Transforming the Health & Life Sciences Ecosystem Through Advanced Analytics

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The Industry Problem

Health care insights today…

• Are hard to get because we don’t manage our data well
• Mainly describe issues / risks that have already happened
• Only show a fraction of the picture (telling “what” without perspective on the factors producing “what”)
• Are not easily understandable by everyone
• Are often not actionable or connected to workflow
• Are commonly derived from unrepresentative populations
• Do not differentiate between “good to know / do” vs. “important to manage / act”
• Are confounded with uncharacterized hypotheses and biases
• Take way too long to obtain

But other than that, they are fine.
Growing up is hard to do…

Maturity of Insight

Maturity of Action

COUNT  FACTOR  MODEL  PREDICT
Example: Health Outcomes Analysis
What Happens with “Patients Like This One”
Example: Population Health

Monitor

- What bad things actually happen to these patients?
- How bad?
- How effectively are we managing risk?

Assess

- What bad things do we expect to happen to these patients?
- How bad?
- How do we expect to manage risk?

Adverse Experiences
- Care Pathway & Protocols
- Performance Management
- Health Outcomes
- Utilization

Risk Segmentation & Stratification
- Care Setting
- Care Coordination & Transition
- Benefit Design
- Total Cost of Care

What actually was important?

What may be important?
Learning Health System “Learning Model”

- **COGNITIVE PHASE**
  - COLLECT: Gather, Aggregate
  - OBSERVE: Describe, Profile, Report

- **ASSOCIATIVE PHASE**
  - SYNTHESIZE: Factors, Models, Relationships, Patterns

- **AUTONOMOUS PHASE**
  - PLAY: Explorations, Novel data, What-ifs, Discovery, New Research
  - EXTEND: New data, Modeling, Integration, Simplification
  - INFLUENCE: Iteration, Implementation, Automation, Validation
  - OPTIMIZE: Refactoring, Tuning, Maintenance

Derived from Fitts & Posner’s 3 Stages of Cognitive Learning (1967)
Example

Bundled Payment Simulation

• Are our assumptions about costs vs. care complexity true?
• Under what clinical conditions do we see utilization variability?
• Where do we see differences in readmissions patterns?
• How does SNF utilization factor in to observed patterns?

Insight include:

• Highest variability can exist in the simplest DRGs, not the most complex
• Clinical complexity is not just represented by the DRG – it is in how practitioners use the DRG, regardless of underlying clinical complexity
• Variability is often seen at care transitions
Moving Towards High Performance … what does it look like?

<table>
<thead>
<tr>
<th></th>
<th>Travel for hours at extreme speeds</th>
<th>Win asymmetrical conflicts</th>
<th>Tell me the future</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceeds Expectations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Reliably</strong></td>
<td>All season</td>
<td>Every battle</td>
<td>Every hour of every day</td>
</tr>
<tr>
<td><strong>On Demand</strong></td>
<td>For every event</td>
<td>Whenever the order comes</td>
<td>Regardless of the weather itself</td>
</tr>
<tr>
<td><strong>Acceptable Costs</strong></td>
<td>Using limited funding from sponsors and fans</td>
<td>Without unacceptable loss of life</td>
<td>For any level of consumer SES</td>
</tr>
<tr>
<td><strong>Despite Variability</strong></td>
<td>No matter the tracks, cars, &amp; drivers involved</td>
<td>No matter what the enemy does</td>
<td>No matter what sort of pattern</td>
</tr>
</tbody>
</table>
Projects vs. Products

Most health industry analyses are conducted as a PROJECT

- Stakeholders are project area experts
- Effort is focused on predefined questions
- Work is relevant to project team
- Timeline is project driven
- Data definitions are project specific
- Data structured for single use
- Little-to-no analytical code reuse
- Release available to project stakeholders

EADS work is managed more like a PRODUCT

- Stakeholders are functional experts
- Questions are not predefined
- Work must be relevant to multiple customers
- Timeline is engineering driven
- Data definitions are enterprise-wide
- Data is structured for broad re-use
- Analytical models are built for multiple projects
- Release available to entire enterprise
The Building Blocks

- Consulting Services
- Overall Governance
- User Enablement
- Knowledge Management
- Agile Disciplines
- Advanced Analytics Methods
- Data Governance
- Product Engineering
Hypothesis- or Data-Driven?

**THEORETICAL FRAMEWORK**
- Data Investigation
- Testable Hypothesis
- Empirical Study
- Hypothesis

**EMPIRICAL STUDY**
- Data Investigation
- Testable Hypothesis
- Empirical Study
- Hypothesis

**HISTORICAL VIEW**
- Theoretical Framework
- Hypothesis
- Empirical Study
- Data Investigation

**ALTERNATE VIEW**
- Data Investigation
- Testable Hypothesis
- Empirical Study
- Hypothesis
- Theoretical Framework
What are we missing?

SCOPE
- global
- multi-institutional
- institutional
- cohorts
- individual

CONSTRAINTS
- controlled
- semi-controlled
- real world

QUALITY IMPROVEMENT

CLINICAL RESEARCH

PRACTICE-BASED EVIDENCE
Summary

We are becoming a data-driven industry

• IT and data are at the core of both processes and decisions

Historical approaches to data and insights (descriptive, retrospective views of limited data sources) are insufficient to support the complexity of high performance, 21st century medicine and decision making

• outcomes vs. costs
• standardized vs. personalized medical treatments

Modern health analytics are characterized by:

• collaborative, data-driven, predictive, patient-centered, and real-time capabilities
• combined perspectives of outcomes, costs, risks, quality, behavioral, and other dimensions

FOR MORE INFORMATION

Twitter
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Book
Health Analytics: Gaining the Insights to Transform Health Care, Jason Burke, Wiley Publishing, 2013