The Role of Data and Artificial Intelligence in Improving Health

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Watson Health Progress

Over 13,000 Clients and partners

115,000 People Touched by Watson Health cognitive offerings

4 Companies Integrated into One Watson Health

210M Clinical and claims data records

40+ Peer reviewed publications, posters and, abstracts for Watson Health’s cognitive offerings

2,500 Patents Granted or pending in healthcare and life sciences

<400 Granted or pending for Watson Health

Quarterly data refresh rate
<table>
<thead>
<tr>
<th>Data Explosion</th>
<th>Physician shortage and burnout rising</th>
<th>Medical images growing and taking valuable time</th>
<th>Managing vulnerable populations is essential</th>
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<tbody>
<tr>
<td>Medical data is expected to <strong>double every 73 days</strong> by 2020.</td>
<td><strong>12.9M</strong> Expected global shortage of healthcare workers by 2035.</td>
<td><strong>60 billion</strong> Medical images generated in the US in 2015.</td>
<td><strong>2 billion</strong> The number of people over the age of 60 by 2050.</td>
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<tr>
<td><strong>300M books</strong> How much health-related data each person will generate in a lifetime.</td>
<td><strong>½ of the workday</strong> Primary care physicians spend nearly 6 hours interacting with EHR’s during and after clinic hours.</td>
<td><strong>64 percent</strong> Time radiologists spend on non interpretive tasks.</td>
<td><strong>80 percent</strong> Medicare beneficiaries have at least one chronic illness, with 20 percent of them having four or more.</td>
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Our Approach: Turning Data into Actionable Insights

Robust Data Ingestion
Unified Data Model for Healthcare
Reporting Framework
Data Publishing
Cognitive and API Services

Clean, Curated Data
Flexible Analytics
Actionable Insights

30+ years
healthcare information experience in making the data analytic ready
Our Approach: Leveraging the IBM Cloud for Health

Industry and process specialization
Depth of Ecosystem Collaboration
Enterprise Scale Cognitive Platform
Public, Private, Multimodel

Built for Health
HIPAA
GxP
GDPR*

Built for Security

Data
(Public, Private, Partner)

IBM Provided Data
Publicly Sourced Data
Partner Provided Data
Private Client Data

*GDPR regulations begin in May
Our Approach: The most AI Services in Healthcare
Our Approach: Creating Innovative Cognitive Solutions with Watson

- **Oncology & Genomics**
  - Watson for Oncology
  - Watson for Genomics
  - Watson for Clinical Trial Matching
  - Watson for Patient Safety

- **Life Sciences**
  - Watson for Drug Discovery
  - Marketscan CED
  - IBM Clinical Development

- **Government Health and Human Services**
  - Watson Care Manager*
  - Social Program Management
  - Next Generation Program Integrity

- **Imaging**
  - Watson for Clinical Imaging
  - Patient Synopsis
  - Care Advisor

- **Value-Based Care**
  - Flexible Analytics**
  - Watson for Benefits
  - Project Gemstone

*Formerly Health and Human Services **Formerly Next Generation Payor/Provider

All statements regarding IBM’s future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.
Managing Care and Improving Lives

High-cost, high-need populations typically make up 20% of the population yet consume 80% of costs.

Uses in Behavioral Health/Social Care:
- Opioid addiction
- Aging populations
- Child welfare services
- Food assistance
- Specialty Courts

147,000 Lives Managed

Accelerating the Pace of Drug Discovery

Watson for Drug Discovery

• Using Watson for Drug Discovery to research Immuno-oncology

• Study findings published in *Acta Neuropathologica*
• Watson ranked 1,500 proteins for their predicted association with ALS (Amyotrophic Lateral Sclerosis)
• Eight of the top 10 ranked proteins proved to be linked to ALS, five proteins had never before been linked to ALS
The Evolution of Watson in Oncology

**Reaching More Patients**
Cumulative Oncology Offerings

- **Today:** 45K+
- **2016:** 9K
- **2015:** 1.8K

**Increased Deployment in Hospitals and Health Organizations**
Cumulative Oncology Offerings

- **Today:** 155
- **2016:** 8
- **2015:** 1

**Additional Cancers Trained**
Watson for Clinical Trial Matching (CTM) and Watson for Oncology (WfO)

- Breast
- Lung
- Colon
- Rectal
- Gastric
- Cervical
- Ovarian
- Prostate
- Bladder
- Liver
- Esophageal
- Thyroid
- Endometrial

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Clinical Evidence: Concordance with Watson for Oncology

The *Annals of Oncology* published a full study led by oncologists at Manipal Hospitals in India studying **Watson for Oncology**’s concordance in breast cancer cases

Manipal’s multidisciplinary tumor board found Watson for Oncology was concordant with their own treatment decisions in 93% of 638 breast cancer cases

Clinical Evidence: Operational Efficiency with Clinical Trial Matching

During a 16-week trial period, data from 2,620 visits by lung and breast care patients were processed in the Clinical Trial Matching (CTM) system.

Watson for Clinical Trial Matching successfully demonstrated the ability to expedite patient screening for clinical trial eligibility, reducing processing time from 1 hour and 50 minutes to 24 minutes.

Increased efficiency

(Compared to manual work by a clinical trial coordinator at Highlands Oncology Group)

- 78% Reduced pre-screening wait time
- 94% Omitted 94% of non-matching patients automatically

Clinical Evidence: Concordance & Additional Treatment Recommendations with Watson for Genomics

Published in *The Oncologist*, a case study with UNC Lineberger Comprehensive Cancer Center compared the human tumor board and *Watson for Genomics’* analysis of tumor sequencing data:

1,018 patients analyzed

Watson was >99% accurate in identifying tumor board findings

Watson identified additional options in 324 patients (33%) of the patients

96 of whom were not previously identified as having an actionable mutation¹

IBM’s Data Principles

**Purpose**
“AI” is for augmenting intelligence, giving insights and supporting what humans do, not replacing them

**Transparency**
Your data is your data; transparency about how our systems are trained and the data & knowledge used to train them

**Skills**
AI systems are trained by and supporting human professionals, leading to “new skills” and “new collar” jobs
Our Mission

To improve lives and give hope by delivering innovation to address the world’s most pressing health challenges through data and cognitive insights.