Uncovering Value in Healthcare Data with Cognitive Analytics

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Conflict of Interest

Christine Livingston
Ken Dugan

Has no real or apparent conflicts of interest to report.
Agenda

• Introductions
• Healthcare Analytics Challenges
• Introduction to Cognitive Solutions
• Impact of Cognitive Solutions
• Example of a Cognitive Platform
• Client Successes
Learning Objectives

• Identify emerging trends and challenges in healthcare data management and analytics
• Evaluate the application of cognitive solutions in the healthcare industry
• Show how cognitive analytics is addressing common data challenges in healthcare
• Demonstrate how cognitive solutions can help organizations achieve the Triple Aim
Introductions

Christine Livingston, Perficient

Christine Livingston leads Perficient’s IBM Watson practice, combining a background in analytics, unstructured content management, and case management to architect and deliver Watson solutions. Leveraging Watson with a background in engineering, Christine helps healthcare organizations analyze complex problems to uncover hidden insights and trends.

Ken Dugan, IBM

The IBM Watson Channel team was introduced in February 2015 with Ken Dugan as the worldwide leader for solution providers. Ken was also part of the original team when the IBM Watson Group was first introduced in January 2014. Prior to joining The Watson Group, Ken was a solutions architect and account executive and for IBM’s Enterprise Content Management Group.
Healthcare Analytics Trends

#1 Integrate clinical and claims data to enable population health management insight
Healthcare Analytics Trends

#2 Leverage cross-continuum data analysis for improved patient care and outcomes
Healthcare Analytics Trends

#3 Grow enterprise intelligence to measure and improve patient and organizational health
#4 Use predictive analytics to reduce readmissions and improve outcomes

Healthcare Analytics Trends
Healthcare Analytics Trends

#5 Leverage new tools and skills to transform large volumes of data into meaningful information
Healthcare Challenges

**Information deluge**
- Medical literature doubling every few years
- Approximately 700 K new scientific articles per year
- Explosion of patient data (EHR, Fitbits, etc)

**Demand outstripping supply**
- American Society of Clinical Oncology suggests that by 2025, overall demand for medical oncology services will grow 42%
- At the same time, supply of hematologists/oncologists is projected to grow only 28%

**Patients not being offered all treatment options**
- <20% of cancer patients are offered clinical trials as a treatment option\(^1\)\(^-\)\(^2\)
- About 20% of cancer patients are eligible for a clinical trial; yet, trial participation is at about 3%
- Takes up to 15 years for latest evidence to be fully adopted

**Patients expect to participate in decision making around their care**
- Fewer than half of patients receive clear information on the trade-offs for their treatments and are satisfied with their level of control in medical decisions
New research and advances in medicine increase the complexity of care and research

On a daily basis clinicians are challenged with...

- Understanding the patient condition: given disparate sources and varying completeness
- Formulating treatment options: based on latest guidelines and medical literature
- Selecting personalized treatment plans: based on co-morbidities, conditions, contraindications, side effects for a patient’s specific clinical attributes

On a daily basis researchers are challenged with...

- Staying up-to-date on medical literature: like rapidly increasing volume of medical literature
- Exploring and uncovering novel connections: looking across scientific domains for new relationships between diseases, genes and drugs
- Generating new insights for future research: to develop valid hypotheses with the potential to lead to groundbreaking discoveries
Today we’re in the midst of an information revolution

Health data will grow
99%
88%
unstructured

Insurance data will grow
94%
84%
unstructured.

80% of this data has been “invisible” to computers, and therefore useless to us. Until now.

Due to this growth in data the cognitive solutions market is expected to reach $13.7 billion, globally, by 2020.

- Allied Market Research -
Transforming data into knowledge is critical for achieving the Triple Aim

- Improving the patient experience of care (including quality and satisfaction)
- Improving the health of populations
- Reducing the per capita cost of health care
Expertise matters more today than ever before
Cognitive systems combine data, information and expertise

- Organized Data
- APIs

- Improve your processes and operations
- Create better products
- Enable new kinds of engagement
- Leverage expertise
- Enable new business models
Three capabilities that differentiate cognitive systems from traditional programmed computing systems

- Understanding
- Reasoning
- Learning
Cognitive systems are creating a new partnership between humans and technology

Humans excel at:
- COMMON SENSE
- MORALS
- IMAGINATION
- COMPASSION
- ABSTRACTION
- DILEMMAS
- DREAMING
- GENERALIZATION

Cognitive Systems excel at:
- LOCATING KNOWLEDGE
- PATTERN IDENTIFICATION
- NATURAL LANGUAGE
- MACHINE LEARNING
- ELIMINATE BIAS
- ENDLESS CAPACITY
The evolution toward cognitive computing

There is a natural and cumulative evolution from basic search, through advanced NLP, to cognitive computing ... all with the goal of delivering information and scaling expertise.
How can we help more patients?

System smarts helps the user to...

...find relevant data

...and surface relevant relationships...

...and "shapes" it...

...system applies analytic and cognitive models...

...user applies experience and gut feel...

I've got the answer. I know what to do. I've made the decision.

...for the user to interact with and reshape...

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Building blocks to cognitive computing

- **Search**
  - Explore and present relevant data and analytics
  - Consolidate data silos

- **Analyze**
  - Analyze unstructured data to reveal new insights
  - Uncover trends and patterns hidden in unstructured content

- **Interpret**
  - Interpret information with APIs

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Cognitive Exploration
Information, analytics and cognitive insights presented in context

- Question & Answer service enables the user to ask natural language
- User Modeling service provides the user with a more detailed profile of the client
- Analytics, in context
- Activity feed for up-to-the-moment information

Data-driven alerts
Collaboration and information sharing
Data from enterprise systems such as CRM, DBMS, CMS and SCM
Content analytics to reveal insights from unstructured data
### Content Analytics uses Natural Language Processing

Provides the “why” behind the “what”

<table>
<thead>
<tr>
<th>Structured Data Analytics</th>
<th>Content Analytics tells us Why is it happening?</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 percent increase in congestive heart failure patients’ readmission rate</td>
<td>Missed medical facts buried in doctors’/patient notes the indicate relationship of age to readmission</td>
</tr>
<tr>
<td>Claims payouts over reserve by 8 percent</td>
<td>Missed suspicious information in description claims submitted</td>
</tr>
<tr>
<td>Decrease in arrests over the past six months as the crime rate slowly rises</td>
<td>Resources redeployed incorrectly due to unrecognized patterns in crime reports</td>
</tr>
<tr>
<td>Sales missed because of out-of-stock inventory</td>
<td>Customers provide negative sentiment when product out of stock</td>
</tr>
</tbody>
</table>
Enable cognitive computing features in apps
Leverage APIs to extend existing healthcare applications

AlchemyLanguage, Concept Insights, Dialog, Document Conversion
Language Translation, Personality Insights, Retrieve and Rank, Natural Language Classifier
Text to Speech, Speech to Text, AlchemyVision, Tradeoff Analytics, AlchemyData News
Unlock the value of information

Cognitive Analytics

- Analyzes structured & unstructured data—in place
- Unique indexing
- Unlimited scalability
- Advanced data asset navigation
- Pattern clustering

- Contextual intelligence
- Text analytics & mining
- Secure data integration
- Query transformation
- Easy-to-deploy big data applications
- User-friendly interface

Provide unified, real-time access and fusion of big data unlocks greater insight and ROI

Improve customer service & reduce call times
Increase productivity & leverage past work increasing speed to market
Analyze customer analytics & data to unlock true customer value
Identify areas of information risk & ensure data compliance

Create unified view of ALL information for real-time monitoring
Leading healthcare organizations recognize the promise of cognitive analytics
The need
This Hospital System strives to reduce the occurrence of high cost Congestive Heart Failure (CHF) readmissions by proactively identifying patients likely to be readmitted on an emergent basis.

The solution
Cognitive analytics will help to better target and understand high-risk CHF patients for care management programs by:
• Utilizing natural language processing to extract key elements from unstructured History and Physical, Discharge Summaries, Echocardiogram Reports, and Consult Notes
• Leveraging predictive models that have demonstrated high positive predictive value against extracted elements of structured and unstructured data
• Providing an interface through which providers can intuitively navigate, interpret and take action

The benefits
• They will be able to proactively target care management and reduce re-admission of CHF patients.
• Teaming unstructured content with predictive analytics, Seton will be able to identify patients likely for re-admission and introduce early interventions to reduce cost, mortality rates, and improved patient quality of life
A Healthcare and University Partnership
Unlocking Biomedical informatics answers

The need
Existing Biomedical Informatics (BMI) resources were disjointed and non-interoperable, available only to a small fraction of researchers, and frequently redundant. No capability to tap into the wealth of research information trapped in unstructured clinical notes, diagnostic reports, and more.

The solution
Cognitive analytics to leverage structured and unstructured information by:
• Extracting key elements from clinical notes, patient notes and records and other unstructured content
• Quickly processing and analyzing huge volumes of structured and unstructured data

The benefits
• Researchers now able to see new trends, patterns and find answers in days instead of weeks or months eliminating manual methods also enables new grant revenue
• Researchers can quickly answer key questions previously unavailable. Examples include Does the patient smoke?, How often and for how long?, If smoke free, how long? What home medications is the patient taking? What is the patient sent home with? What was the diagnosis and what procedures performed on patient?
The need
Medicare and Medicaid will begin charging penalties for what they see as excessive hospital readmissions. For many hospitals facing readmission rates for heart conditions as high as 25 percent, those Medicare and Medicaid readmissions alone will total more than USD1 million in fines. One hospital system in the United States realized that a key to reducing readmissions was to ensure that patients follow up on tests and treatments after discharge, staying healthier and reducing the likelihood of further adverse health events such as infection and relapse.

The solution
• Hospital staff can now use the solution to analyze unstructured text for key discharge terminology, convert that text into structured data, and generate alerts and reports for patients’ primary care doctors and other caregivers
• Clearer data and better communication between health professionals helps ensure that patients keep their follow-up appointments and complete their post-discharge treatment
• Not only can patients stay healthier, but the hospital can also save millions of dollars on costly hospital readmissions.

The benefits
• Expected to prevent approximately USD1.1 million in Medicare and Medicaid penalty fines in areas of treatment with high readmission rates
• Expected to significantly reduce the overall number of hospital readmissions
• Expected to help improve recovery speeds by helping more patients follow up on treatments after discharge
• Expected to improve communications between staff, patients and follow-up caregivers by converting free text into searchable, reportable structured data

A Healthcare Organization Implements Proactive Patient Care
Questions

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