





# The Power of Data

Presented by **Todd Brown**

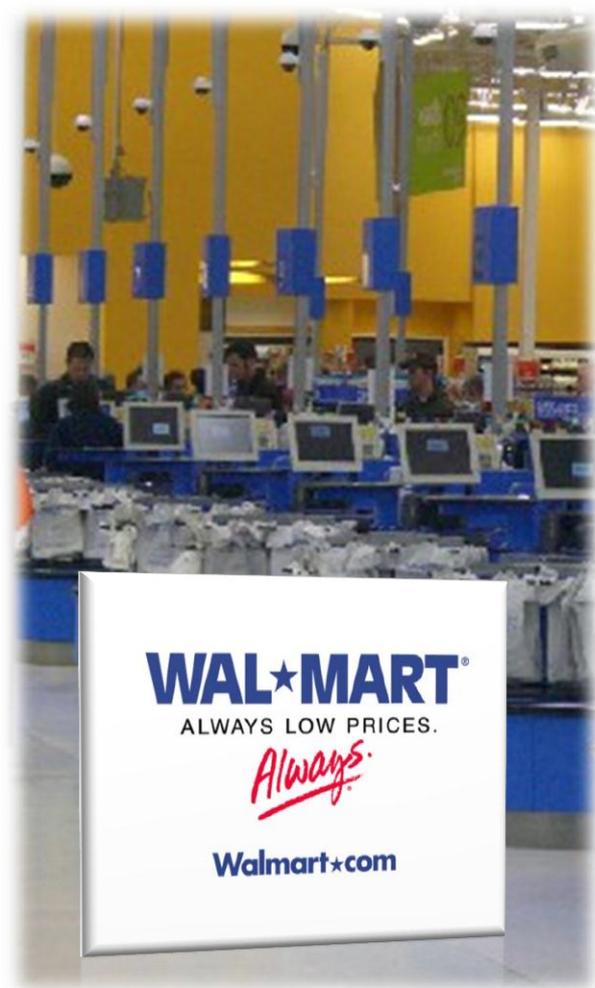
**“It is a very sad  
thing that  
nowadays there is  
so little useless  
information.”**

**Oscar Wilde - 1894**



**“Every day I wake up and ask, ‘how can I **flow** data better, **manage** data better, **analyze** data better?’”**

Rollin Ford, CIO Wal-Mart





 NYSE  
EURONEXT

# New York Stock Exchange



**VISA: 300 Million Transactions / Day**





NALCO

Refined Knowledge provides visibility into water and process systems to optimize performance and drive down TCO.

- Process historian
- SCADA
- DCS
- Inventory Mgmt
- Collected by handheld
- 3D TRASAR
- Field Analyzers

DATA SOURCES



Combined Experience Level  
300+ years



Higher Performance

*Turn Data into Actionable Knowledge*

- Catch upsets before they occur
- Identify improvement opportunities
- Optimize process systems

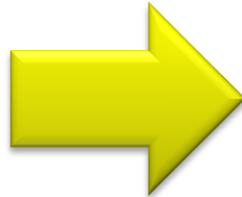
Refined Knowledge

OSIsoft. USERS CONFERENCE 2012

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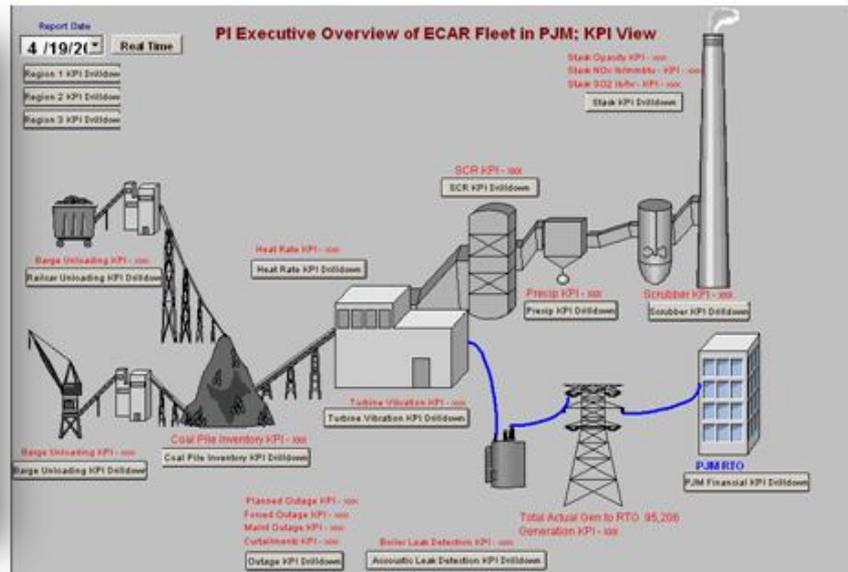
OSIsoft  
**USERS**  
CONFERENCE 2012  
The Power of Data



## The Challenge Provide Those That Need The Data The Big Picture

### PI Helps Control Production Costs

Controllable Cost	Units	Actual	Target	Design	Deviation from Target (Btu/Kwh)	Cost (\$/Shift)	Total (\$/Shift)
Main Steam Pressu	PSIG	1,985	2,000	2,000	-15	\$6.48	\$ 0
Main Steam Temperat	F	976	962	1,050	88	\$ 32.04	\$ 2
1st FH Steam Temperat	F	976	948	1,050	102	\$ 59.76	\$ 3
1st Reheat Attempt	lb/hr	1,079	0	0	1,079	\$ 1.86	\$ 0
Excess Ai	%	21.4	19.8	14.0	7.4	\$ 20.86	\$ 1
Exit Gas Temperatu	F	359.4	329.7	305	54.7	\$ 150.12	\$ 17
Steam Coil Air Heaters	klb/hr						
Condense	in. of HG	1.13	0.92	0.77	0.36	\$ 64.98	\$ 8
HP Feedwater Heate	Btu/Kwh	5.2	0	0	5.2	\$ 8.61	\$ 1
LP Feedwater Heaters	Btu/Kwh						
Auxiliary Pow	Mw	14.33	16.08	15.41	-1.75	\$ 186.90	\$ 13
<b>Total Operator Controllable C</b>						<b>\$ 25.79</b>	<b>\$ 6</b>





## Why do it - whats it all about?

- Process Data is a Huge Untapped Asset
- The only definitive record of Plant Performance
- Trending is not enough - we are only human!
- Key issues surround the **combination** of plant variables.



## Unlock the Value in Process Data

Making Money with Statistics & Datamining

David Stockill  
Shell Global Solutions International  
12th April 2001

Shell Global Solutions

7



VISA



WAL★MART®  
ALWAYS LOW PRICES.  
*Always.*



amazon.com®

**Companies that invest in the  
value that data provides  
will prosper.**



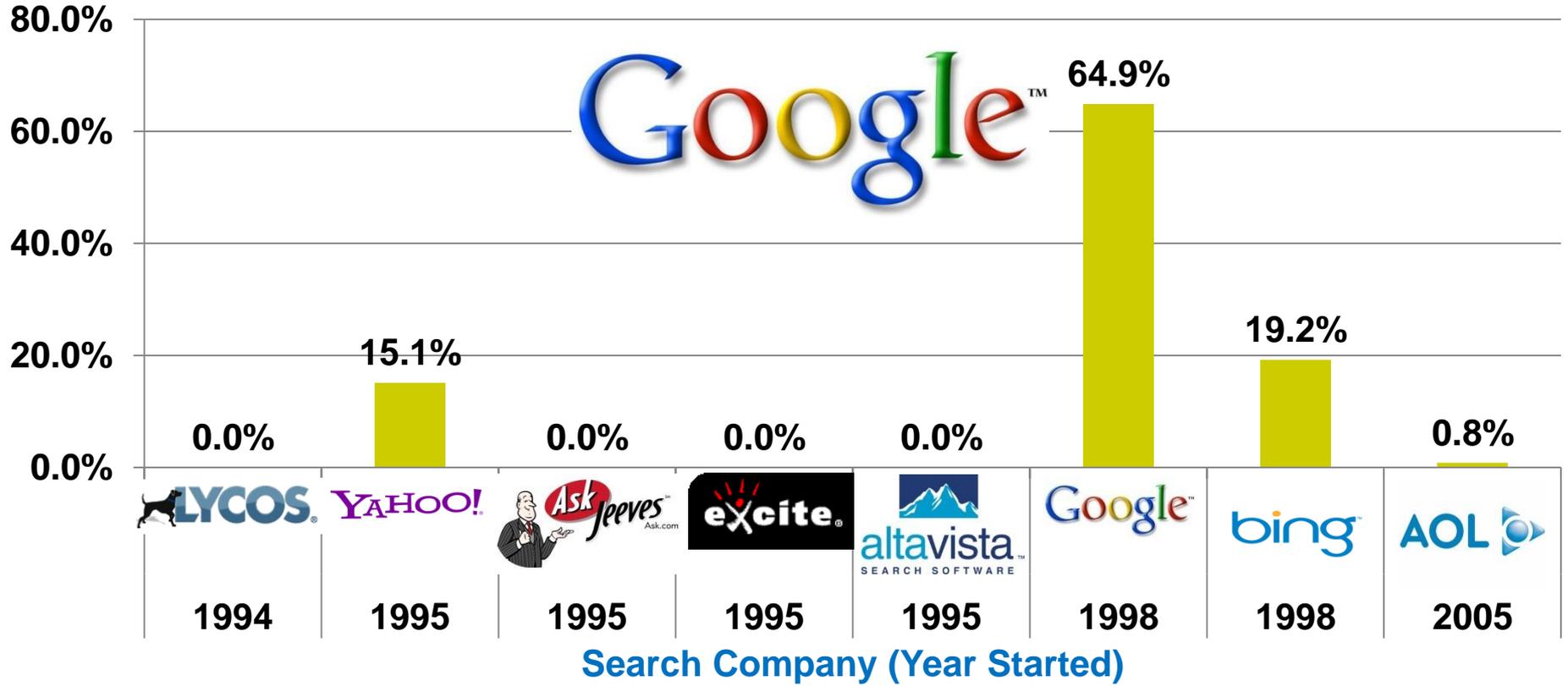
NALCO



AEP®

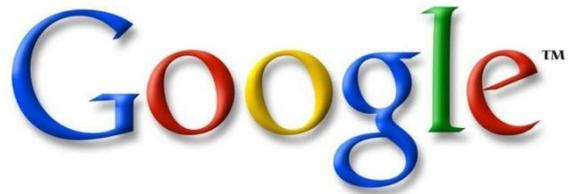


# US Core Web Search Market Share - Aug 2012



Search Company (Year Started)

<http://finance.boston.com/boston/news/read?GUID=22253566>



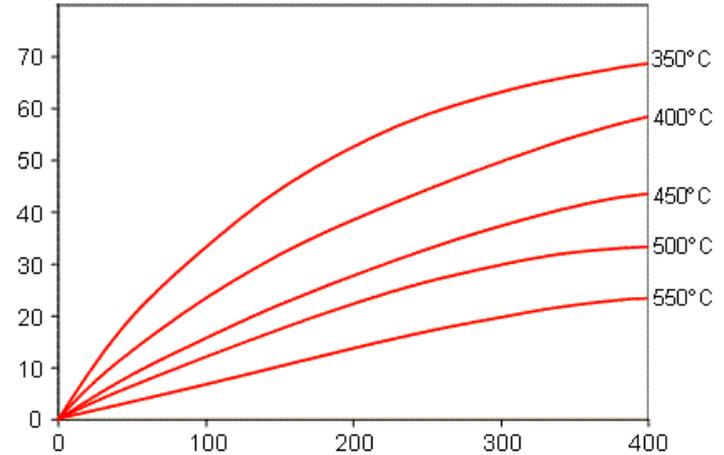
- Why did they beat the earlier contenders?
  - Recognized there was more data than meets the eye (**clicks**)
  - Technology: **Map-Reduce**



*"This Google Algorithm always works for me!"*

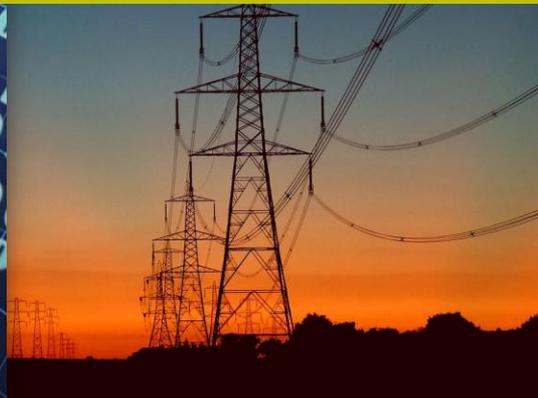


- Early to Mid-1980s: started out in Advanced Control
  - Technology: **Advanced Control**
  - Recognized there was more data than meets the eye (**historize the real-time data**)



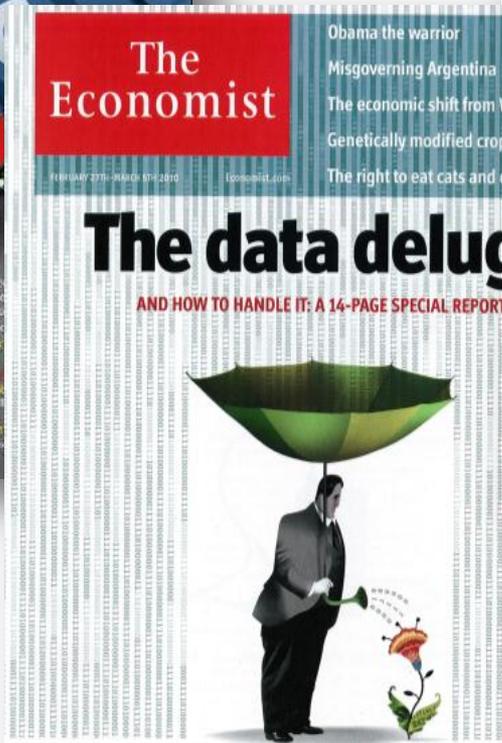


**Infrastructure is the most efficient way to deliver services needed by many**



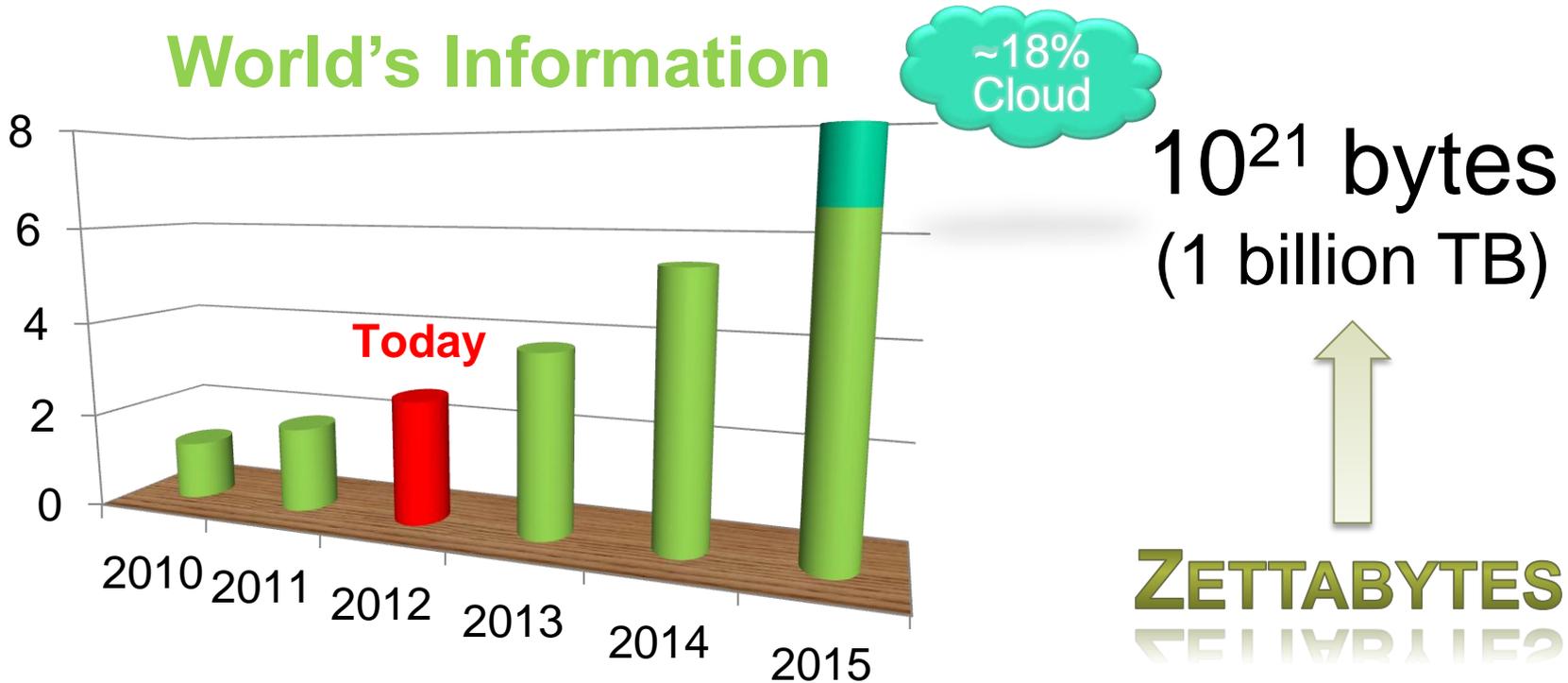
**Infrastructure**

# How do we **overcome** the **data challenges?**



# Big Data

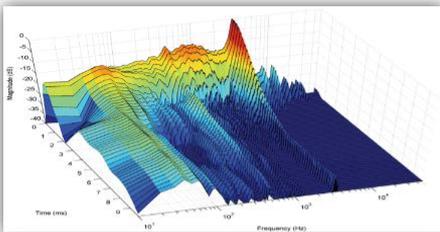
## World's Information



Source: <http://www.emc.com/leadership/programs/digital-universe.htm>

# PI SERVER 2012

(SCALABILITY: 20+ MILLION PI TAGS)



## Synchro Phasors

4.8K data streams, 120Hz  
3 years online  
Unique Events: 55 Trillion  
Estimated Data: 430TB

430TB



## Data Center

100K cells, 2M breakers  
10 years online  
Unique Events: 105 Trillion  
Estimated Data: 840TB

840TB



## Automated Metering

20M meters, 5-min reads  
7 years online  
Unique Events: 177 Trillion  
Estimated Data: 1,410TB

1,410  
TB



## Fleet Monitoring

1K assets, 1M points  
10 years online  
Unique Events: 6,307 Tr  
Estimated Data: 50,460TB

50,460  
TB

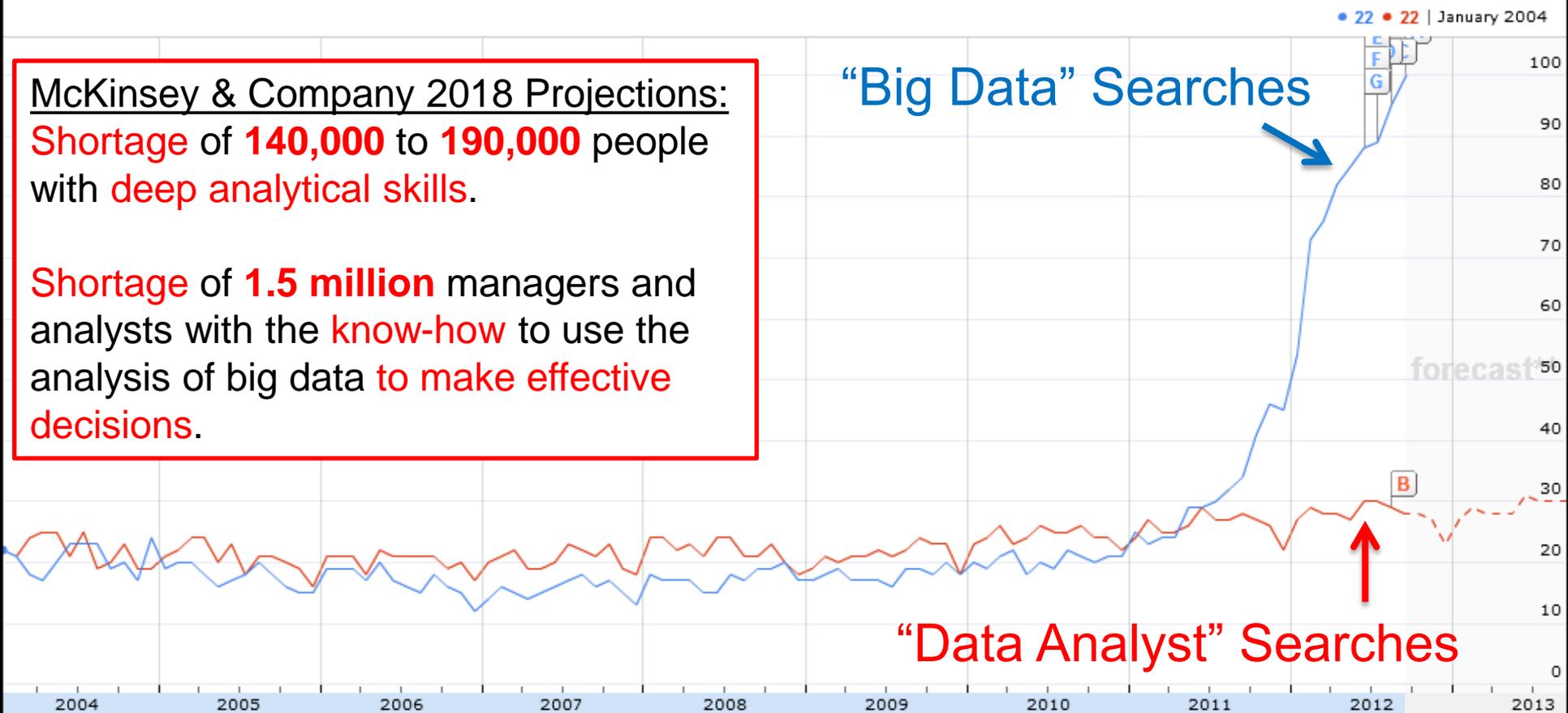
# Big Data Skills Are Lacking

McKinsey & Company 2018 Projections:  
Shortage of **140,000** to **190,000** people with **deep analytical skills**.

Shortage of **1.5 million** managers and analysts with the **know-how** to use the analysis of big data to **make effective decisions**.

“Big Data” Searches

“Data Analyst” Searches



# Addressing the Data Skills Shortage

STANFORD UNIVERSITY

Stanford Center for Professional Development

## Data Mining and Analysis

STATS202

► Online

### Description

In the Information Age, there is an unprecedented amount of data being collected and stored — by banks, supermarkets, internet retailers, security services, etc. So, now that we have all this data, what do we with it?

The discipline of data mining and analysis provides crunchers with the tools and framework to discover meaningful patterns in data sets of any size and scale. It allows us to turn all this data into valuable, actionable information. In this course, learn how to explore, analyze, and leverage data.

### Topics Include

- Decision trees
- Neural networks
- Association rules
- Clustering
- Case-based methods
- Data visualization



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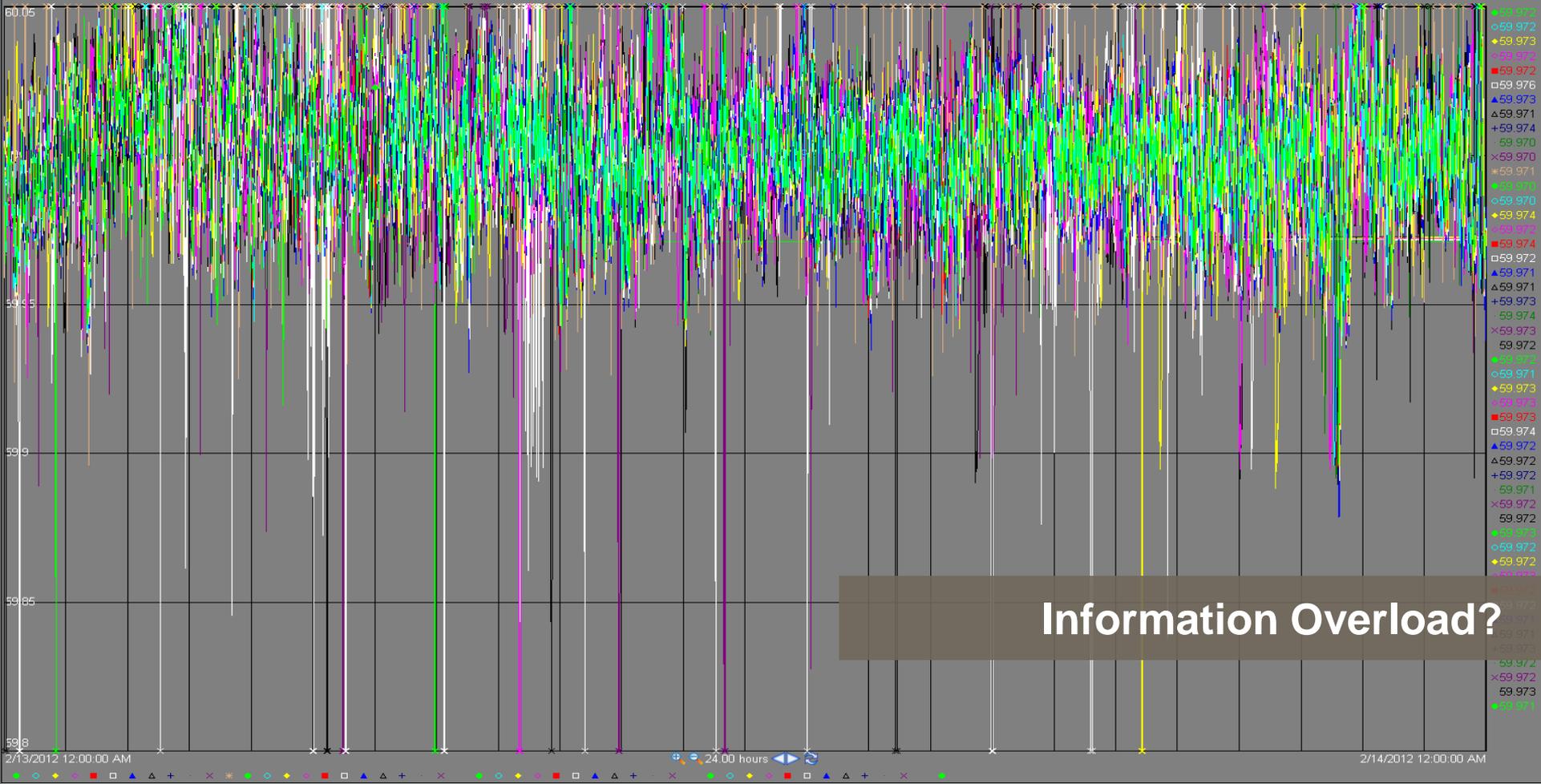
All activity Uploads only

OSIsoft: Install PI Coresight. v1.0.0.6b  
Start-to-finish installation on OSIsoft's PI Coresight  
228 views  
4 days ago  
OSIsoftLearning uploaded + 2 more

PI ProcessBook (v3.0)  
OSIsoftLearning added to a playlist  
OSIsoft: Exercise Viewing PI notifica...  
OSIsoft: Open the PI ProcessBook d...  
OSIsoft: Send email and instant mes...  
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OSIsoft: Use the Contacts window in...  
OSIsoft: View notifications in PI Proc...  
2 weeks ago

OSIsoft: Show Average, Maximum, & Minimum on a PI  
[0:09] Add a statistic line to PI Coresight trend symbol  
56 views  
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OSIsoftLearning uploaded + 1 more

OSIsoft: Build a Read-only PI Coresight display with Kiosk  
[0:02] Introduction and Demonstration  
2 weeks ago



Information Overload?



## Information Overload?



116

Y 4.G 74<sup>7</sup>:c-L

## Metadata (Card Catalog)

## Elements

- Distribution grid
  - Layers
  - Arizona
  - California
    - San Diego
      - District 01
      - District 02
        - Neighborhood A1
          - SD-02\_A1-001
          - SD-02\_A1-002
          - SD-02\_A1-003
          - SD-02\_A1-004
          - SD-02\_A1-005
          - SD-02\_A1-006
          - SD-02\_A1-007
          - SD-02\_A1-008
          - SD-02\_A1-009
          - SD-02\_A1-010
          - SD-02\_A1-011
          - SD-02\_A1-012
          - SD-02\_A1-013
          - SD-02\_A1-014
          - SD-02\_A1-015
          - SD-02\_A1-016
          - SD-02\_A1-017

## Elements

## Transfers

## Library

## Unit of Measure

## MyPI

## Notifications

## Contacts

Power factor

## SD-02\_A1-001

General Child Elements Attributes Ports Version

SD-02\_A1-001

Name	Value	Unit Of Measure
<b>Meter Alarming</b>		
High Amps	1500 A	ampere
High Voltage	245 V	volt
Low PF	90 %	percent
<b>Meter Configuration</b>		
Contracted Amps	150 A	ampere
Coordinates	<None>	<None>
Installation date	1/1/2007 12:00:00 AM	<None>
Last inspection	1/1/2007 12:00:00 AM	<None>
<b>Meter Power</b>		
Amperage	2173.79644310348 A	ampere
Amps range	2000 A	ampere
Apparent power	500.540378262017 kVA	kilovoltamp
Contracted Amps	150 A	ampere
High Amps	1500 A	ampere
High Voltage	245 V	volt
Low PF	90 %	percent
Phases	3	<None>
Power consum...	7.91365308033049 kWh	kilowatt hour
Power factor	99.8803055824083 %	percent
Power Statistics	<None>	<None>

Group by:  Category

Name: Power factor

Description:

Configuration Item: 

Categories: Meter Power

UOM: percent

Value Type: Double

Value: 99.8803055824083 %

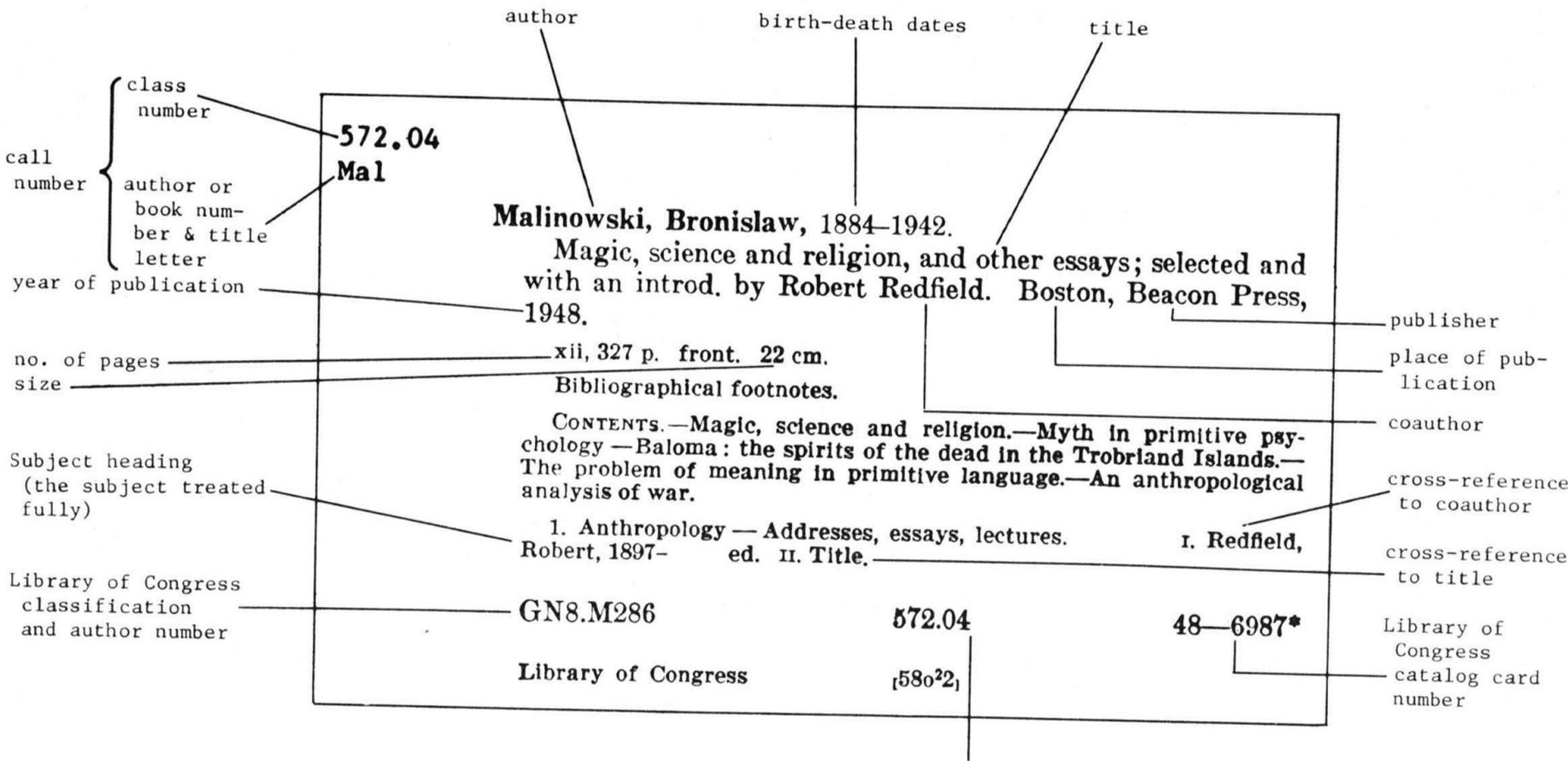
Data Reference: Formula

Settings...

A=Real power,UOM-kW;B=Apparent power,UOM-kW;A/B\*100;UOM=%

Metadata (PI AF)

# Metadata (Card Catalog)



## PI AF: A Complete Picture of Your Asset

### Real-time Values

- Inlet pressure
- Inlet flow
- Ambient temperature

### Asset Details

- Name
- Make
- Model

### External Databases

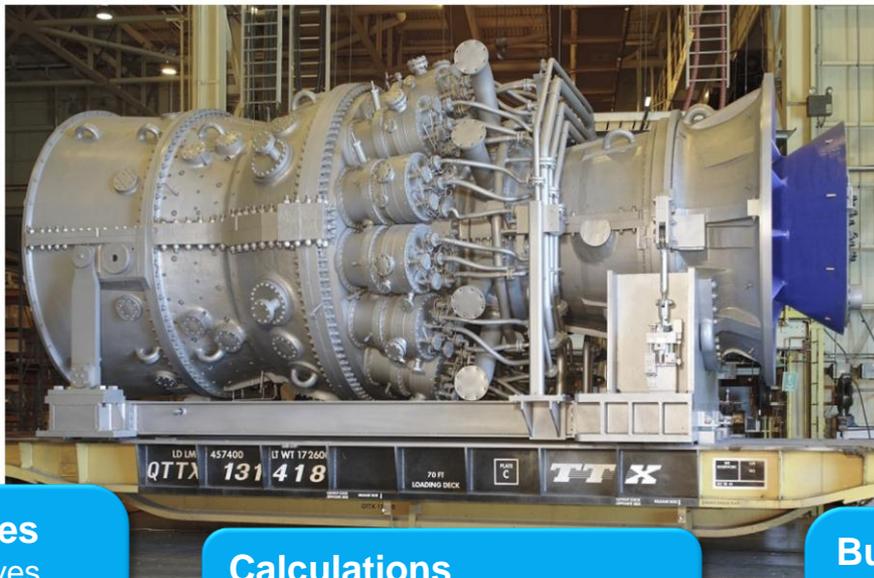
- Performance curves
- Last service date
- Design documents
- Inspection best practice

### Calculations

- Performance calculations
- KPI's

### Business Events

- Downtime
- Startups
- Shutdowns
- Excursions



### Real-time Values

- Exhaust temperature
- Exhaust flow
- Measured MW output

### Notifications

- Performance excursions
- Temperature difference
- High temperature

# Trust the Data

**“1 in 3 business leaders don’t trust the information they use to make decisions.”**

IBM

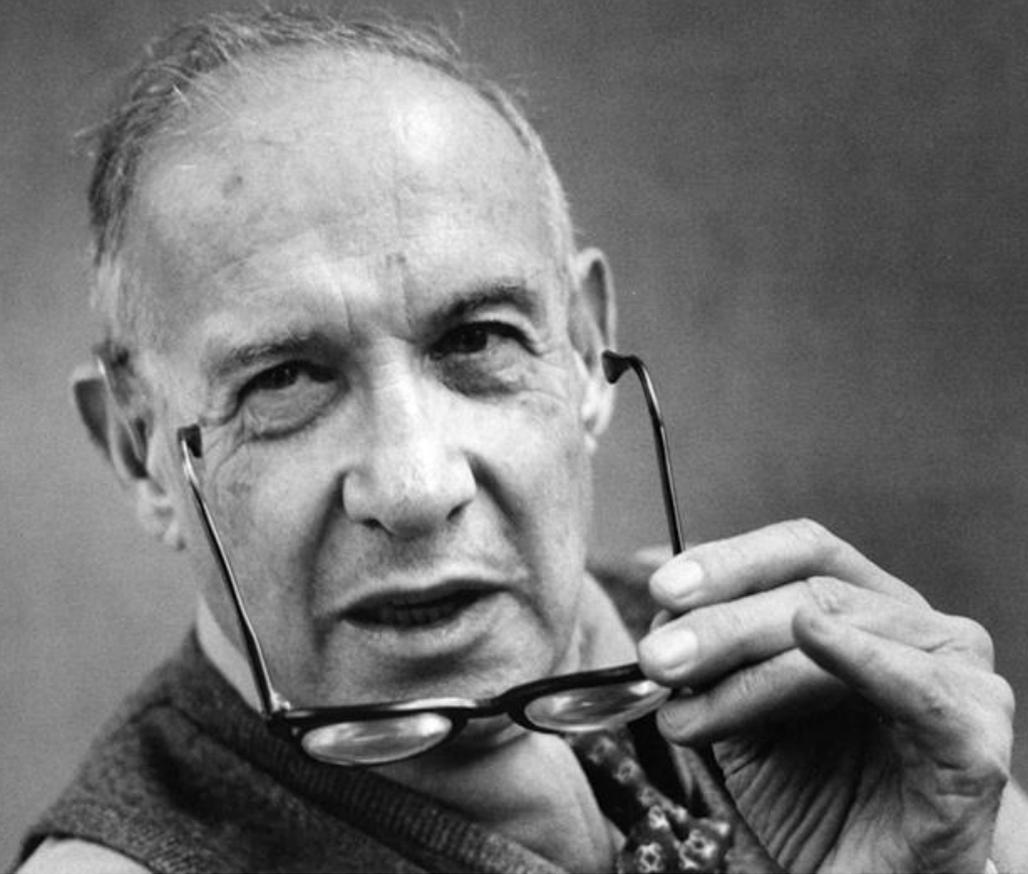




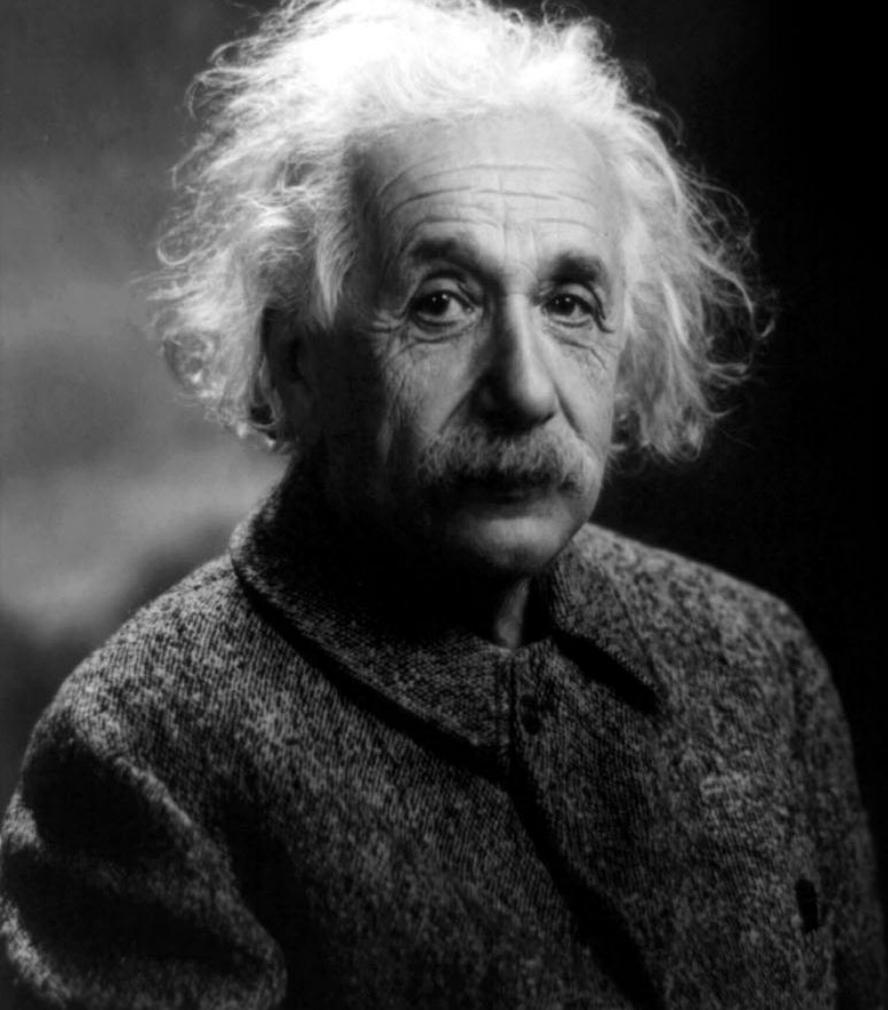
**If 1 in 3 PI customers didn't trust the PI System, we would be out of business.**

What are the **keys** to  
realizing & unlocking  
the **power of data?**

Peter Drucker,  
*The Practice of Management*



**“The important  
and difficult job  
is never to find  
the right  
answers, it is to  
find the right  
question.”**



**“The formulation of a problem is often more important than its solution.”**

Albert Einstein

**“It [Big Data] has great potential for good—as long as consumers, companies and governments make the right choices about when to restrict the flow of data, and when to encourage it.”**

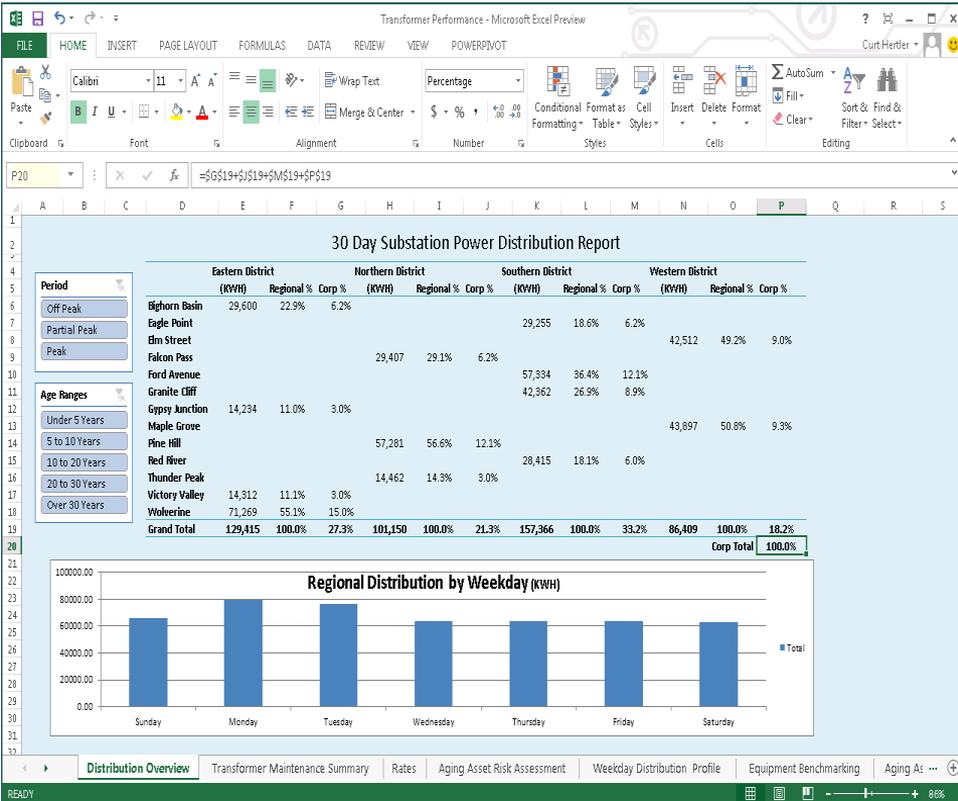
*“The data deluge”, Feb 25, 2010  
The Economist*

**ALL  
the  
DATA**

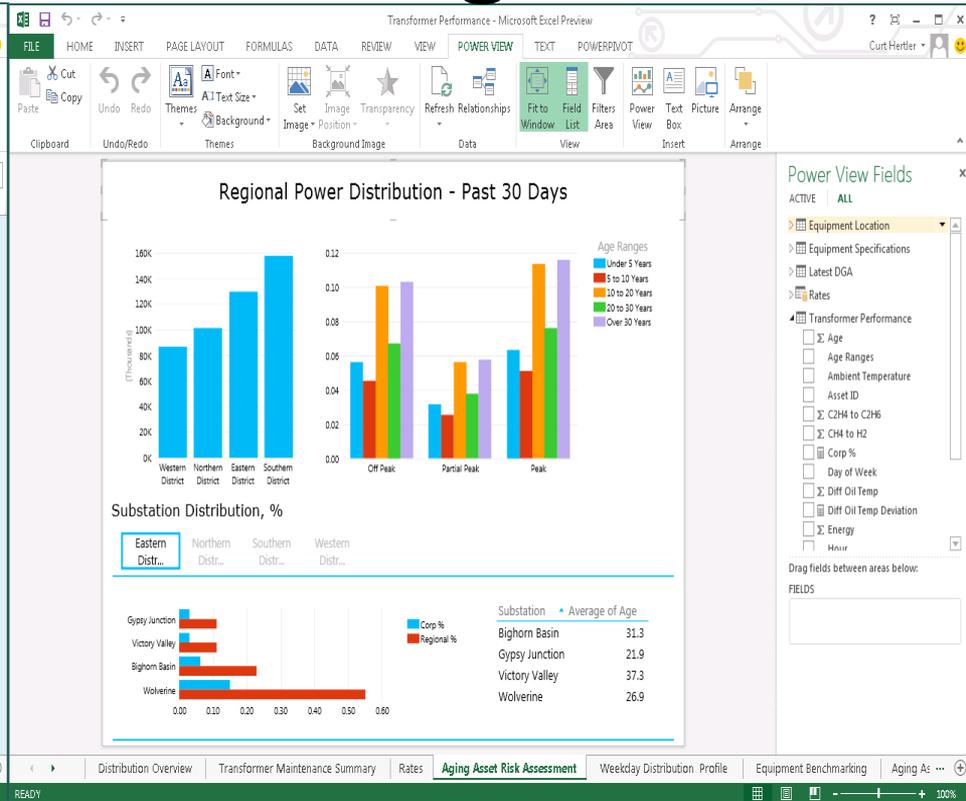


# Technology & Skills

# Microsoft Business Intelligence



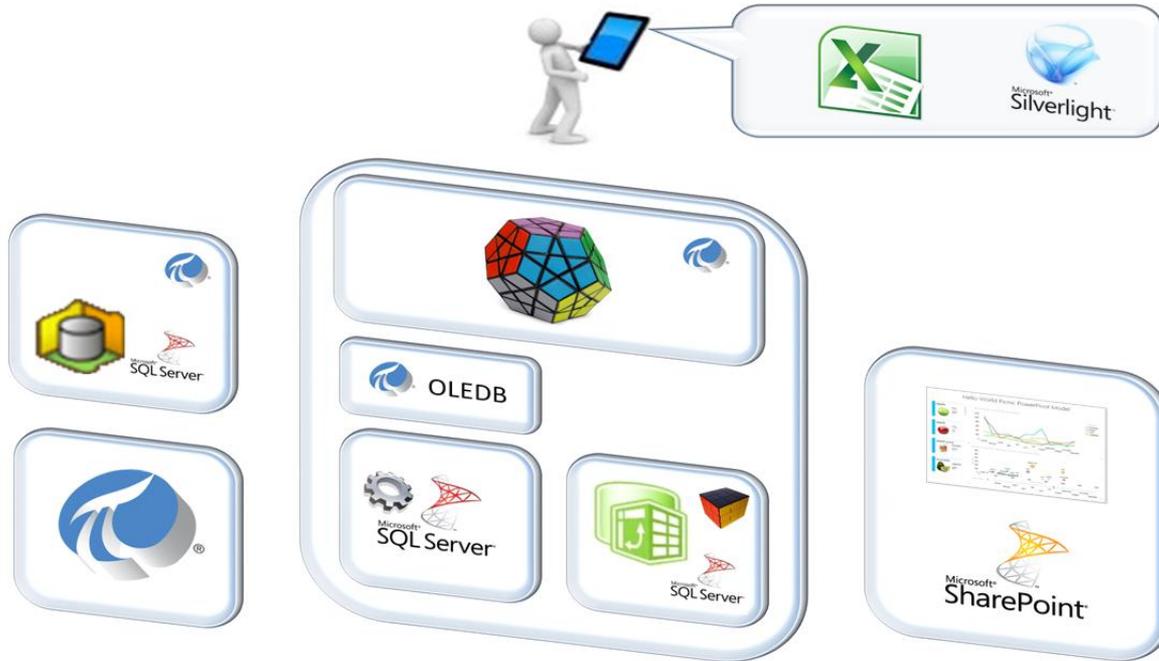
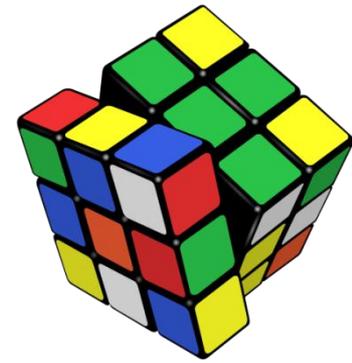
PowerPivot



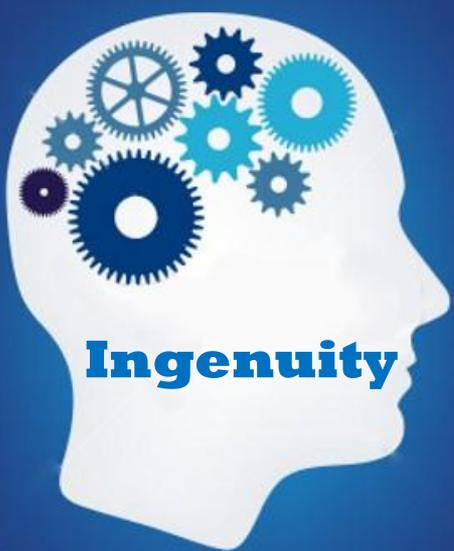
Power View

# OSIsoft: Project Rubik

*Goal: Integrate PI System Data with Microsoft BI*

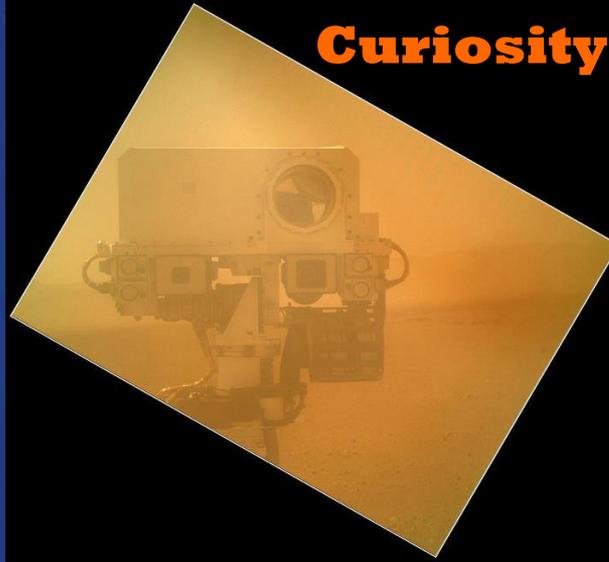


- Bridge the Gap
- Auto-build BI models
- Proper data aggregation

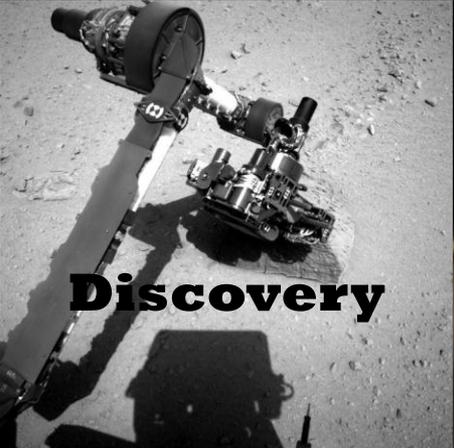


**Ingenuity**

**Curiosity**

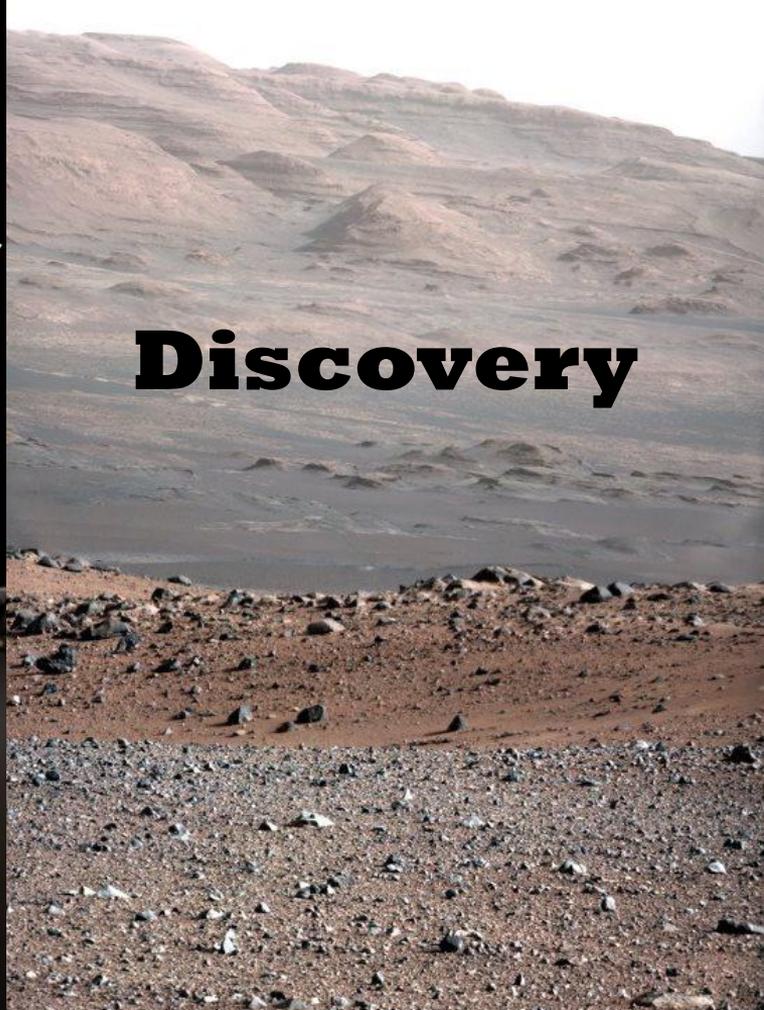


**Discovery**



**Discovery**

**Insight**



# Google™

**VISA** **WAL-MART** **amazon.com.**  
 ALWAYS LOW PRICES. *Always*

**Companies that invest in the value that data provides will prosper.**

**NALCO** **AEP** 

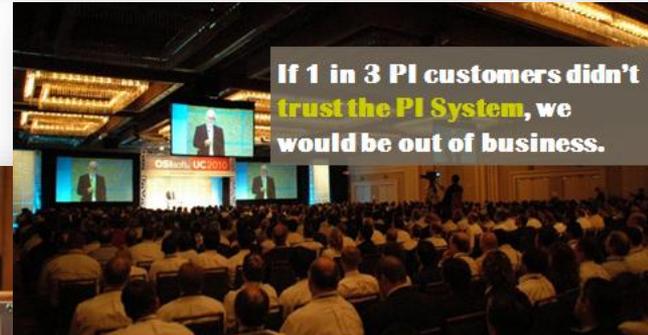
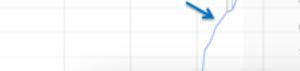


## Big Data Skills Are Lacking

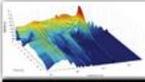
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"Big Data" Searches



## PI SERVER (SCALABILITY: 20+ MILLION P...

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Metadata (Card Catalog)

**find the right question** → **ALL**  
**Discover** ← **Insight** **the**  
**POWER of DATA**

→ **Ingenuity**  
**Curiosity**

← **apply technology & skills**



# THANK YOU

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