The Role of Data and Artificial Intelligence in Improving Health

David Cole  
*Innovation Lead Europe, IBM Watson Health*  
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“eHealth – Transforming Healthcare in Disruptive Times”
Cognitive System Attributes

Understanding
Measured by the ability to interpret and derive actionable information and knowledge

Reasoning
Ability to link together data and knowledge elements, draw connections from information resources and solve problems using the information

Learning
Extent the system improves over time with exposure to new data

Interacting
Recognition of and leveraging available content to fit naturally in workflow and provide interactions that work best for users
Growing data volume and complexity demands a new approach

We are Here

2010

2020

44 zettabytes

Sensors & Devices

Medical Images

Images/Multimedia

Natural Language

Enterprise Data

IDC, Digital Universe Study, 2014
# Data Explosion and Industry Challenges Creating Opportunities for AI

## Data Explosion

- Medical data is expected to **double every 73 days** by 2020<sup>1</sup>
- **300M books** How much health-related data each person will generate in a lifetime<sup>2</sup>

## Physician shortage and burnout rising

- **12.9M** Expected global shortage of healthcare workers by 2035<sup>3</sup>
- **½ of the workday** Primary care physicians spend nearly 6 hours interacting with EHR’s during and after clinic hours<sup>4</sup>

## Medical images growing and taking valuable time

- **60 billion** Medical images generated in the US in 2015<sup>5</sup>
- **64 percent** Time radiologists spend on non-interpretive tasks<sup>6</sup>

## Managing vulnerable populations is essential

- **2 billion** The number of people over the age of 60 by 2050<sup>7</sup>
- **80 percent** Medicare beneficiaries have at least one chronic illness, with 20 percent of them having four or more<sup>8</sup>

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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

Annotator for Clinical Data

Insights for Patient Data

Patient Similarity

Medical Insights
Our Approach: Creating Innovative Cognitive Solutions with Watson

- **ONCOLOGY & GENOMICS**
  - Watson for Oncology
  - Watson for Genomics
  - Watson for Clinical Trial Matching

- **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 objections only.
The Evolution of Watson in Oncology

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

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

**Reaching More Patients**
Cumulative Oncology Offerings

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

**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

- **2016 WfO Only:**
  - Breast
  - Lung
  - Colon
  - Rectal
  - Gastric
  - Cervical
  - Ovarian
  - Prostate
  - Bladder

- **Today (WFO/CTM):**
  - 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 multidiciplinary tumor board found Watson for Oncology was concordant with their own treatment decisions in 93% of 638 breast cancer cases.

93%

Treatment concordance with Manipal Hospital’s multidisciplinary tumor board for breast cancer patients

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 mutation

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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 humans and support human professionals, leading to “new skills” and “new collar” jobs.
“In the not too distant future not using AI or a Decision Support Systems will amount to medical negligence!”

Demis Hassabis
Google DeepMind Founder
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
David Cole
Innovation Lead Europe
+44 (0) 7802 475522
davidjmcole@uk.ibm.com
76/78 Upper Ground, South Bank, London, SE1 9PZ