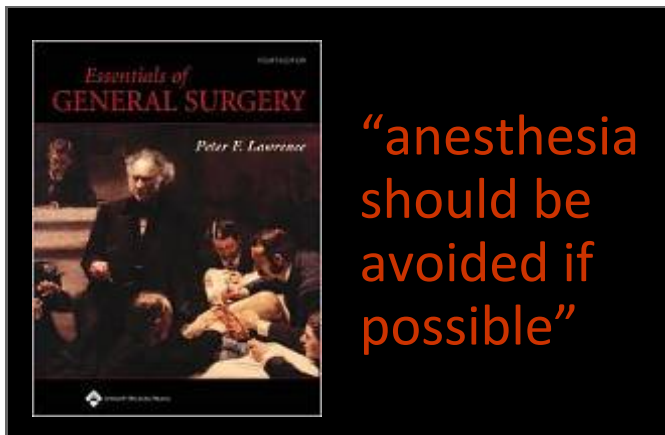
- Model the weather to optimize placement of turbines, maximizing power generation and longevity
- Build models to cover forecasting and real-time operation of power generation units
- Incorporate 6 PB of structured and semi-structured information flows

Applying Watson to the Real World

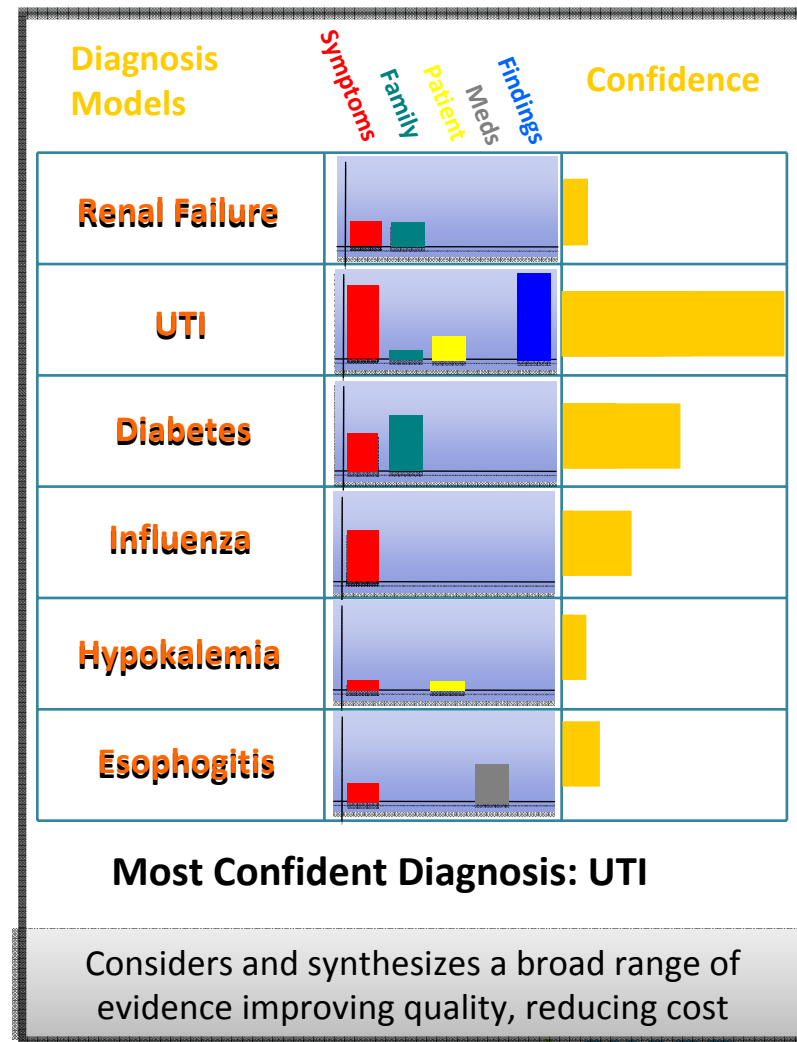
Continuous Evidence-Based Diagnostic Analysis

Answer Sources

- Symptoms
- Family History
- Patient History
- Medications
- Tests / Findings
- Notes / Hypotheses
- Huge Volumes of Texts, Journals, References, Databases. etc.



“anesthesia should be avoided if possible”



Inconsistent quality and increasing costs require healthcare transformation in **key areas**



We need
**better
clinical
outcomes**



- **One in five patients** suffer from preventable readmissions ... represents \$17.4 billion of the current \$102.6 billion Medicare budget*
- **1.5 million patients** in the U.S. harmed annually by errors in the way medications are prescribed, delivered and taken



We need
**better
operational
outcomes**



- In 2012, Hospitals will be penalized for high readmission rates - Medicare discharge payments starting will be reduced in key areas**
- **\$475 billion:** Estimated annual US healthcare spending on administrative and clinical waste, fraud, abuse and other waste

Medical Transcription Discharge Summary Sample # 2:

DATE OF ADMISSION: MM/DD/YYYY

DATE OF DISCHARGE: MM/DD/YYYY

ADMITTING DIAGNOSIS: Syncope.

CHIEF COMPLAINT: Vertigo or dizziness.

HISTORY OF PRESENT ILLNESS: The patient is a (XX)-year-old female with a medical history of coronary artery disease, hypertension, atrial fibrillation, peripheral arterial disease, peripheral neuropathy, recently retired one year ago secondary to leg pain. The patient came to the ED for an episode of vertigo while reaching for some books. The patient was able to reach the books with support self, but did not recall the exact details. She has had similar episodes in the past, which were associated with dizziness, headache, vision changes or speech changes. The patient has had similar episodes since one year. Peripheral neuropathy is of 25 pounds in the last 6 months. Appetite is decreased.

Unstructured data is messy but filled with key medical facts

Echocardiogram Sample Report:

DATE OF STUDY: MM/DD/YYYY

DATE OF INTERPRETATION OF STUDY:

Echocardiogram was obtained for assessment of left ventricular function. The patient has been admitted with syncope. Overall, the study was suboptimal.

FINDINGS:

1. Aortic root appears normal.
2. Left atrium is mildly dilated. No grossly enlarged, although subtle abnormality cannot be excluded.
3. There is echo dropout of the interventricular septum.
4. Right and left ventricles are normal in size. Left ventricular systolic function appears to be normal. Fraction is around 55%. Again, due to suboptimal image quality, some abnormalities in the distribution of late diastolic flow cannot be excluded.
5. Aortic valve is sclerotic with normal Doppler study demonstrates trace aortic regurgitation.
6. Mitral valve leaflets are also sclerotic with normal Doppler study demonstrates mild mitral regurgitation.
7. Tricuspid valve is delicate and opening is clearly seen. No evidence of pericardial effusion.

CONCLUSIONS:

1. Poor quality study.
2. Eyeball ejection fraction is 55%.
3. Trace to mild degree of mitral regurgitation.
4. Trace aortic regurgitation.

The patient had a chest x-ray, which showed cardiomegaly, a left costophrenic angle which has not changed, a head CT, which showed atrophy with old ischemic changes.

Cardiology Consultation Transcribed Medical Transcription Sample Reports

REFERRING PHYSICIAN: John Doe, MD

CONSULTING PHYSICIAN: Jane Doe, MD

HISTORY OF PRESENT ILLNESS: This (XX)-year-old lady is seen in consultation for Dr. John Doe. She has been under consideration for ventral hernia repair and has a background of aortic valve replacement and known coronary artery disease. The patient was admitted with complaints of abdominal pain, anorexia, and vomiting. She underwent a CT scan of the abdomen and pelvis and this showed the ventral hernia involving the transverse colon, but without strangulation. There was an atrophic right kidney. She had bilateral renal cysts. The hepatic flexure wall was thickened. There was sigmoid diverticulosis without diverticulitis. It has been recommended to her that she undergo repair of the ventral hernia. For this reason, cardiology consult is obtained to assess whether she can be cared from the cardiac standpoint.

PAST CARDIAC HISTORY: Bypass surgery. She underwent echocardiography and cardiac catheterization prior to the operation. Echocardiography showed an ejection fraction of 50%. There was marked left ventricular hypertrophy with septal wall 1.60 cm and posterior wall 1.55 cm. Coronary arteriography showed 90% stenosis in the anterior descending artery, situated distally just before the apex of the left ventricle. Only mild to moderate narrowing was seen elsewhere in the coronary circulation.

CORONARY RISK FACTORS: Her father had an irregular heartbeat and her brother had a fatal heart attack. She herself has had high blood pressure for 20 years. She has elevated cholesterol and takes Lipitor. She has had diabetes for 20 years. She is not a cigarette smoker. She does little physical exercise.

REVIEW OF SYMPTOMS: CARDIOVASCULAR AND RESPIRATORY: She has no chest pain. She sometimes becomes short of breath if she walks too far. No cough. She has occasional swelling of her feet. Occasionally, she gets mildly lightheaded. Has not lost consciousness. She tends to be aware of her heartbeat when she is tired. She has no history of heart murmur or rheumatic fever. GASTROINTESTINAL: Recent GI symptoms as noted above, but she does not usually have such problems. She has had no hematemesis. She has no history of ulcer or jaundice. She sometimes has blood in the stool. GENITOURINARY: She tends to have up once at night to pass urine. No dysuria, incontinence. She has had occasional urinary stones noted. NEUROLOGIC: She has occasional headaches. No hearing, or speech. No limb weakness. MUSCULOSKELETAL: She has joint pains and has a history of gout. HEMATOLOGIC: No anemia, no blood transfusion. GYNECOLOGIC: No gynecologic or breast surgery.

Cardiology Consultation Transcribed Medical Transcription Sample Reports

DATE OF CONSULTATION: MM/DD/YYYY

REFERRING PHYSICIAN: John Doe, MD

CONSULTING PHYSICIAN: Jane Doe, MD

REASON FOR CONSULTATION: Suspected evaluation for coronary artery disease.

HISTORY OF PRESENT ILLNESS: The patient is a (XX)-year-old female with a medical history of coronary artery disease. She underwent previous percutaneous coronary intervention (PCI) for her coronary artery disease. She has been relatively stable with medical management. However, in the past several weeks, she started to notice some exertional dyspnea with chest pain. For the most part, the pain subsides with rest. For this reason, she was re-evaluated with a cardiac catheterization. This was a proximal lesion. The left ventriculogram did not show any ventricular function was mildly reduced with an ejection fraction of about 45%. The left ventriculogram did not show any hypokinesis. In view of these findings, a surgical consultation was requested and the patient was seen and evaluated by Dr. Doe.

PAST MEDICAL HISTORY:

1. Coronary artery disease as described above with previous PTCA and stenting procedures.
2. Dyslipidemia.
3. Hypertension.
4. Status post breast lumpectomy for ductal carcinoma in situ.

ALLERGIES: None.

MEDICATIONS: Aspirin 81 mg daily, Plavix 75 mg daily, Atace 2.5 mg daily, metoprolol 50 mg b.i.d. and Lipitor 10 mg q.h.s.

SOCIAL HISTORY: She quit smoking 10 years ago. She had about a 35- to 40-pack-year history. She does not abuse alcohol.

FAMILY MEDICAL HISTORY: Mother died prematurely of breast cancer. Her father died prematurely of gastric carcinoma.

REVIEW OF SYMPTOMS: There is no history of any CVAs, TIAs or seizures. No chronic headaches. No asthma, TB, hemoptysis or productive cough. There is no congenital heart abnormality or rheumatic fever history. She has no palpitations. She notes no nausea, vomiting, constipation, diarrhea, but immediately prior to admission, she did develop some diffuse abdominal discomfort. She says that since then, this has resolved. No diabetes or thyroid problem. There is no depression or psychiatric problems. There is no musculoskeletal disorders or history of gout. There are no hematologic problems or blood dyscrasias. No bleeding tendencies. Again, she had a history of breast cancer and underwent lumpectomy procedures for this with followup radiation therapy. She has been followed in the past 10 years and mammography shows no evidence of any recurrent problems. There is no recent fevers, malaise, changes in appetite or changes in weight.

PHYSICAL EXAMINATION: Her blood pressure is 120/70, pulse is 80. She is in a sinus rhythm on the EKG monitor. Respirations are 18 and unlabored. Temperature is 98.2 degrees Fahrenheit. She weighs 160 pounds, she is 5 feet 4 inches. In general, this was an elderly-appearing, pleasant female who currently is not in acute distress. Skin color and turgor are good. Pupils were equal and reactive to light. Conjunctivae clear. Throat is benign. Mucosa was moist and noncyanotic. Neck veins not distended at 90 degrees. Carotids had 2+ upstrokes bilaterally without bruits. No lymphadenopathy was appreciated. Chest had a normal AP diameter. The lungs were clear in the apices and bases, no wheezing or egophony appreciated. The heart had a normal S1, S2. No murmurs, clicks or gallops. The abdomen was soft, nontender, nondistended. Good bowel sounds present. No hepatosplenomegaly was appreciated. No pulsatile masses were felt. No abdominal bruits were heard. Her pulses are 2+ and equal bilaterally in the upper and lower extremities. No clubbing is appreciated. She is oriented x3. Demonstrated a good amount of strength in the upper and lower extremities. Face was symmetrical. She had a normal gait.

IMPRESSION: This is a (XX)-year-old female with significant multivessel coronary artery disease. The patient also has a left main lesion. She has undergone several PTCA and stenting procedures within the last year to year and a half. At this point, in order to reduce the risk of any possible ischemia in the future, surgical myocardial revascularization is recommended.

PLAN: We will plan to proceed with surgical myocardial revascularization. The risks and benefits of this procedure were explained to the patient. All questions pertaining to this procedure were answered.

Medications, diseases, symptoms, non-symptoms, lab measurements, social history, family history and much more

She has had shoulder and hand injuries and has had carpal tunnel and has been on insulin. She has chronic renal insufficiency with has had hypothyroidism. She has had morbid obesity. She has chronic uses BIPAP. She has had hysterectomy and oophorectomy in the past.

hospital, she was taking glipizide XL 2.5 mg daily, metoprolol 50 mg (torvastatin 40 mg daily, Synthroid 75 mcg daily, aspirin 81 mg daily, irrenilnyl, she is taking Lipitor 40 mg daily, Lantus 10 units at bedtime, pprol 50 mg b.i.d., and Zosyn 2.25 grams q.6h. She does not drink alcohol.

She is not currently dyspneic, in no distress. She is alert, oriented, and does not react normally. No icterus. Mucous membranes well colored. No peripheral edema. Jugular venous pressure not elevated. Carotids equal. Heart rate regular and the blood pressure 132/78. The cardiac r. There is a grade 3/6 ejection systolic murmur heard medial to the with well heard radiation to the neck vessels. There is no diastolic murmur. Normal respiratory effort. No rales. The presence of a large ventral hernia is noted. Posterior tibial pulses were felt bilaterally, but I did not feel the femoral pulses.

lesions are noted. LABORATORY DATA: Electrolytes are normal. BUN and creatinine 18/2.2. Hemoglobin 11.7 with hematocrit 34.9, platelets 187,000. Hemoglobin A1c 7.7. TSH 1.82. Troponin I was normal on three occasions. ECG showed a regular rhythm with postoperative changes, but no evidence of acute myocardial infarction. Low voltage QRS, probable inferior wall anterior wall infarction, age undetermined.

with bioprosthetic valve. Residual systolic murmur. There is severe stenosis in anterior descending artery, but this is only a small mass of myocardium. The EKG appearance of previous myocardial infarction, indicating multiple other medical problems as listed above the chart.

It appears that she does not wish to proceed with the surgery at this time, and if such surgery is not

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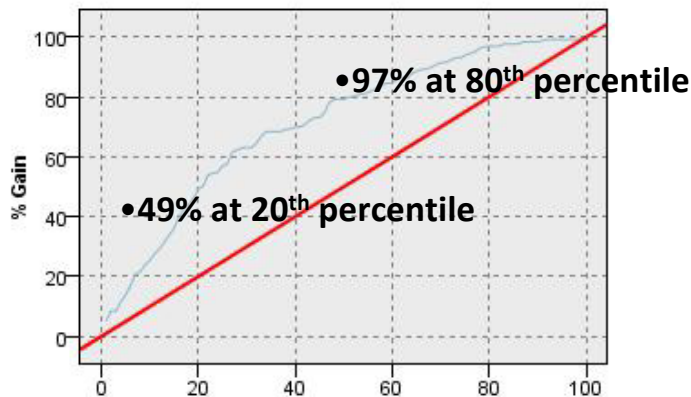
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The Data We Thought Would Be Useful ... Wasn't

- 113 candidate predictors from structured and unstructured data sources
- Structured data was less reliable than unstructured data – increased the reliance on unstructured data

New Unexpected Indicators Emerged ... Highly Predictive Model

- 18 accurate indicators or predictors



Predictor Analysis	% Encounters Structured Data	% Encounters Unstructured Data
Ejection Fraction (LVEF)	2%	74%
Living Arrangements	<1%	73% (100% Accurate)
Assisted Living	0%	13%

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IBM Watson for Healthcare



Leverage learned knowledge with QA-style interactions for clinical applications such as diagnosis

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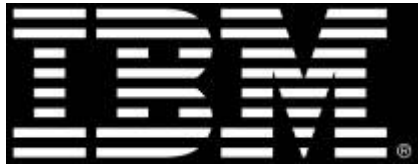


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Thank you

