

Keynote Speaker



*Photo courtesy of the Milken
Institute*

Jay Schnitzer, MD, PhD
MITRE Corporation
Director Biomedical Sciences

Definitions of Big Data

- **3 v's: high volume, high velocity, high variety**
- **Oxford English Dictionary: “data of a very large size, typically to the extent that its manipulation and management present significant logistical challenges”**
- **Wikipedia: “an all-encompassing term for any collection of data sets so large and complex that it becomes difficult to process using on-hand data management tools or traditional data processing applications”**

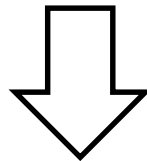
Examples of Big Data that might be useful for Cancer Research and Care

- **Clinical data (EMR)**
- **Scientific literature**
- **Omics**
 - Genomic data
 - Proteomic data
 - Metabolomic
- **Social media**
- **Communication: lay publications, print media, other**

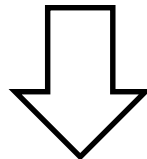
- **Heavier-than-air flying machines are impossible**
 - Lord Kelvin, president, Royal Society, 1895
- **Who the hell wants to hear actors talk?**
 - H.M. Warner, Warner Brothers, 1927
- **I think there is a world market for maybe five computers**
 - Thomas Watson, chairman of IBM, 1943
- **There is no reason anyone would want a computer in their home**
 - Ken Olson, president, chairman, and founder of Digital Equipment Corp., 1977
- **640K ought to be enough for anybody**
 - Bill Gates, 1981

Innovative Thinking

IMPOSSIBLE



IMPROBABLE

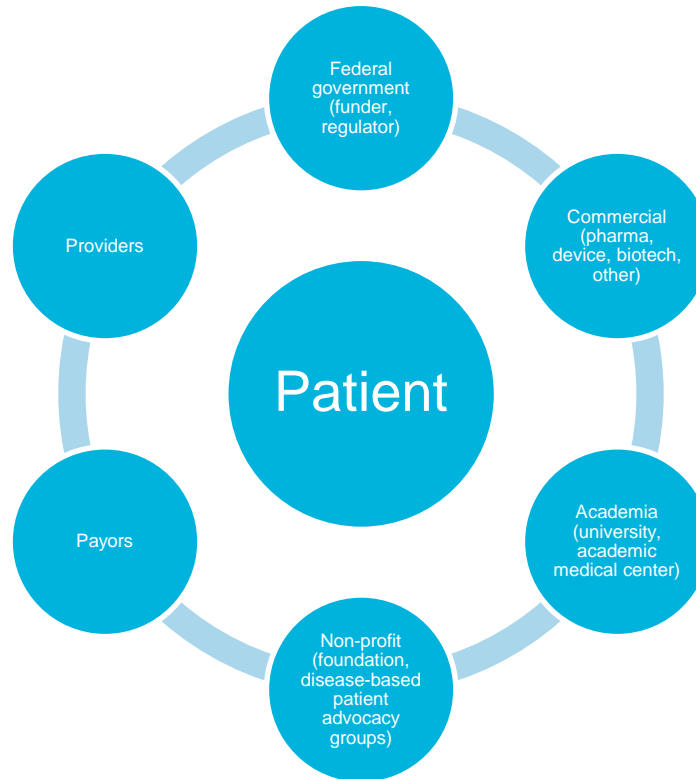


INEVITABLE

Barriers

- **The promise of big data to accelerate new cancer diagnostics and therapeutics is enormous, but can only be fully realized in the context of systems approaches to research, funding, and ultimately translating new discoveries into new products for patients**

The biomedical enterprise: A complex ecosystem



Tension in research

- **Dichotomy:**

hypothesis-driven

vs.

big data discovery approach

- **A “fishing expedition” has historically been the kiss of death in NIH study sections**

Systems approach to big data

- **Put value on analytics, not on having/owning the data**
- **Share data widely and freely, compete on analytics**
 - **After all, the data should ultimately belong to the patients**
- **Usable types of data: not just medical, clinical, or scientific**

ASIAS Members

46 Air Carriers

ABX Air	Kalitta Air
Aerodynamics, Inc.	Mesa Airlines
Air Wisconsin Airlines	Miami Air
Alaska Airlines	International
Allegiant Air	Mountain Air Cargo
Aloha Air Cargo	National Airlines
American Airlines	Northern Air Cargo
Atlas Air	Omni Air International
Cape Air	Piedmont Airlines
Chautauqua Airlines	Polar Air Cargo
CommutAir	PSA Airlines
Compass Airlines	Republic Airlines
Delta Air Lines	Shuttle America
Empire Airlines	Silver Airways
Endeavor Air	SkyWest Airlines
Envoy Air (was	Southern Air
American Eagle	Southwest Airlines
Airlines)	Spirit Airlines
ExpressJet	Sun Country Airlines
FedEx Express	Trans States Airlines
Frontier Airlines	United Airlines
GoJet Airlines	United Parcel Service
Hawaiian Airlines	US Airways
Horizon Air	Virgin America
JetBlue Airways	

2 Maintenance, Repair and Overhaul

AAR Aircraft Services
HAECO Americas (was TIMCO—Triad International Maintenance Corporation)

5 Government

AMC—Air Mobility Command
FAA
NASA
Naval Air Force Atlantic
USAF Safety Center

11 Corporate/Business

1 Academia

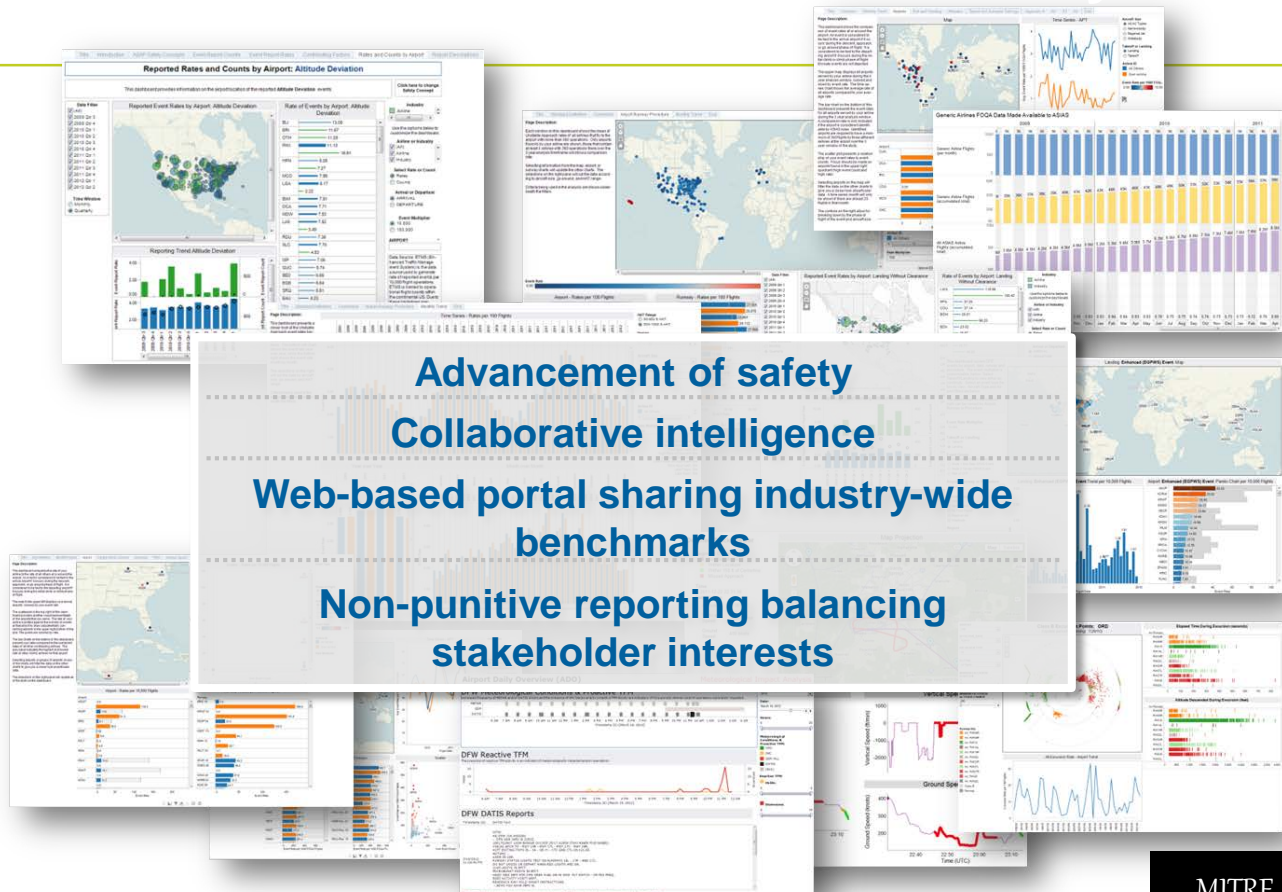
University of North Dakota

11 Industry

A4A—Airlines for America
AIA—Aerospace Industries Association
Airbus
ALPA—Air Line Pilots Association
APA—Allied Pilots Association representing Coalition of Airline Pilots Associations (CAPA)
Boeing
NACA—National Air Carrier Association
NATCA—National Air Traffic Controllers Association
RAA—Regional Airline Association
SAPA—SkyWest Airlines Pilot Association
SWAPA—Southwest Airlines Pilots' Association

*Newest Member

As of 23 February 2015



Advancement of safety
Collaborative intelligence
Web-based portal sharing industry-wide benchmarks
Non-punctive reporting balancing stakeholder interests



Biology is chemistry and physics

- **Language of chemistry and physics is mathematics (not just 1's and 0's)**
- **Future major discoveries are likely to occur at the collision of the continents of life sciences and physical sciences**

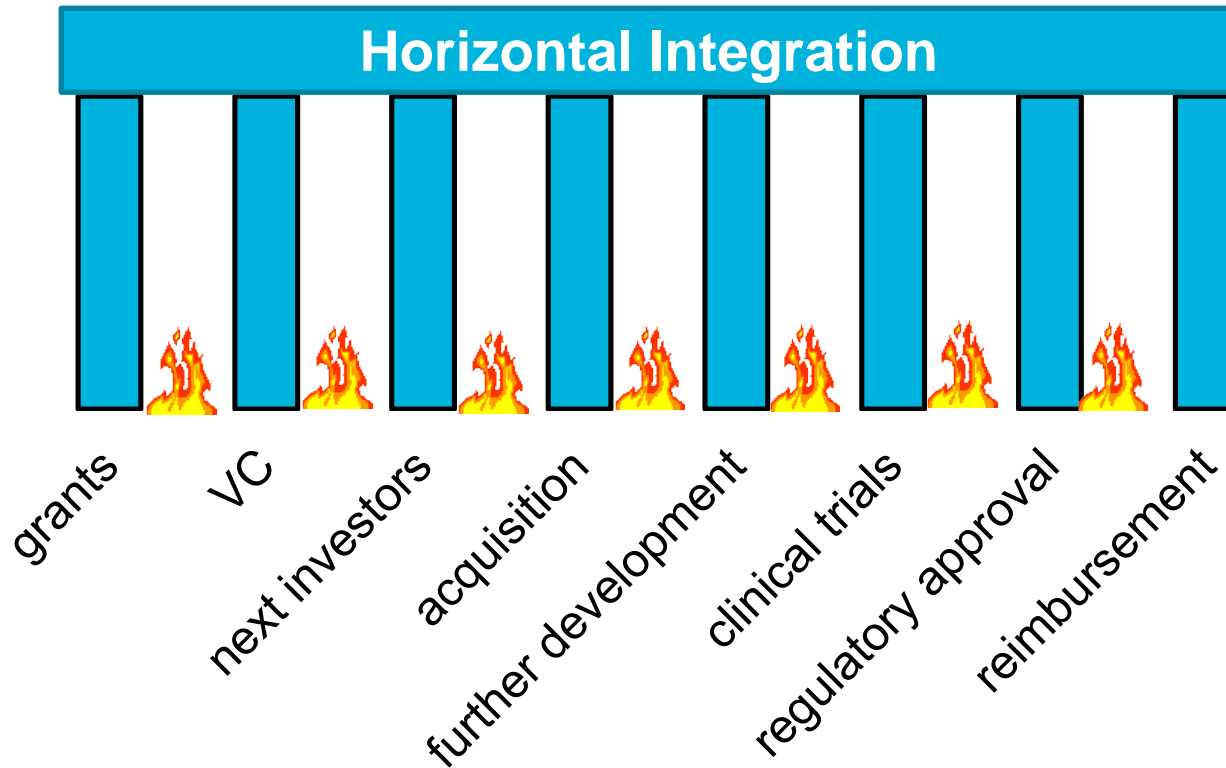
Biology is not linear, but humans are linear thinkers

- **So....we need to use systems approaches**
- **Boundaries in medicine and biology are artificial and man-made (e.g., immunology and cancer)**

Abyss

The Valley of Death

Valley of death is actually a series of deep, deadly canyons



- He failed in business in '31.
- He was defeated for state legislator in '32.
- He tried another business in '33. It failed.
- His fiancée died in '35.
- He had a nervous breakdown in '36.
- In '43 he ran for congress and was defeated.
- He tried again in '48 and was defeated again.
- He tried running for the Senate in '55. He lost.
- The next year he ran for Vice President and lost.
- In '59 he ran for the Senate again and was defeated.
- In 1860, the man who signed his name A. Lincoln, was elected the 16th President of the United States. The difference between history's boldest accomplishments and its most staggering failures is often, simply, the diligent will to persevere.

**Always do the right thing. That will
gratify some, and astonish the rest.**

- Mark Twain