The Age of Big Data and the Power of Watson

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There’s a **gap** between what we know and what we do…

45.1% of medicine is not evidence based;¹ it takes **17 years** to translate science to practice²

It’s **humanly impossible** to keep up with the knowledge and the data…

Doctors would have to read approximately **29 hours** each workday to keep up with new professional insights;² **80%** of data is unstructured and each of us will produce **300M books** of health-related data in our lifetime

Healthcare Disruption is Underway

24 months
Frequency at which electronic healthcare data doubles\(^1\)

150+
Exabytes of available healthcare data today\(^2\)

80%
Of data is unstructured\(^3\)

$7.2 trillion
In global healthcare spending; 10.6% of the global GDP\(^4\)

90%
Of the world’s data has been created in the past 2 years. \(^5\)

75%+
Percentage of patients expected to use digital health services in the future\(^4\)
Data per individual

70% Social and Environment And Behavioral
20% Genomics Factors
10% Clinical Factors

1100 Terabytes Generated Per lifetime
6 Terabytes Per lifetime
0.4 Terabytes Per lifetime

Environment
Genetics & Family History
Healthcare Access & Experience
Socioeconomic Standing
Behavior & Habits
Social Influences

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The Challenges of Big Data

Keeping up

There are 100,000+ clinical trials running in parallel.

A patient will generate >12 TB of personal health data in a lifetime (300 million books).

Medline: 424 million published articles in 5600 journals
1.8 million new articles published annually

80% Unstructured

A typical high-need patient has a 100+ page electronic health record.

Text where meaning is often derived from context

Images: X-rays, sonograms, electrocardiograms, magnetic resonance images, and mass spectrometry results

Noisy

Problems of scale: finding the signal in the noise when its buried in millions of pages across multiple silos

Humans must collect, organize data and evaluate evidence

Introduces cognitive bias

1. Journal of Clinical Oncology, Talk about Health Blog, Sept 2011
Five V’s of Big Data

Volume
Variety
Veracity
Velocity
Value
Our mission

We, Watson Health, aspire to improve lives and give hope by delivering innovation to address the world’s most pressing health challenges through data and cognitive insights.
What is cognitive?

**Understands**
Watson can read & understand documents & data – both structured & unstructured – at a massive scale.

**Reasons**
Watson searches & analyzes data, returning evidence-based insights.

**Learns**
Decisions made by leading experts feed the engine. Watson learns & improves over time.
Humans excel at:

- Common Sense
- Dilemmas
- Morals
- Compassion
- Imagination
- Dreaming
- Abstraction
- Generalization

Cognitive systems excel at:

- Natural Language
- Pattern Identification
- Locating Knowledge
- Machine Learning
- Eliminate Bias
- Endless Capacity
Harrow Council
Delivering the full range of business applications for health and social care

Cognitive Insights
Know Your Client
Population Health
Differential Response
Program Integrity
Cost Trends and Projections

Care Management
Intake and Assessment
Case Management
Extend care team collaboration
Investigation and appeals

Case Manager

Agency Director

Benefit Management
Screening
Eligibility and Entitlement
Capturing chances of circumstances
Payment management

Citizen and Families
A Comprehensive Approach to Health

**Economic Health**
- Retirement
- Disability
- Employment
- Migration
- Education

**Individual Health**
- Healthcare
- Social Care
- Insurers
- Researchers

**Employer Health**
- Injury Compensation
- Workforce Development
- Sickness & Presentism
- Rehabilitation
- Back to Work

**Community Health**
- Social Care
- Child & Adult Protection
- Disability Supports
Watson for Patient Safety*

**Potential Healthcare Benefits**
- Identify AEs within ICSRs and literature automatically and systematically using NLP
- Scale AE detection with improved consistency, quality and accuracy

**Potential Healthcare Benefits**
- Detect potential AEs with greater accuracy and precision through automation
- React sooner with more information through accelerated signal detection

Adverse Event detection within literature & spontaneous reports

Signal detection across many data sources

Dashboard and Alerts for Safety Signals

*Watson for Patient Safety is currently in development*
Imagine a World Where…

Researchers can:

- access structured and unstructured data from disparate sources in seconds
- quickly uncover novel patterns and connections across domains and therapeutic areas
- focus their time and resources investigating selected targets supported by evidence

Which may lead to...

- more efficient and informed decision-making
- effective drugs reaching patients sooner

The Goal of Watson for Drug Discovery is to Make This a Reality
Watson for Drug Discovery looks broadly across public, licensed and client data to unlock hidden information and deliver insights.
Case study: accelerating discovery in oncology

• There is data overload of 100,000 new cancer articles published per year. On average, one p53 kinase was discovered per year over the past 35 years.

• Using IBM Watson for Drug Discovery, Baylor College of Medicine researchers were quickly alerted to targets for research based on data and evidence from thousands of scientific articles.

Watson Value:

• In the last 30 years, scientists have uncovered 28 p53 kinases; the Baylor team found 6 potential new kinases that target p53 in around 30 days.

30 years
28 new proteins targets identified for cancer research

30 days
6 potential new proteins identified for cancer research using Watson for Drug Discovery
Watson is creating a new partnership between humans and technology to help improve relationships by enhancing, scaling, and accelerating knowledge.
Thank you!

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