



OSIsoft®
REGIONAL
SEMINARS 2012
The **Power** of **Data**

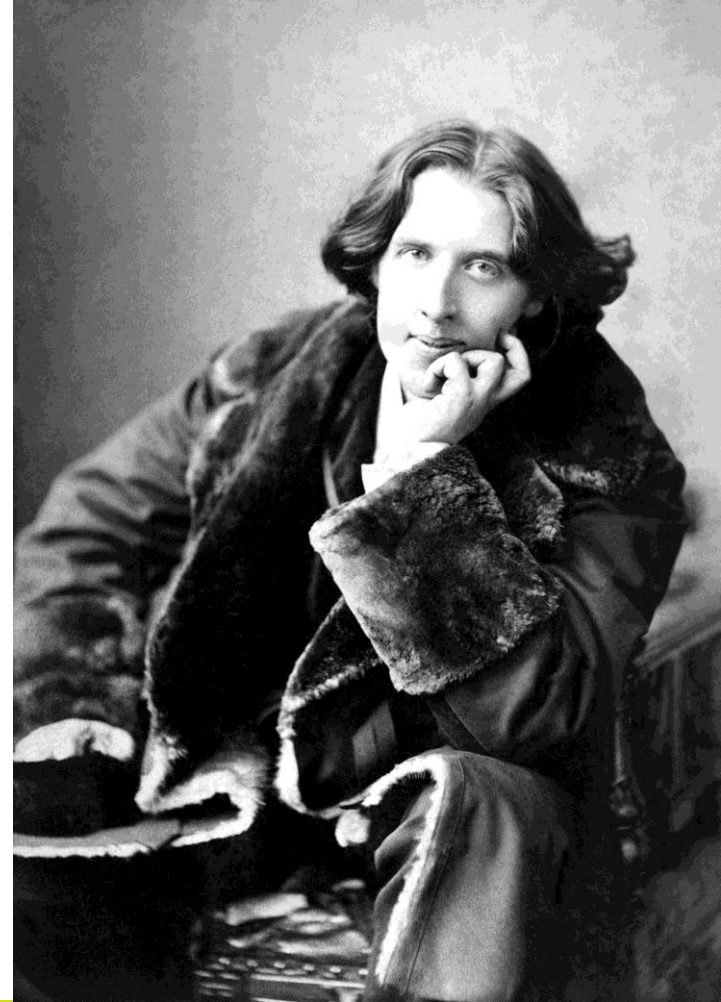


The Power of Data

Presented by **Todd Brown**

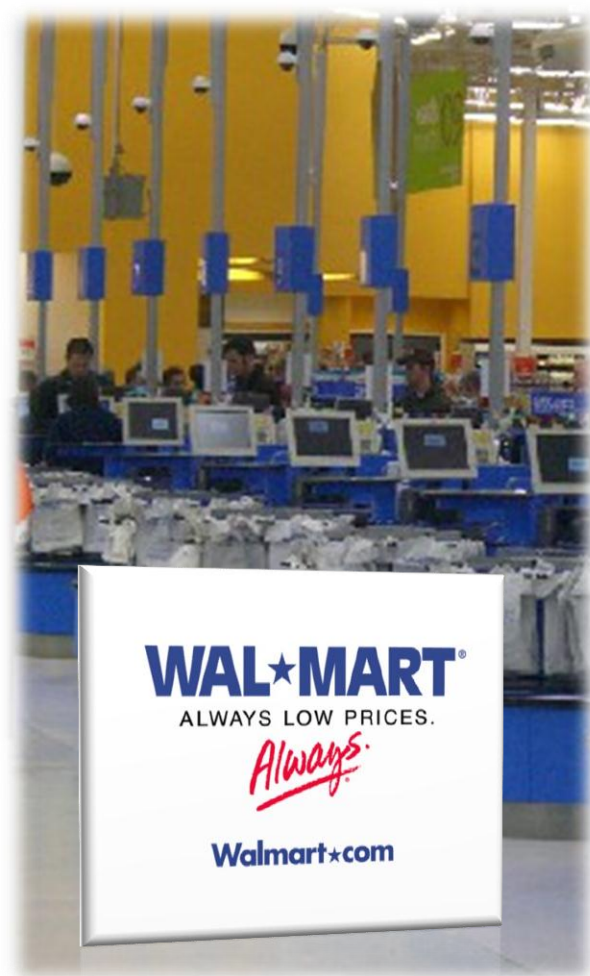
**“It is a very sad
thing that
nowadays there is
so little useless
information.”**

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





New York Stock Exchange

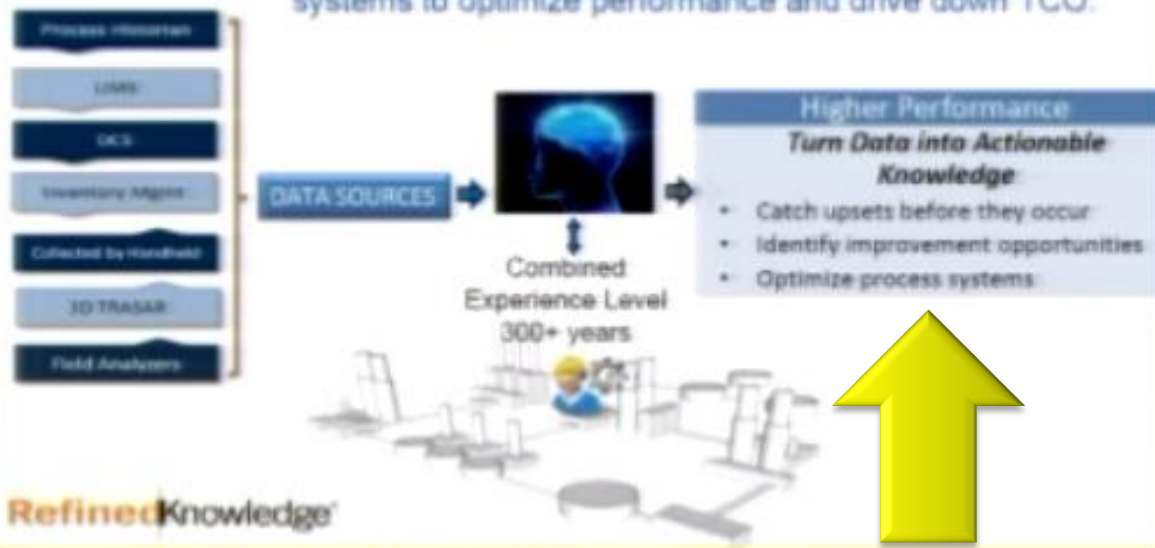


VISA: 300 Million Transactions / Day





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

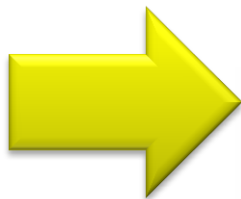


Refined Knowledge

OSIsoft. USERS CONFERENCE 2012

© OSIsoft/OTC | RUC2012

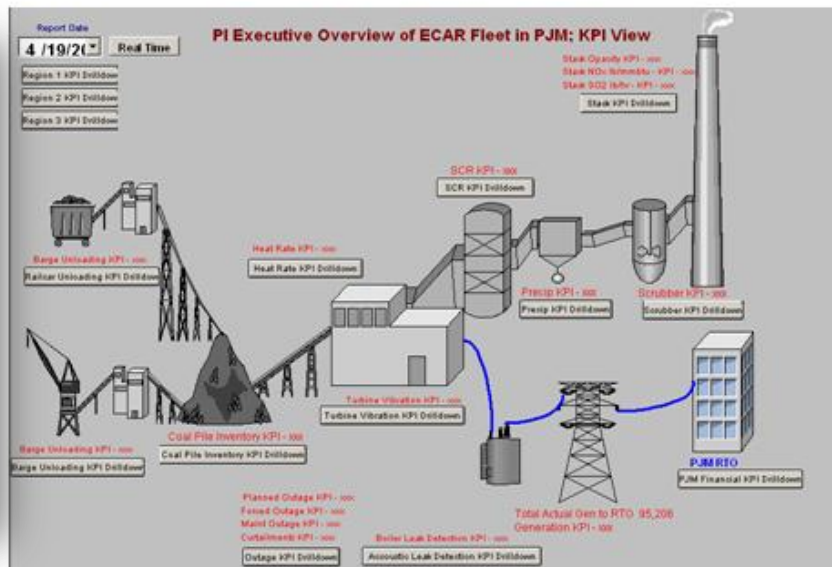




The Challenge Provide Those That Need The Data The Big Picture

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	114	\$32.04	\$2
1st RH Steam Temperat	F	976	940	1,050	110	\$59.76	\$3
1st Reheat Temperatur	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 Temperatur	F	359.4	329.7	305	54.7	\$150.12	\$17
Steam Coil Air Heaters	kib/hr						
Condense	in. of HG	1.13	0.92	0.77	0.21	\$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
Total Operator Controllable C						\$25.79	\$6





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

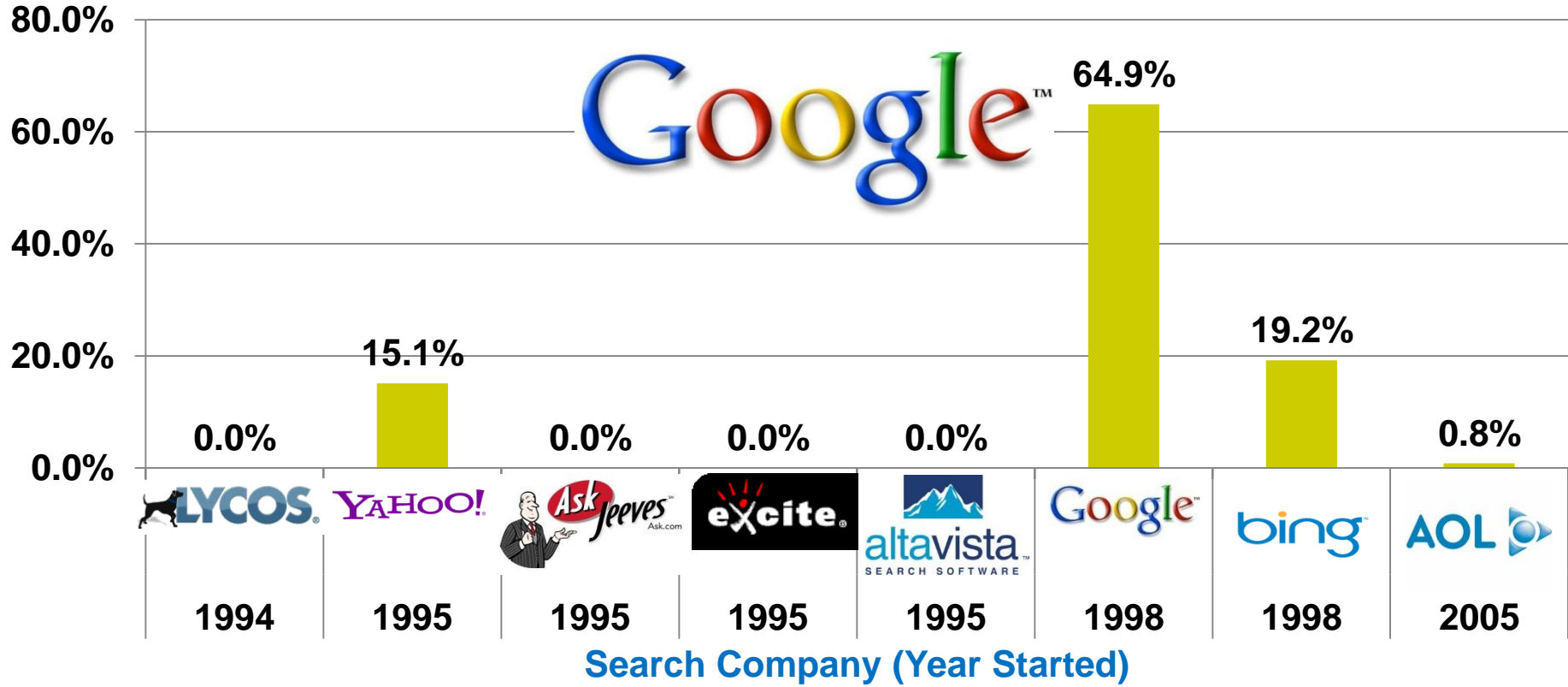
7

The Visa logo is displayed in its characteristic blue, italicized, sans-serif font.The Walmart logo features the words "WAL★MART" in blue, with a red star between the words. Below it, the tagline "ALWAYS LOW PRICES." is written in a smaller blue font, and the word "Always" is written in a red script font.The Amazon.com logo is shown in a grey, sans-serif font, with a yellow curved arrow underneath the text.

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

The Nalco logo consists of a stylized blue graphic of two overlapping shapes above the word "NALCO" in a blue, sans-serif font.The AEP logo features the letters "AEP" in a bold, white, sans-serif font, set against a red rectangular background.

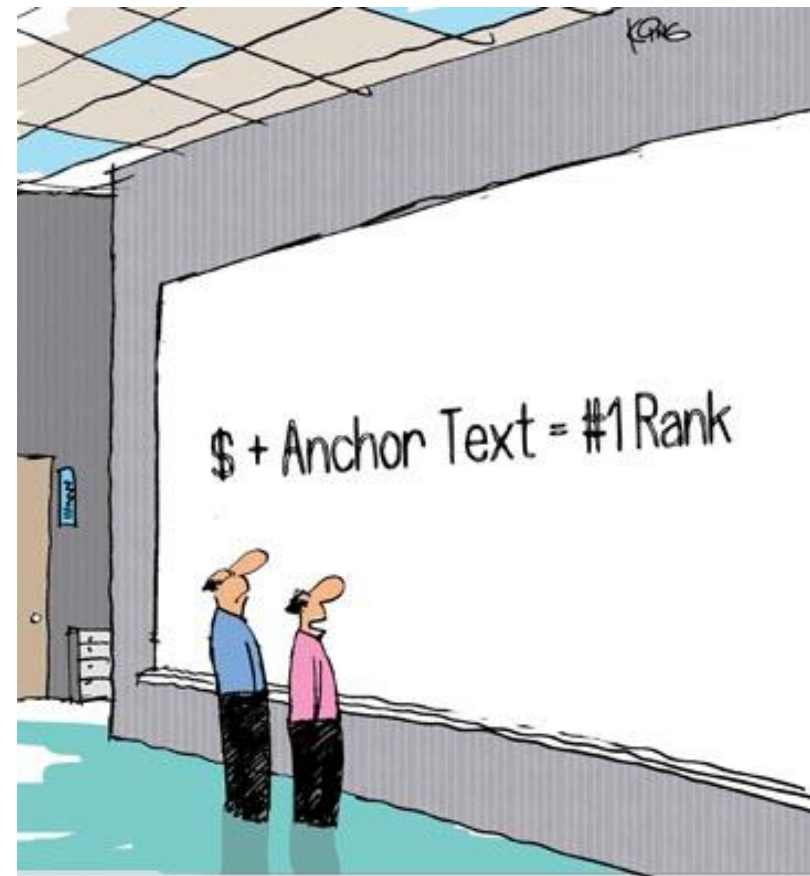
US Core Web Search Market Share - Aug 2012



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



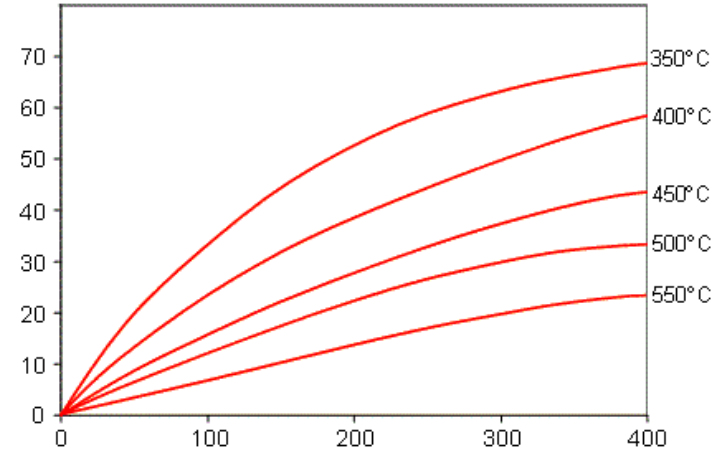
- Why did they beat the earlier contenders?
 - Recognized there was more data than meets the eye (**clicks**)
 - Technology: **Map-Reduce**



"This Google Algorithm always works for me!"

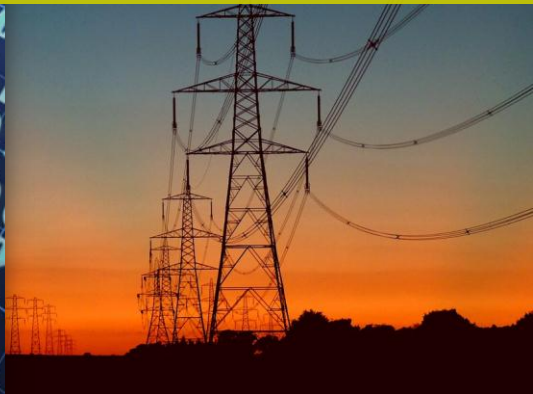


- Early to Mid-1980s: started out in Advanced Control
 - Technology: **Advanced Control**
 - Recognized there was more data than meets the eye (**historize the real-time data**)





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

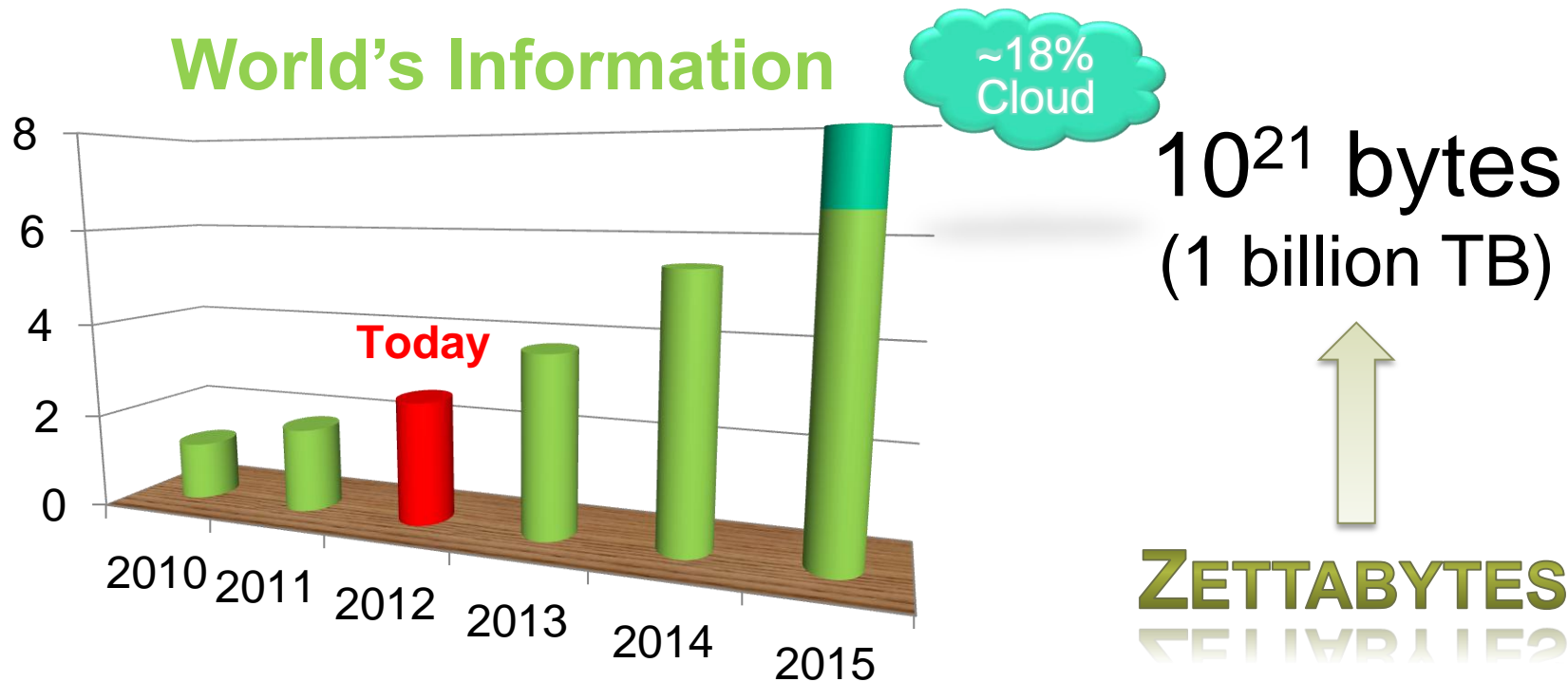


Infrastructure

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



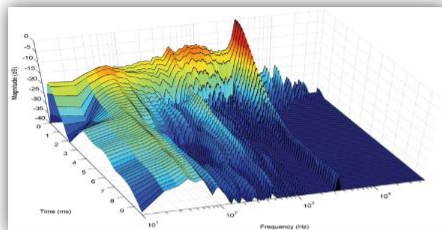
Big Data



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

PI SERVER 2012

(SCALABILITY: 20+ MILLION PI TAGS)



Syncro Phasors

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



Data Center

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



Automated Metering

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



Fleet Monitoring

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

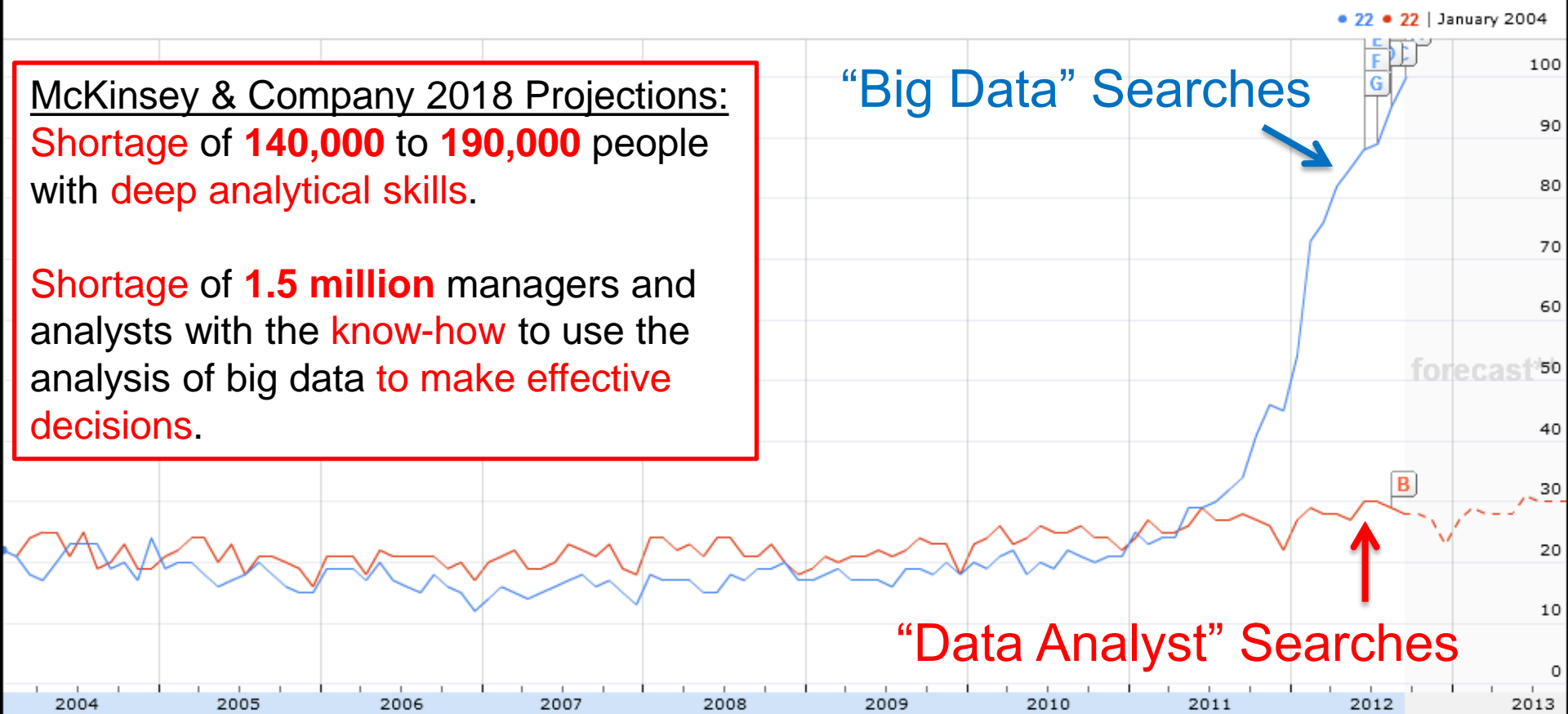
Big Data Skills Are Lacking

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

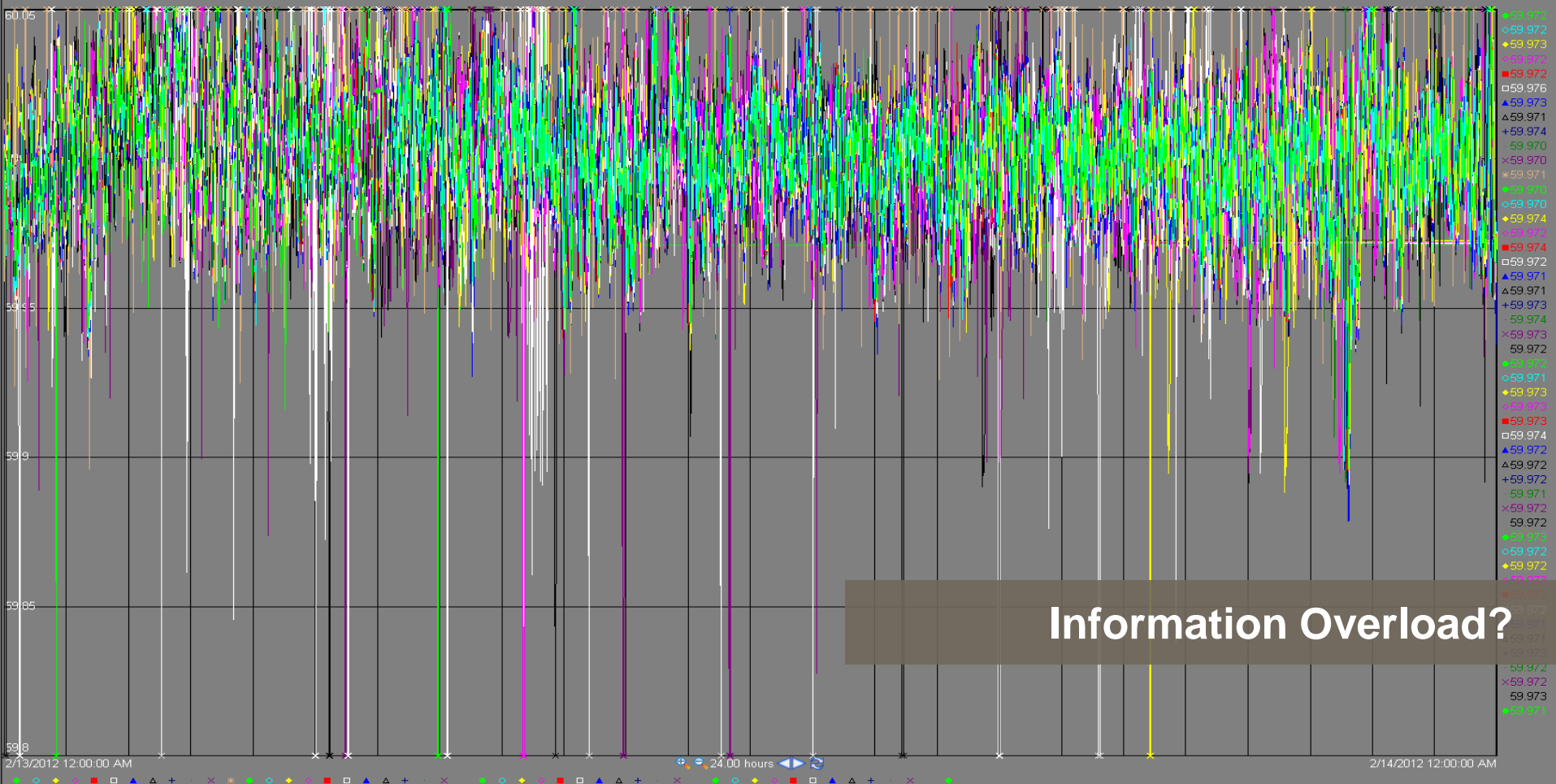
- Decision trees
- Neural networks
- Association rules
- Clustering
- Case-based methods
- Data visualization



On-Demand Learning at Your Fingertips



Watch us on
YouTube



Information Overload?



Information Overload?



Metadata (Card Catalog)

UC2007 - PI System Explorer

File Edit View Go Help

Database Query Date Back Check In New Element New Attribute Search

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

SD-02_A1-001

General Child Elements Attributes Ports Version

SD-02_A1-001

Search

Name	Value	Unit Of Measure
Meter Alarming		
High Amps	1500 A	ampere
High Voltage	245 V	volt
Low PF	90 %	percent
Meter Configuration		
Contracted Amps	150 A	ampere
Coordinates		<None>
Installation date	1/1/2007 12:00:00 AM	<None>
Last inspection	1/1/2007 12:00:00 AM	<None>
Meter Power		
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>

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=kVA;UOM=%

Metadata (PI AF)

Metadata (Card Catalog)

call number

class number

author or book number & title letter

year of publication

no. of pages

size

Subject heading
(the subject treated fully)

Library of Congress classification and author number

author

birth-death dates

title

572.04

Mal

Malinowski, Bronislaw, 1884-1942.

Magic, science and religion, and other essays; selected and with an introd. by Robert Redfield. Boston, Beacon Press, 1948.

xii, 327 p. front. 22 cm.

Bibliographical footnotes.

CONTENTS.—Magic, science and religion.—Myth in primitive psychology — Baloma: the spirits of the dead in the Trobriand Islands.—The problem of meaning in primitive language.—An anthropological analysis of war.

1. Anthropology — Addresses, essays, lectures. Robert, 1897— ed. II. Title.

GN8.M286

Library of Congress

publisher

place of publication

coauthor

cross-reference to coauthor

cross-reference to title

Library of Congress catalog card number

572.04

48-6987*

[580²2]

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

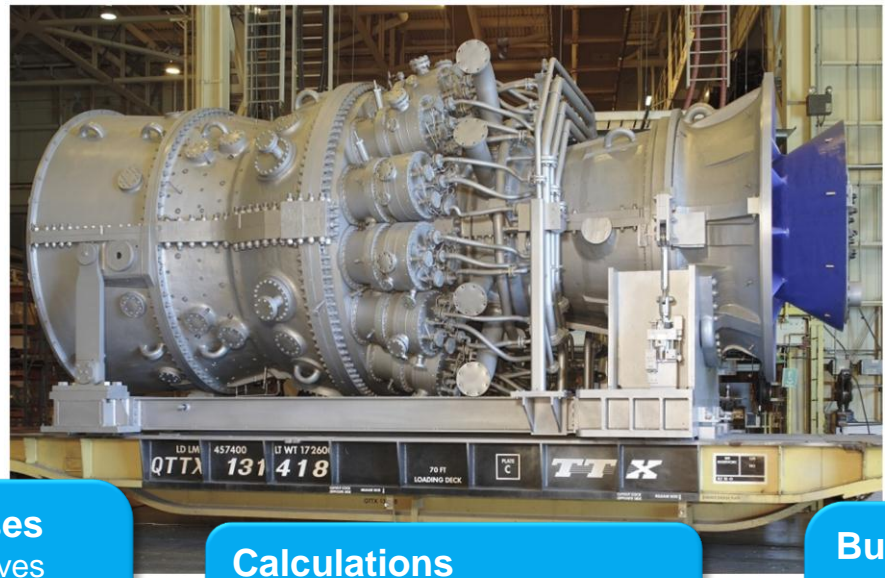
- Downtime
- Startups
- Shutdowns
- Excursions

Real-time Values

- Exhaust temperature
- Exhaust flow
- Measured MW output

Notifications

- Performance excursions
- Temperature difference
- High temperature

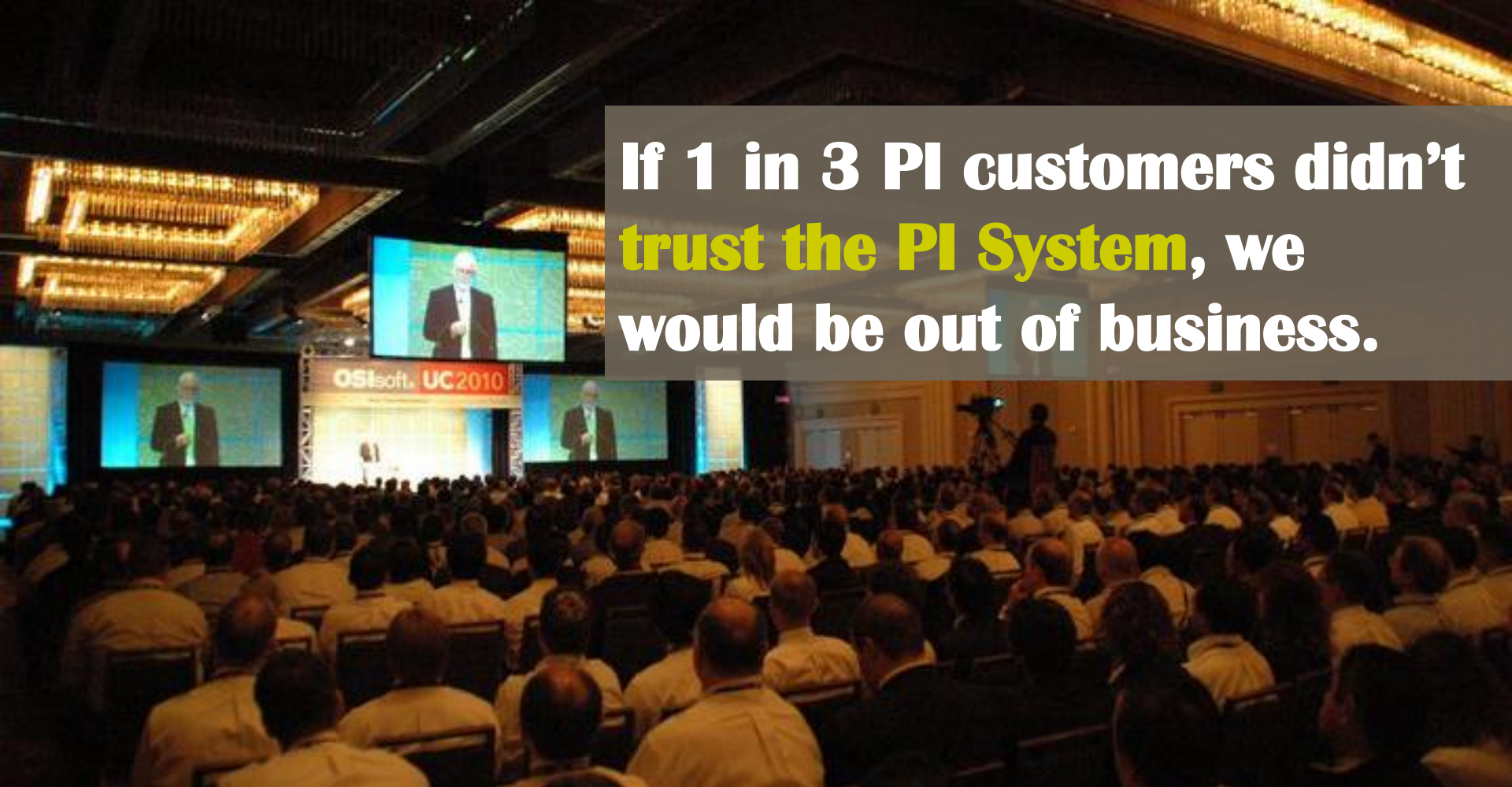


Trust the Data

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

IBM

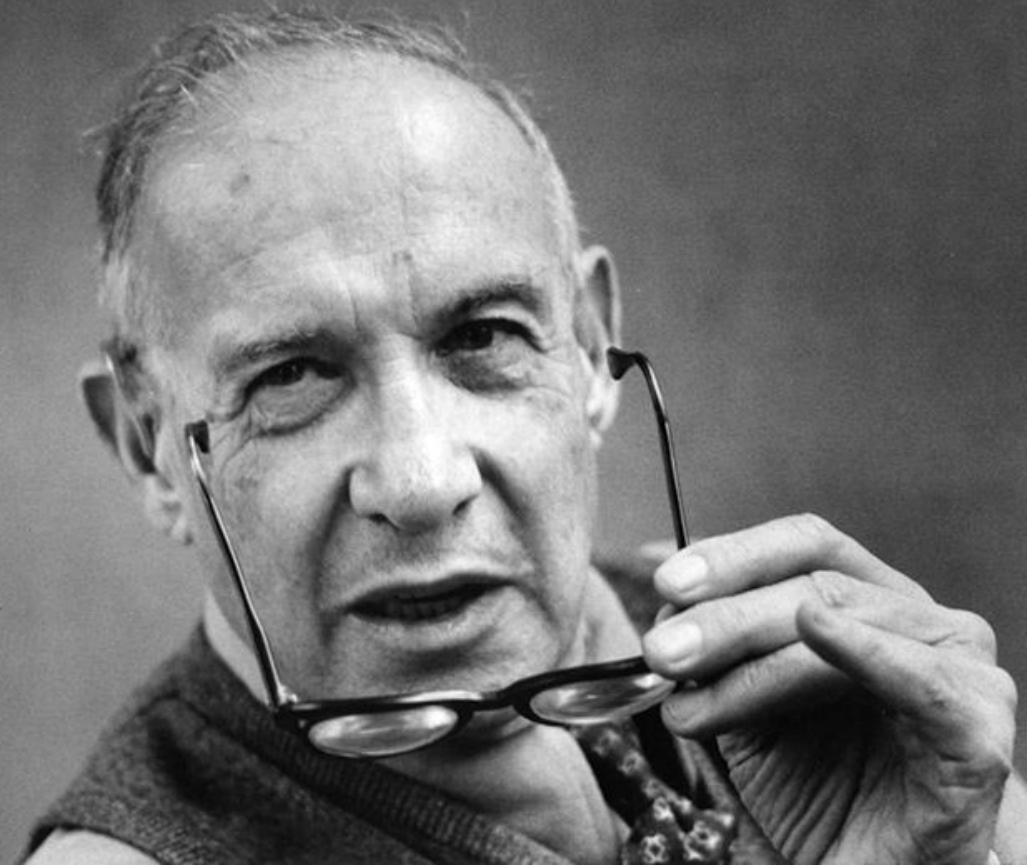




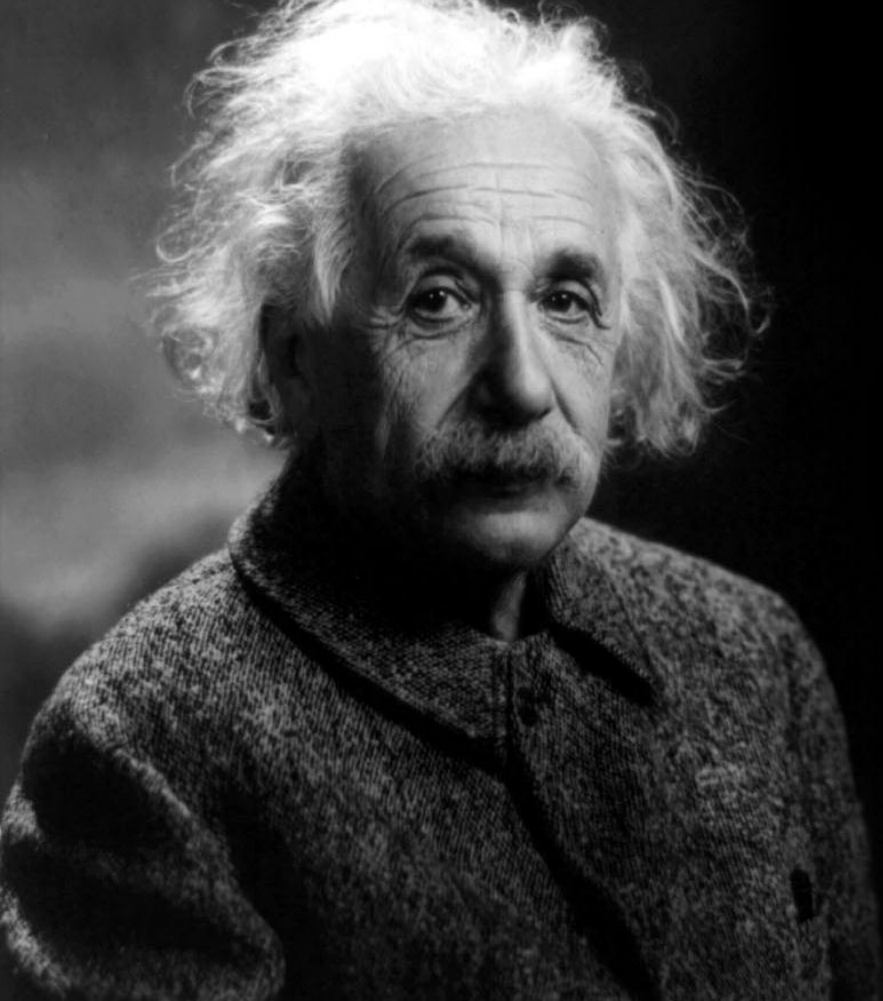
**If 1 in 3 PI customers didn't
trust the PI System, we
would be out of business.**

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.”

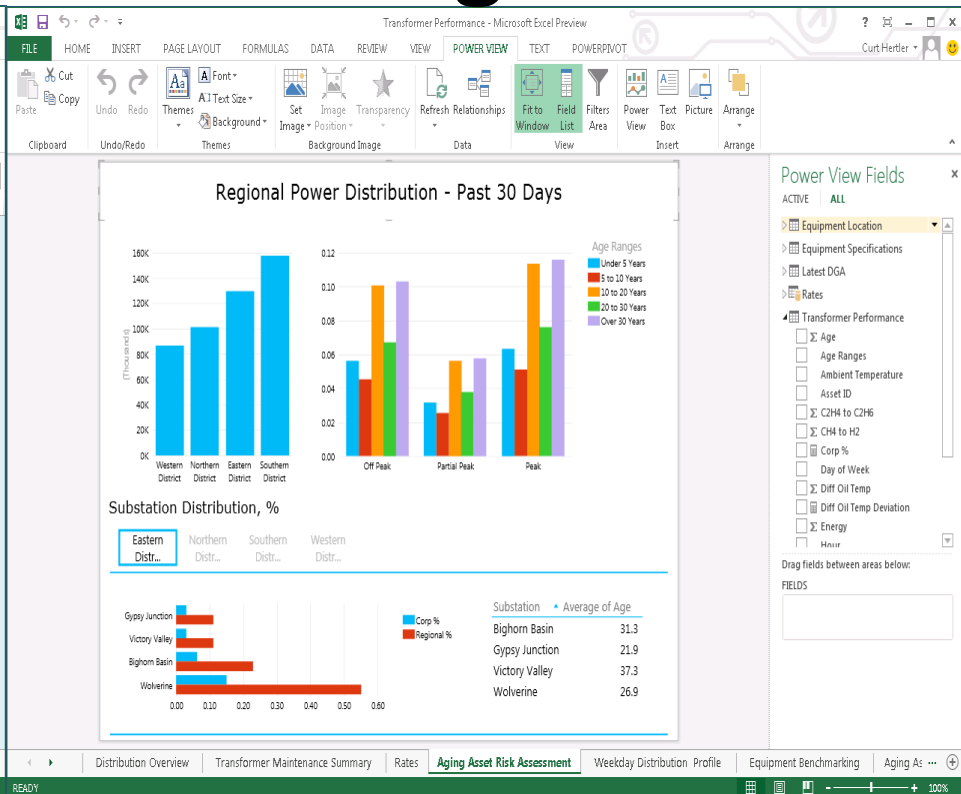
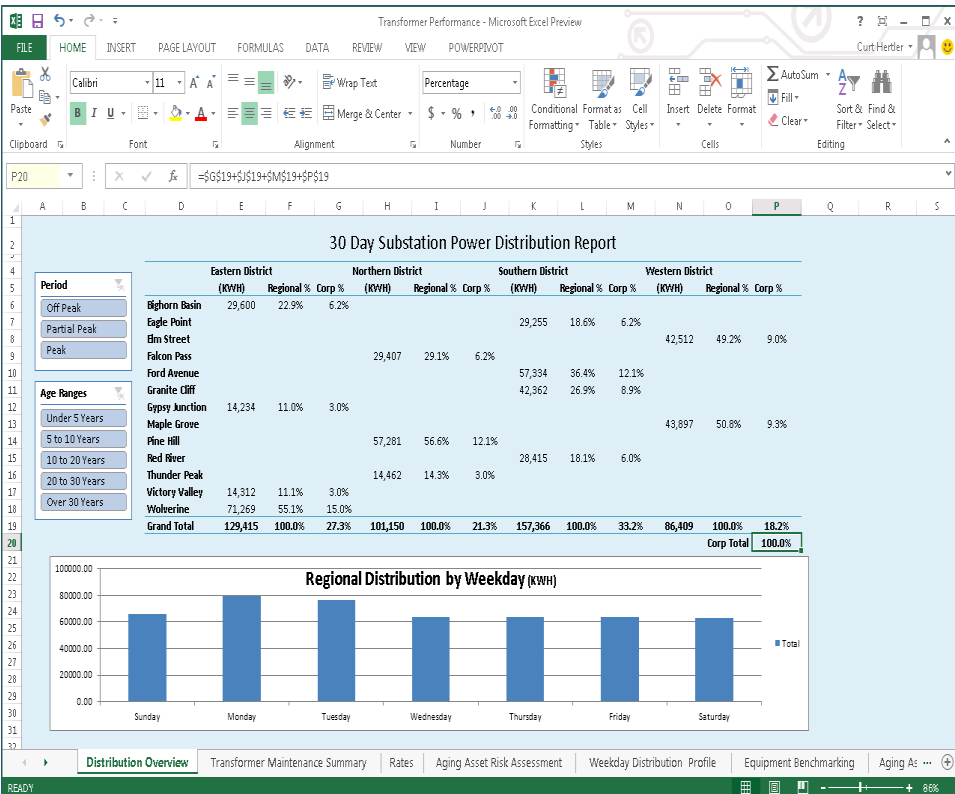
*“The data deluge”, Feb 25, 2010
The Economist*

**ALL
the
DATA**

A young child with blonde hair, wearing a blue and white striped shirt and light blue jeans, is sitting on a grassy hill. The child is focused on a black laptop, with their hands on the keyboard. The background is a clear blue sky. The scene is brightly lit, suggesting it's daytime.

Technology & Skills

Microsoft Business Intelligence

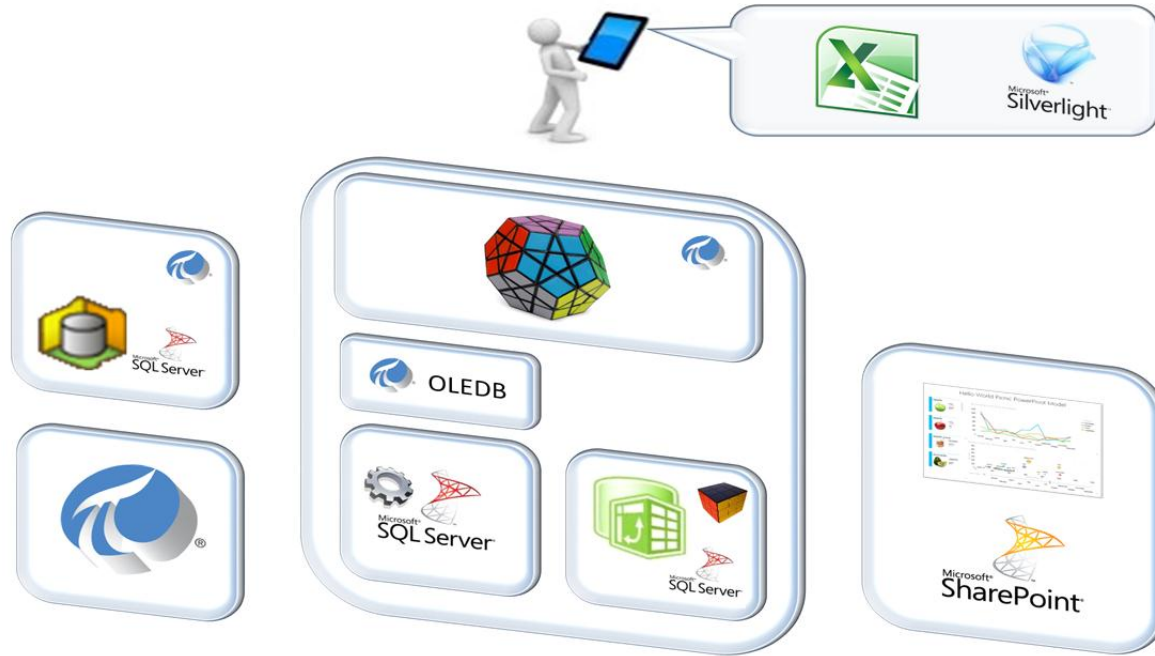
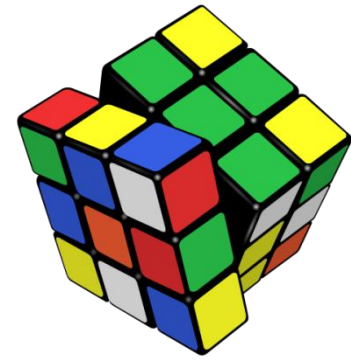


PowerPivot

Power View

OSIsoft: Project Rubik

Goal: Integrate PI System Data with Microsoft BI



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

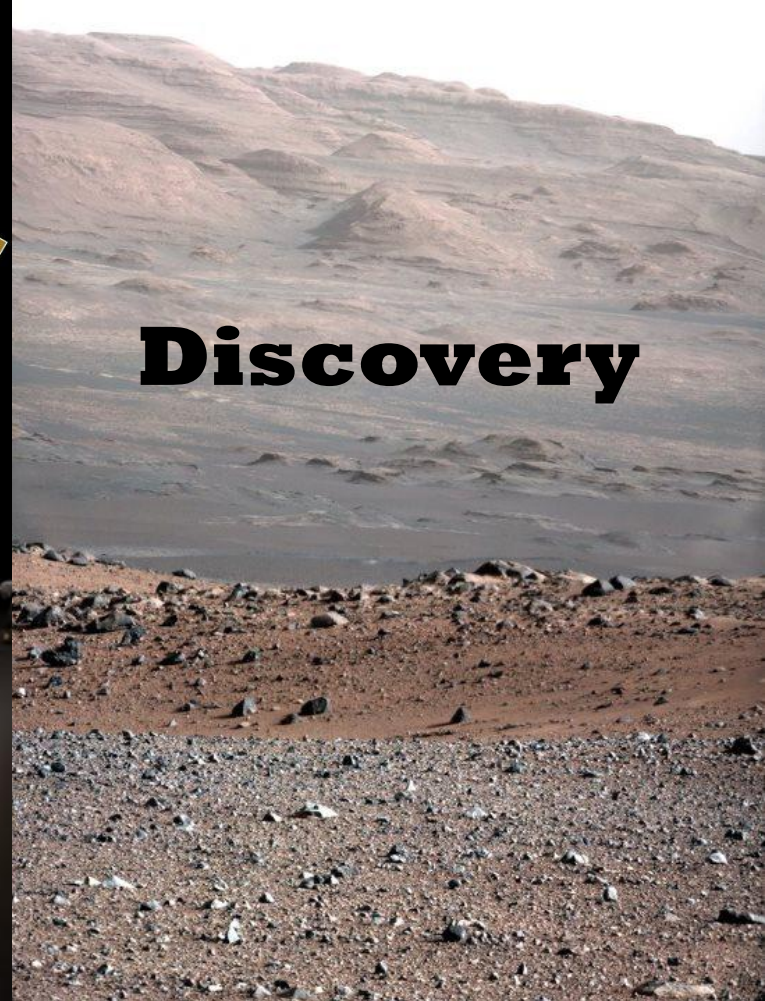


Ingenuity

Curiosity



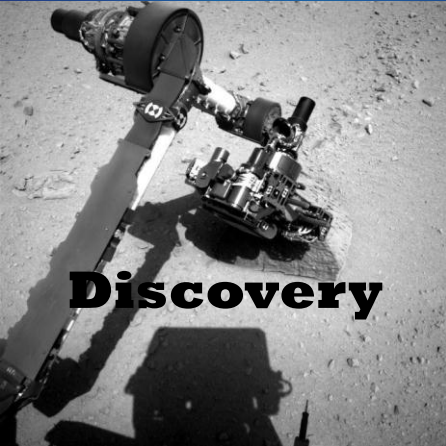
Discovery



Insight



Discovery





OSIsoft. REGIONAL SEMINARS 2012

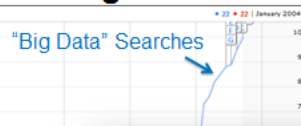
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OSIsoft. REGIONAL SEMINARS 2012

PI SERVER

(SCALABILITY: 20+ MILLION P)



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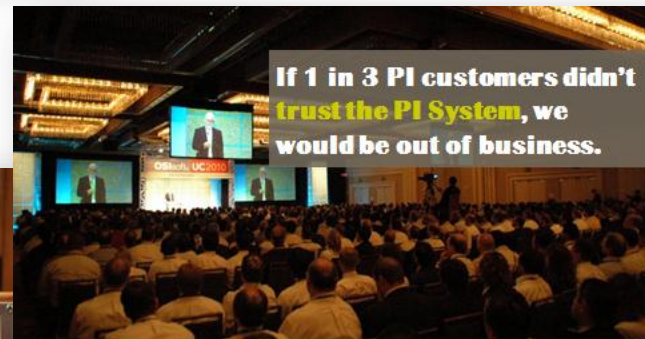
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Metadata (Card Catalog)

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find the right question → **ALL**
Discover ← **Insight** **the**
POWER of DATA
→ **Ingenuity**
Curiosity →
apply technology & skills ←



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