



Big Data Applications in Healthcare

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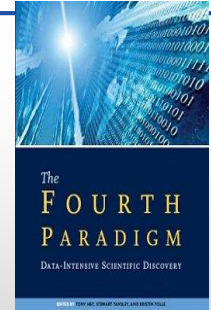
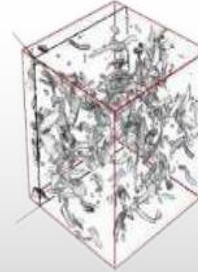
PYA Analytics, LLC

- **Advanced analytics company headquartered in Knoxville, Tennessee**
- **History:**
 - **Oak Ridge National Laboratory**
 - National Security and Science
 - CMS Knowledge Discovery Infrastructure (KDI)
 - **Healthcare Clients**
 - Hospitals
 - Provider Groups
 - Research Institutes
 - CMS

The changing nature of research



$$\left(\frac{\dot{a}}{a}\right)^2 = \frac{4\pi G\rho}{3} - K \frac{c^2}{a^2}$$



Experiment

Thousand
years ago

*Description of
natural
phenomena*

Theory

Last few
hundred years

*Newton's laws,
Maxwell's
equations...*

Computation

Last
few decades

*Simulation of
complex
phenomena*

Data

Today and the Future

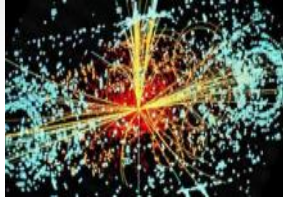
*Knowledge Discovery
from Disparate and
Dynamic Data*

The Data Explosion

Experiments



Simulations



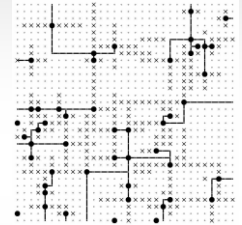
Archives



Social Media



Sensors



The Challenge
Enable Discovery

Petabytes
Exabytes
Zettabytes

The Response

Big Data = Volume, Variety, Velocity



The Business of Big Data

- **\$300 billion** annual value of big data for the US health care system, two-thirds of which would come in reduced expenditures (McKinsey).
- **\$165 billion** worth of value for big clinical data (McKinsey).
- **966 petabytes** data stored by discrete manufacturing companies in the US during 2009; 848 petabytes of data stored by government in the same year (McKinsey).
- By 2020, IT departments will have 10 times more servers and 50 times more data to look after than they do now.

Data Analytics Expertise is in High Demand

- The US will face shortages of:
 - between **140,000** and **190,000** individuals with “deep” analytical skills” capable of working with very large data sets
 - between **300,000** and **400,000** skilled technicians and support staff
 - about 1.5 million “data-savvy” managers and analysts.
(McKinsey)

Transparency of Data

The screenshot shows the homepage of the DATA.GOV / HEALTH community. At the top, it says "An Official Web Site of the United States Government" and "Tuesday, January 18, 2011". The main header includes the "DATA.GOV / HEALTH" logo and "Login | Sign Up" links. A large banner features the text "WELCOME TO THE HEALTH DATA COMMUNITY" and "HEALTH INDICATORS WAREHOUSE" with a "VIEW MORE" button. Below the banner is a navigation menu with links for Home, Dev, Data Tools, Apps Expo, Other Data Sites, Blogs, and Forums, along with a search bar. The main content area is divided into three sections: "Challenges" featuring the "2010 Health 2.0 DEVELOPER CHALLENGE", "What's New" with a link to "Learn about our newest high-value datasets" and a list of resources including ClinicalTrials.gov, Genetics home reference, MedlinePlus Health Topic Web Service, and PubChem, and "Recent Blog Post" with a placeholder image and text.

Community

Restore the Gulf ✓

Open Data ✓

Semantic Web ✓

Health ✓

Law ✓

Energy ✓

Education

Ocean

Research and Development

Public Safety

Human rights

+ many more...

Actions to Address How to Bring Big Data to Healthcare



- Enacted under the American Recovery and Reinvestment Act of 2009
 - Accelerate the use of Electronic Health Records (EHRs)
 - Meaningful use requirements for EHRs
- Health information exchanges
- Open Government

Home > People > Executive Moves



Brennan



RELATED CONTENT

- [Editorial: Better rules needed to boost use of big data](#)
- [Can the biosensor market deliver on its potential?](#)

CMS names first chief data officer

By Joseph Conn | November 19, 2014

The CMS has named Niall Brennan as essentially its first **Big Data** czar.

Brennan will head the new Office of Enterprise Data and Analytics at the CMS as its first chief data officer, "tasked with overseeing improvements in data collection and dissemination as the agency strives to be more transparent," according to a **CMS announcement Wednesday**.

Brennan, who has been serving as the acting director of the CMS' Offices of Enterprise Management, was appointed to the newly created position after leading various CMS data programs and initiatives at OEM.

"It's clear how much data transparency will help the country improve outcomes, control costs and aid consumer decisionmaking," CMS Principal Deputy Administrator Andy Slavitt said in the statement. "This appointment signals to the industry that there is no turning back from the healthcare data agenda. Niall Brennan will help make sure CMS leads the way."

As the CMS continues payment reforms, changing from volume-based, fee-for-service reimbursements to those focused on outcomes and coordination of care, "the need for CMS to analyze data across its multiple programs and provide greater access to this data, whether in granular or aggregate form, will only intensify," the statement said.

CMS names First Chief Data Officer...

“tasked with overseeing improvements in data collection and dissemination...”

Early Results?

**'Jaw-dropping': Medicare deaths,
hospitalizations AND costs reduced**

**[Liz Szabo](#), USA TODAY 4:51 p.m. EDT July
28, 2015**

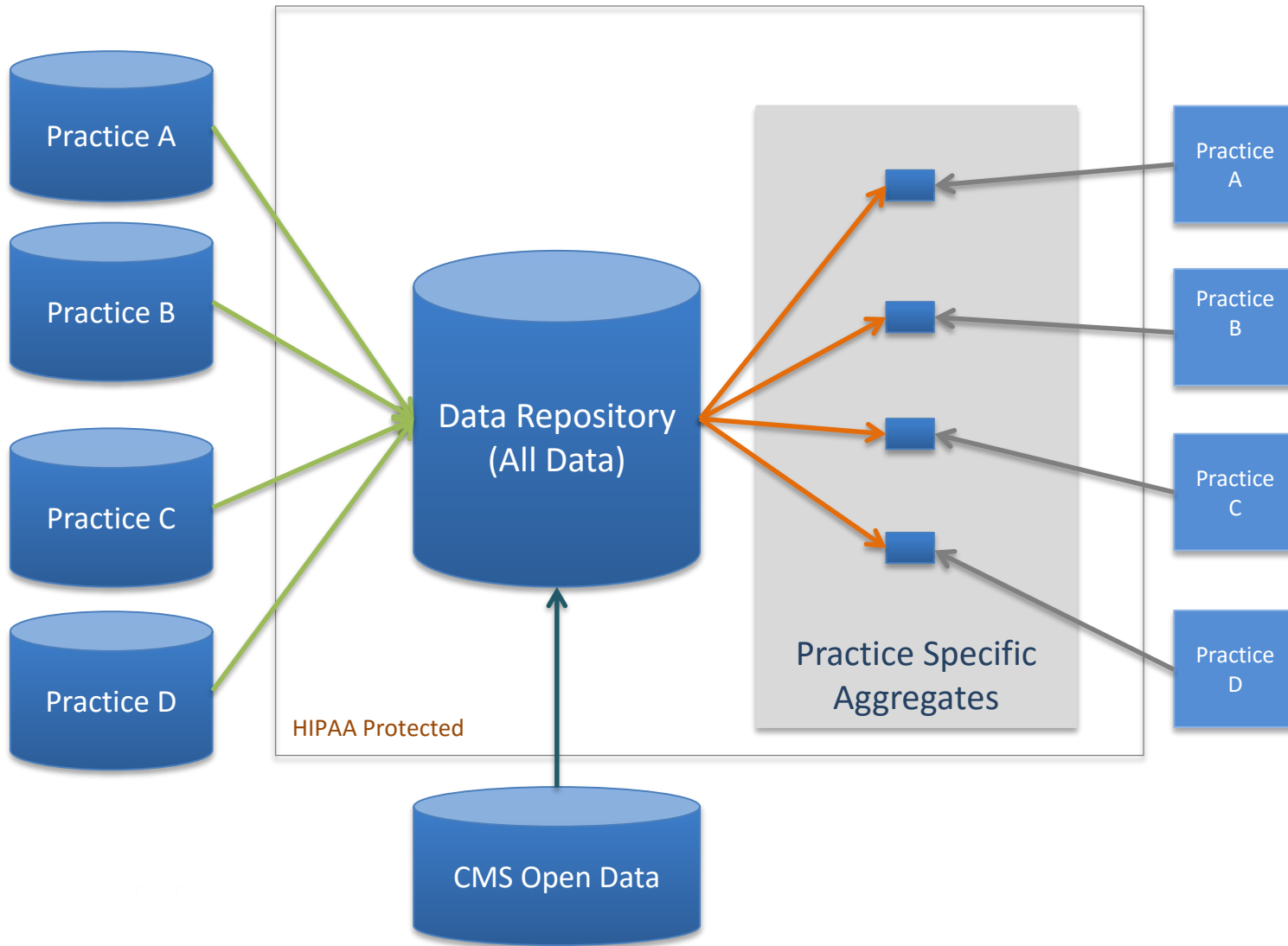
Healthcare Analytics Will Reduce Costs by Addressing Key Issues

- Unwarranted medical procedures
- Fraud, waste, and abuse
- Administrative costs
- Provider inefficiencies
- Coordinated care
- Preventable conditions

Healthcare Analytics for Improving Care

- Ability to mine wide population data to improve patients' diagnosis and outcomes
- Reduction of medical errors
- More successful drug development
- Data-driven preventive care
- Consumers of healthcare, not just patients

Data aggregation, protection and anonymity



Examples

- Market Basket Analysis
- Practice Statistics
- Medication/Drug Statistics
- Margin Calculator (EOB Data)
- Clinical Trials Candidates Discovery
- Drug Study and Outcomes Analysis
- Propensity to Pay
- Compliance Monitor

Your Physician Can Make Use of Data

Story

Visualization

Translate

