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The Power of Data

THRIVING IN A WORLD OF CHANGE

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Jon Peterson

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Realizing the Power of Data

Presented by
Jon Peterson, OSIsoft
Tony Fenn, Veedims
Ravi Malla, Chevron
Kevin Crean, Jannsen Pharmaceutical

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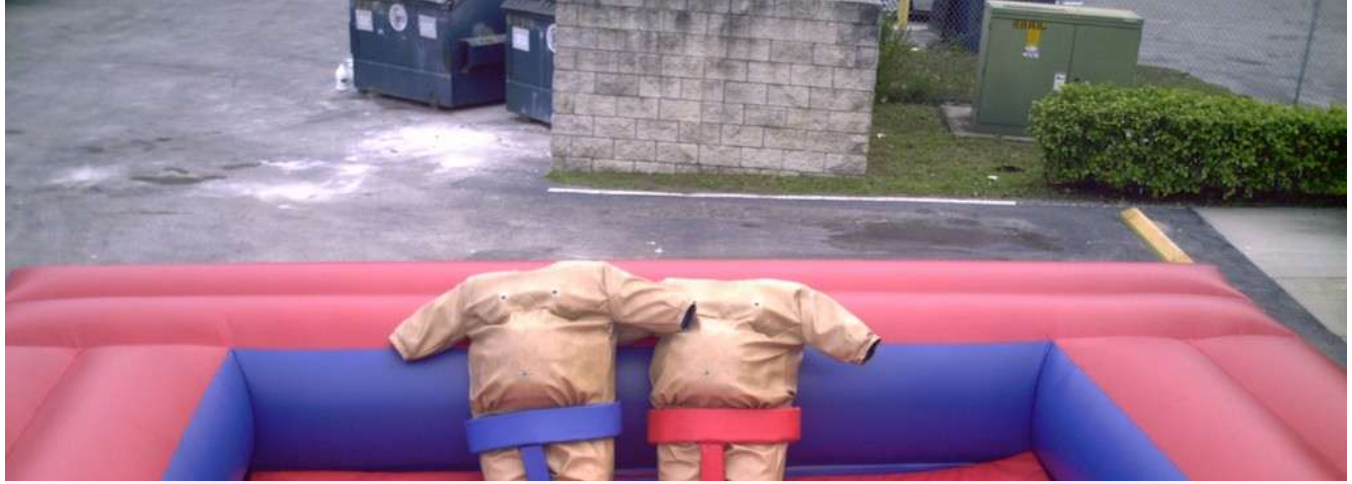

From Wikipedia:

Sumo (相撲, *sumō*[?]) is a competitive full-contact wrestling sport where a wrestler (*rikishi*) attempts to force another wrestler out of a circular ring (*dohyō*) or to touch the ground with anything other than the soles of the feet.

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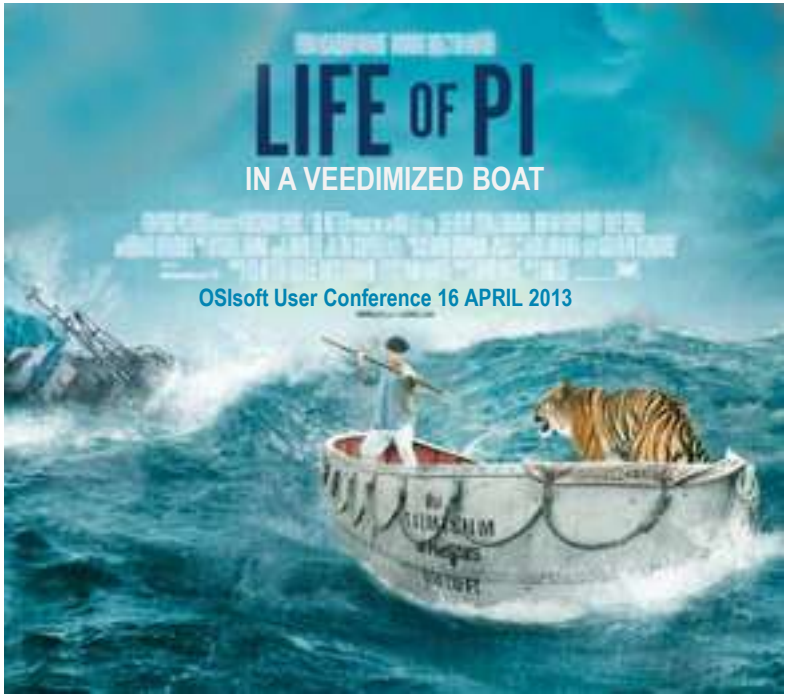

Presented by **Tony Fenn ,** Director Systems Engineering, Veedims, LLC

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It started with a car…

Iconic AC Roadster
All electrical and electronic systems in the vehicle are controlled and managed by VEEDIMS, including the fuel cap, headlights, taillights, ignition, gauges, switches and 1500 data points flow to an onboard PI System and wireless link to a fleet PI System

And then a boat…

Cigarette
Over two dozen mechanical switches, a variety of circuit breakers, and over 60 pounds of wiring has been deleted from the build, and replaced by VEEDIMS and three touch screen 15 inch displays. Over 2100 data points flow to a fleet PI System

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PI Event Frames and PI Notifications are used for vehicle trip analytics and alerting

PI AF is used to for vehicle registration and to support different user views

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Digital Oilfields and Decision Support Applications at Chevron SJV

Presented by

Ravi Malla

UWT Program Manager, CHEVRON

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Challenge

Upstream asset surveillance and remote field data gathering needs

- Thousands of wells and other assets scattered across wide area
- Need to capture data from remote locations using:

❖Paper based routes
- Cumbersome
- Not Real-time
- Hard to track information

❖Home Grown Excel and Access based Apps
- Data Redundancy
- Hard to find Required Information
- Hard to maintain across the team
- Hard to maintain Security Features

❖Other Point Solutions
- Need for 3rd party access privileges
- Maintain Role Based Security Features
- Role Based Security
- Hard to meet Report Requirements
- Real-time Dashboards and Data Integration for the same
- No single source to capture the BI

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MDSA User Interface

Joe Doe

Time Period

Region: Americas > SJV

From: Date 01 | Month MAY | Time 14:30

To: Date 01 | Month JUN | Time 14:30

Submit

Home | Usage Screen | Chemical Cost | Monitoring | Process | Train | Logs

Tree Map | Grid | Notifications | Alarms

- CHEMICAL AND CORROSION
- HMBP
- V&V
- ROTATING EQUIPMENT
- ORD
- FLEET MANAGEMENT
- SCORECARD
- EMISSIONS

Level 1 | Level 2 | Level 3

Context Sensitive Tabs

Levels of Expertise in Monitoring

Monitoring Context

List of Menus visible are based on User Profile

Tree Maps providing option to drill down and see Diagrams, Maps etc

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Connected Worker

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Combining Laboratory and Process Data on the PI System

Presented by **Kevin Crean**

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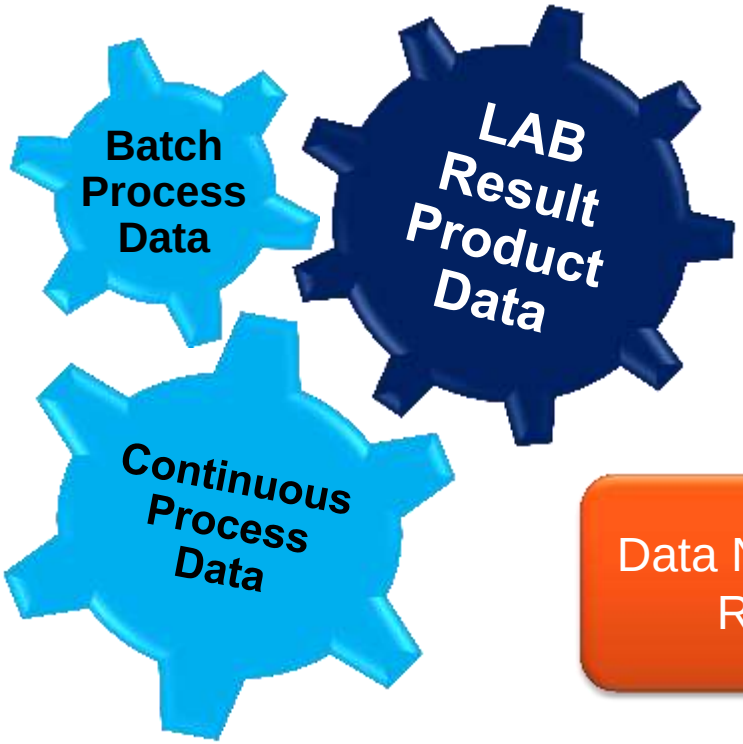
Creating Solutions – Connecting Data

Process Data:

- ***Batch Data***: From multiple source Control Systems – batch/ unit batch / step start and end times, durations, interactions, events, etc
- ***Continuous Data***: From multiple source Control Systems – Reactor Temperature, Agitation Speed, etc



Product Data:

- ***Lab Sample Test Result Data:*** Critical Quality Attributes (CQAs) – Loss in Drying, HPLC Results, Assays, etc

Data NOW acquired and in Required Context

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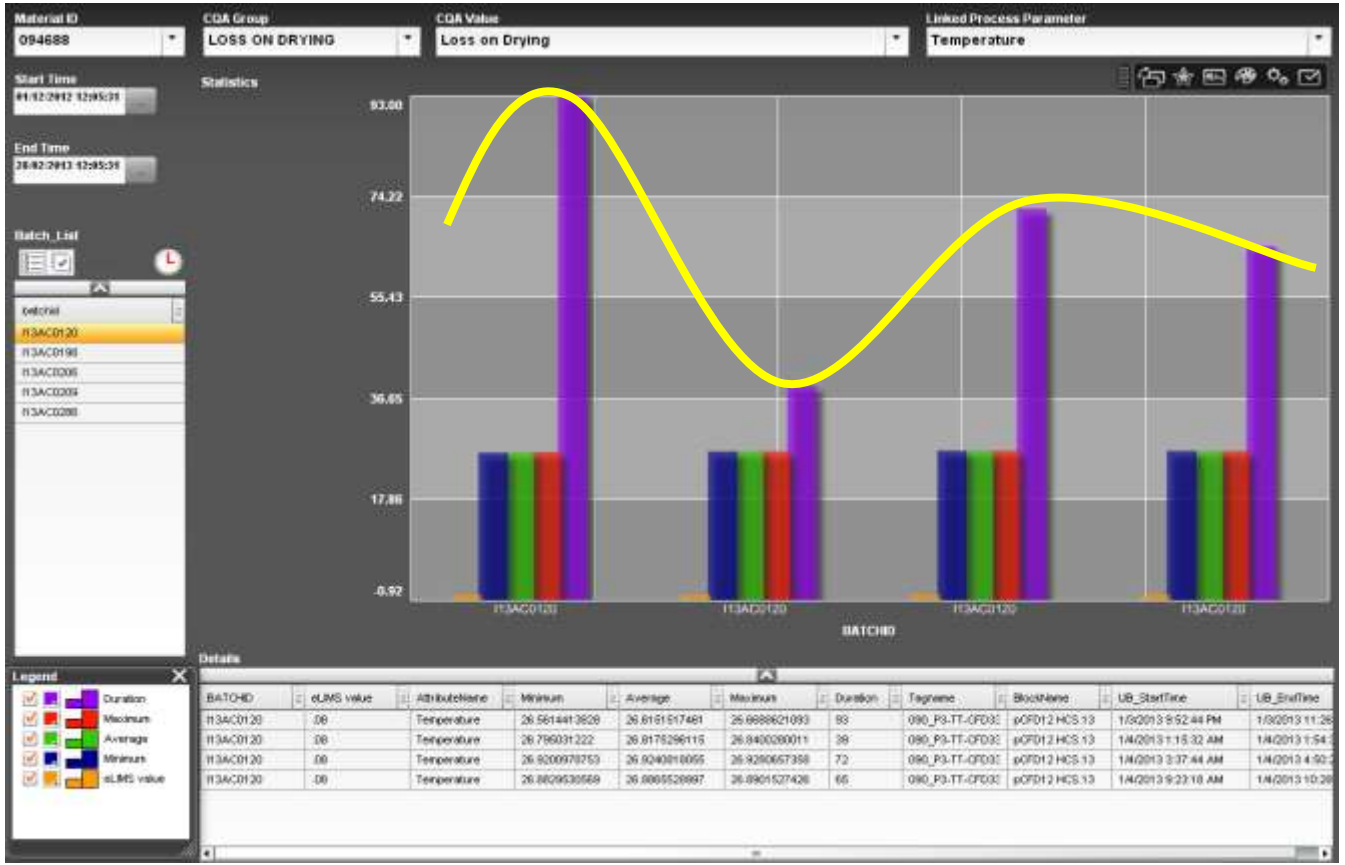
Creating Solutions – One System/ One View

VIEW PROCESS DATA

Batch Search
Batch Step Duration
Max Tag Value
Min Tag Value
Average Tag Value

VIEW PRODUCT DATA

Batch Search
Parameter List
CQA



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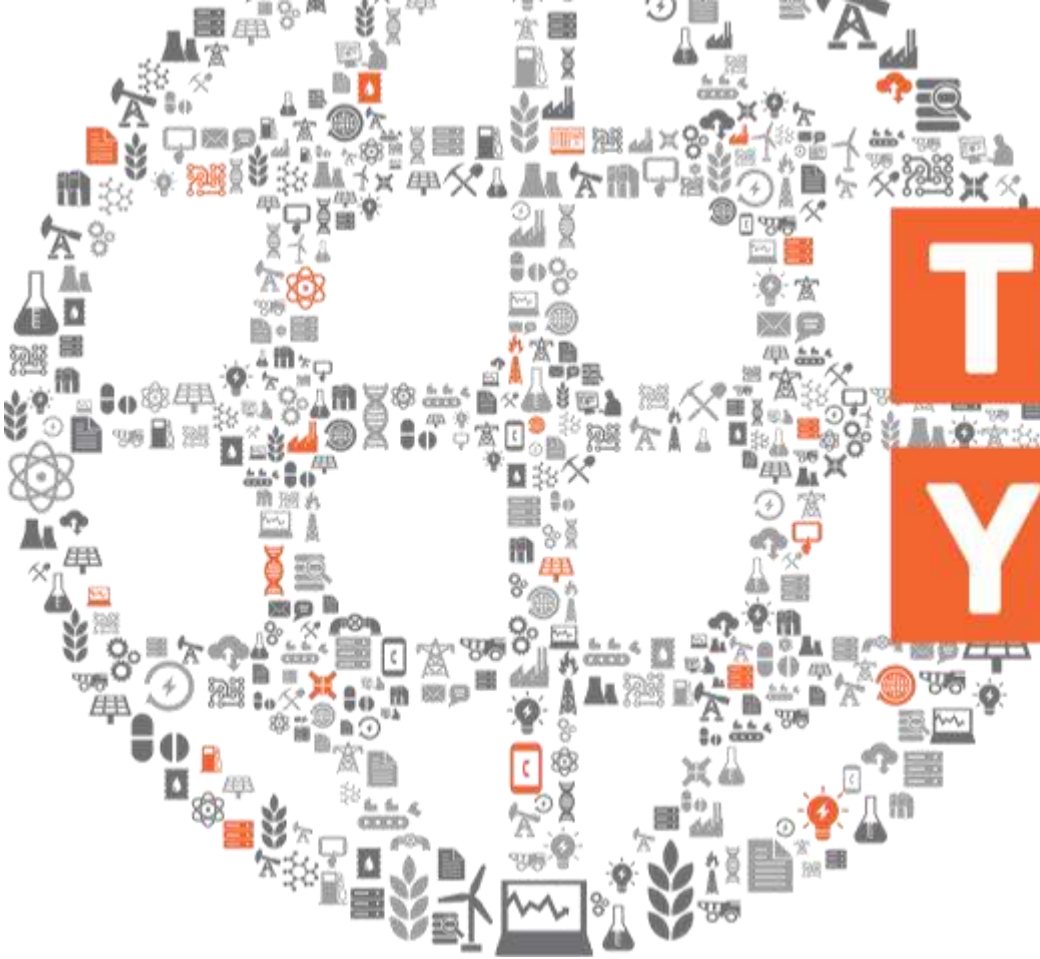

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Jim Crompton

Senior Advisor - Global Upstream IT, *Chevron*

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Large Volumes, Big Data and Advanced Analytics in Exploration and Production

Wilfredo Lee / AP

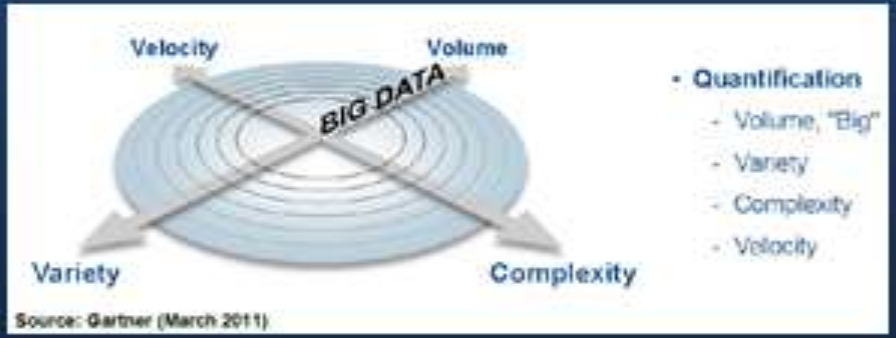
Chevron is considering a $40 million investment to produce 5 billion barrels of oil.

The Oil Industry is High Tech

Big Data Challenges are More Than Data Size

And require new technologies like MapReduce

The Four Axes of Big Data



- **Quantification**
  - Volume, "Big"
  - Variety
  - Complexity
  - Velocity

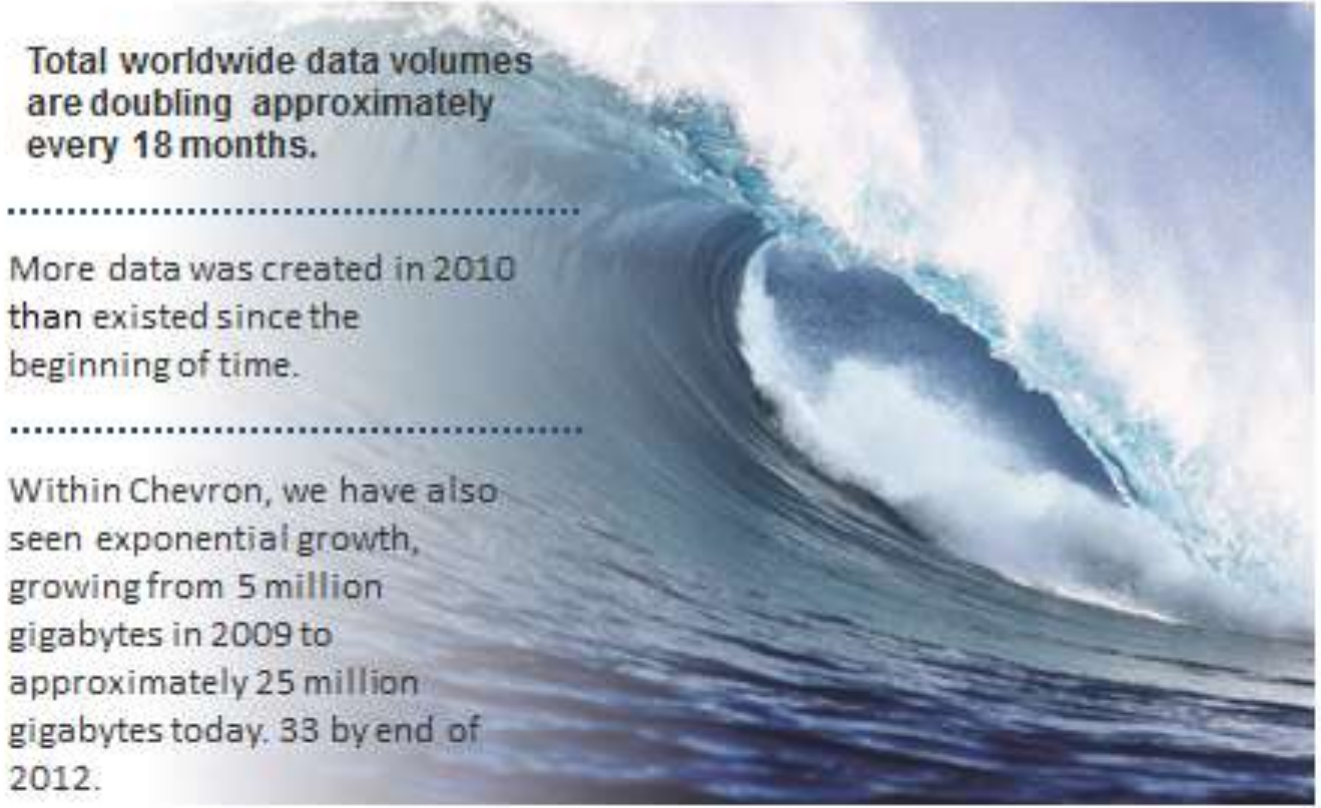
"CIOs face significant challenges in addressing the issues surrounding big data...

New technologies and applications are emerging **(examples include Hadoop and MapReduce)**

and should be investigated to understand their potential value."

Source: CEO Advisory: 'Big Data' Equals Big Opportunity, Gartner, 22 March 2012.

Digital Deluge

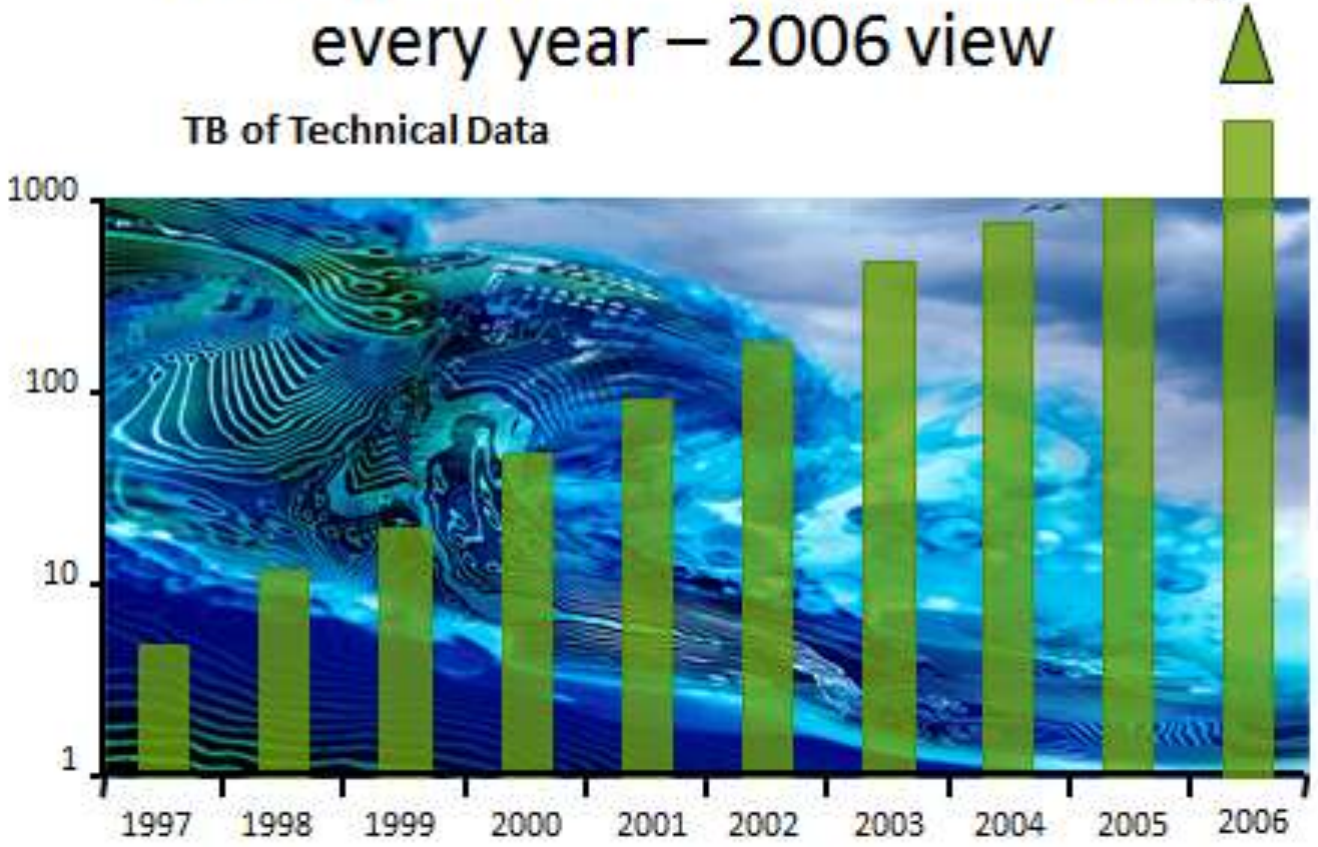


Total worldwide data volumes are doubling approximately every 18 months.

More data was created in 2010 than existed since the beginning of time.

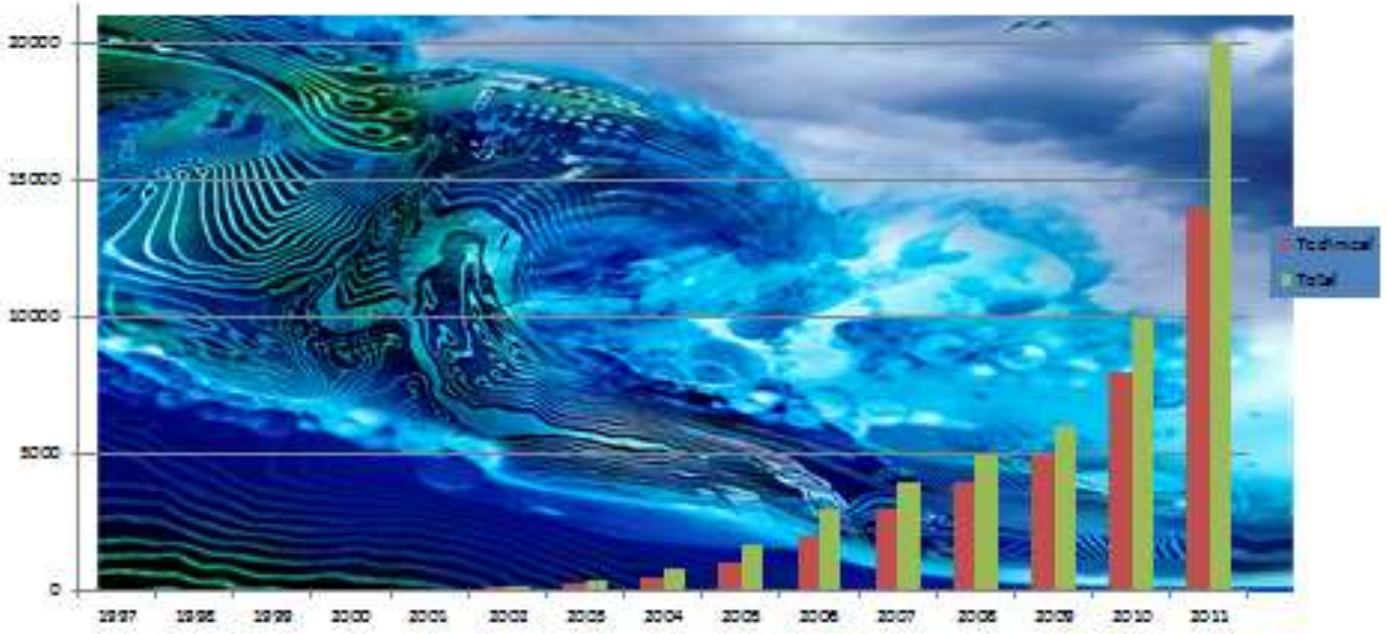
Within Chevron, we have also seen exponential growth, growing from 5 million gigabytes in 2009 to approximately 25 million gigabytes today. 33 by end of 2012.

Chevron's data storage is doubling every year – 2006 view

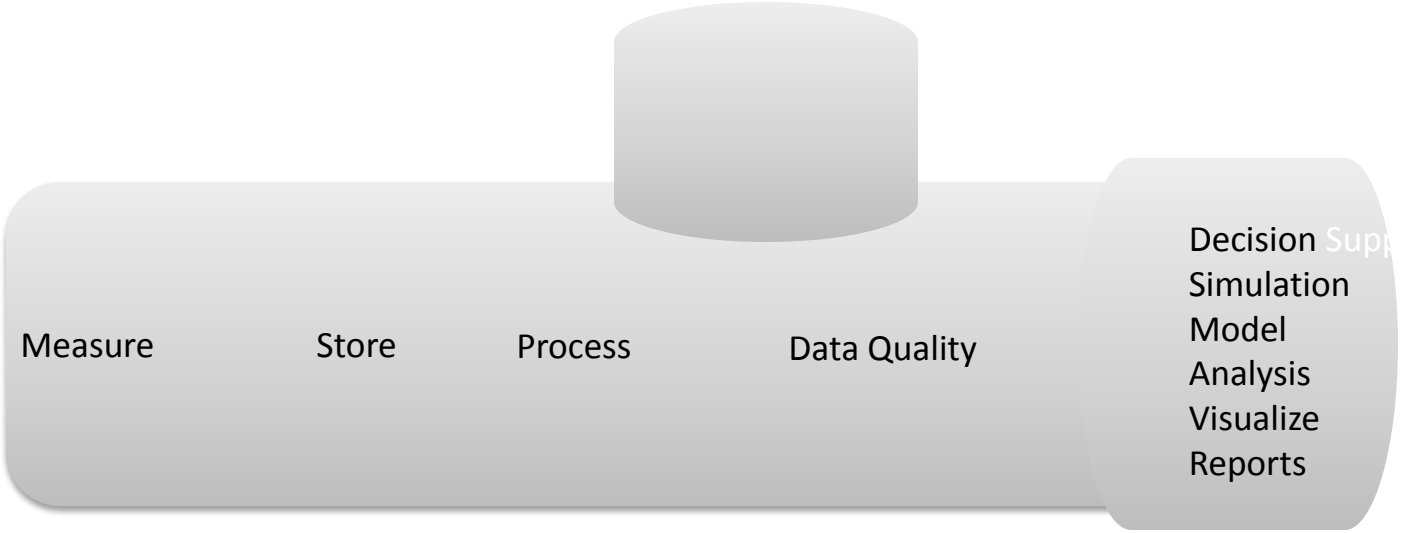


Total Data Volumes (rough estimate)

Grown about 10x since 2005, back to doubling yearly

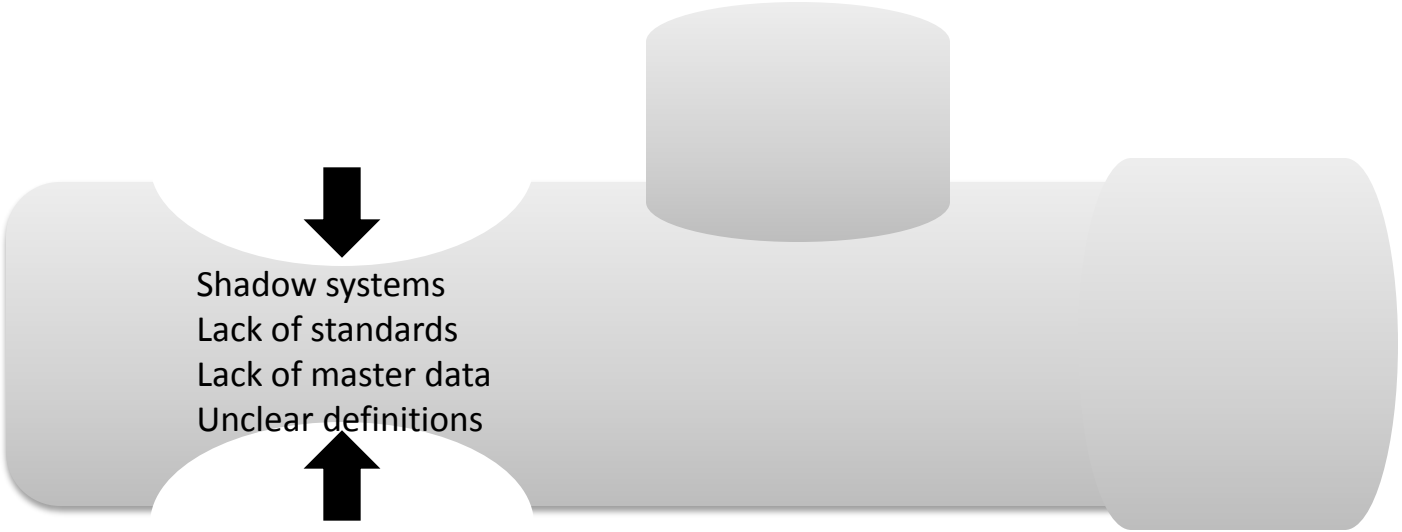


The Information Pipeline



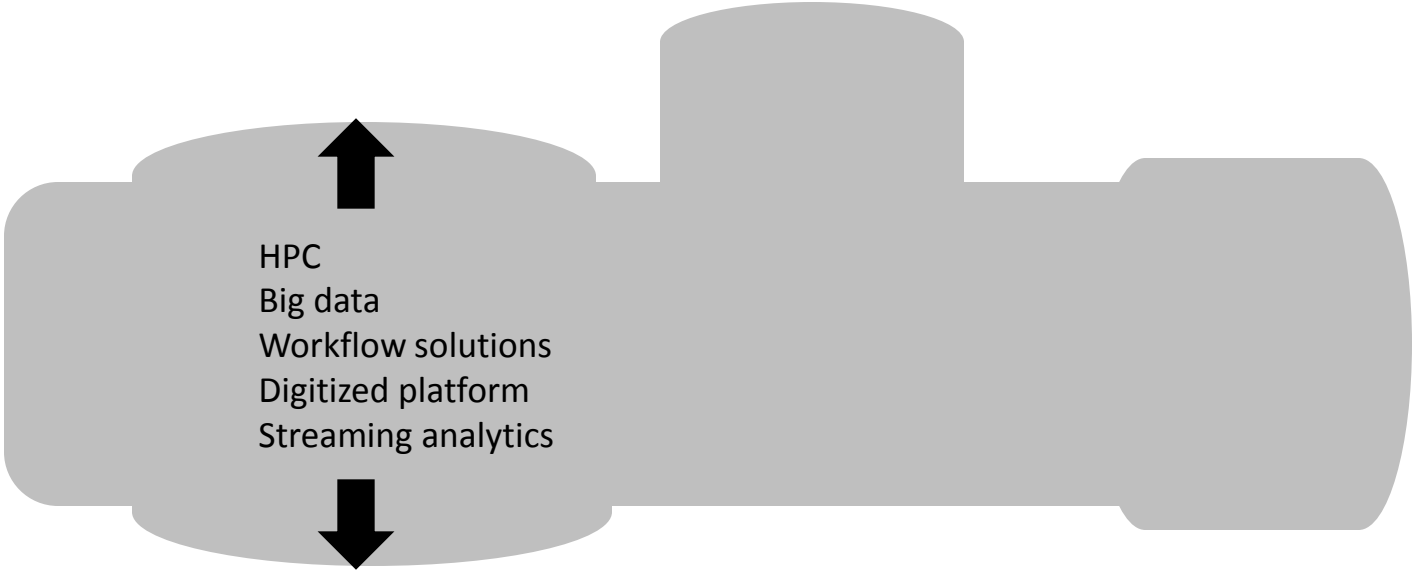
Fully Instrumented Facility

Barriers To Information Flow

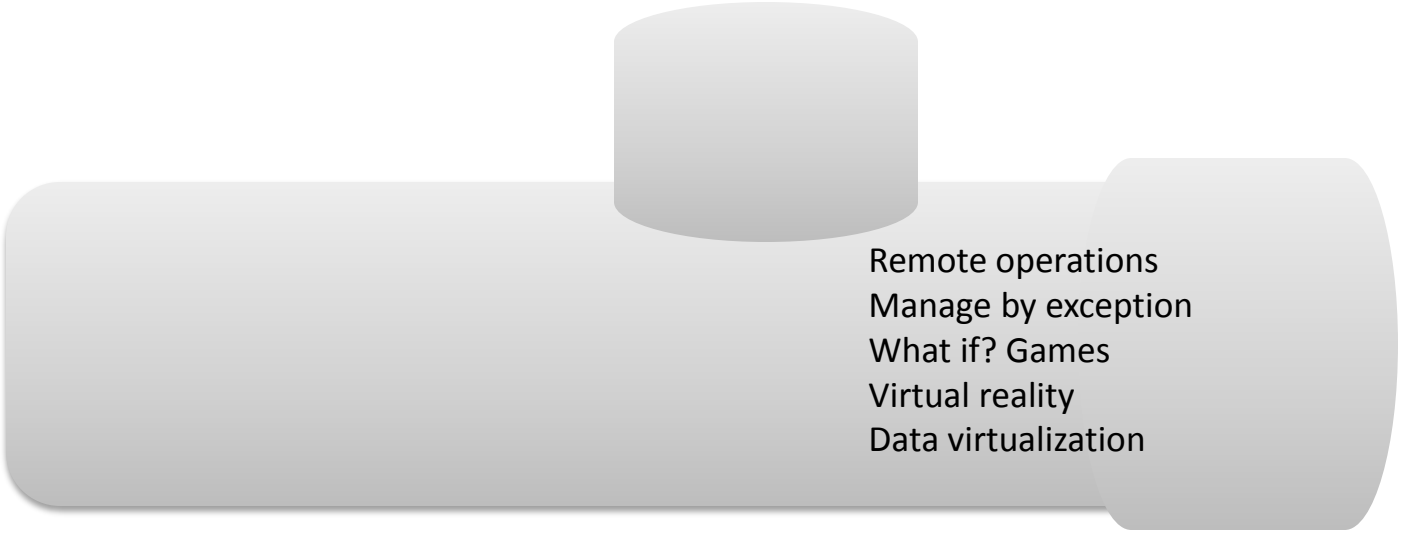


Where do you go to find information?

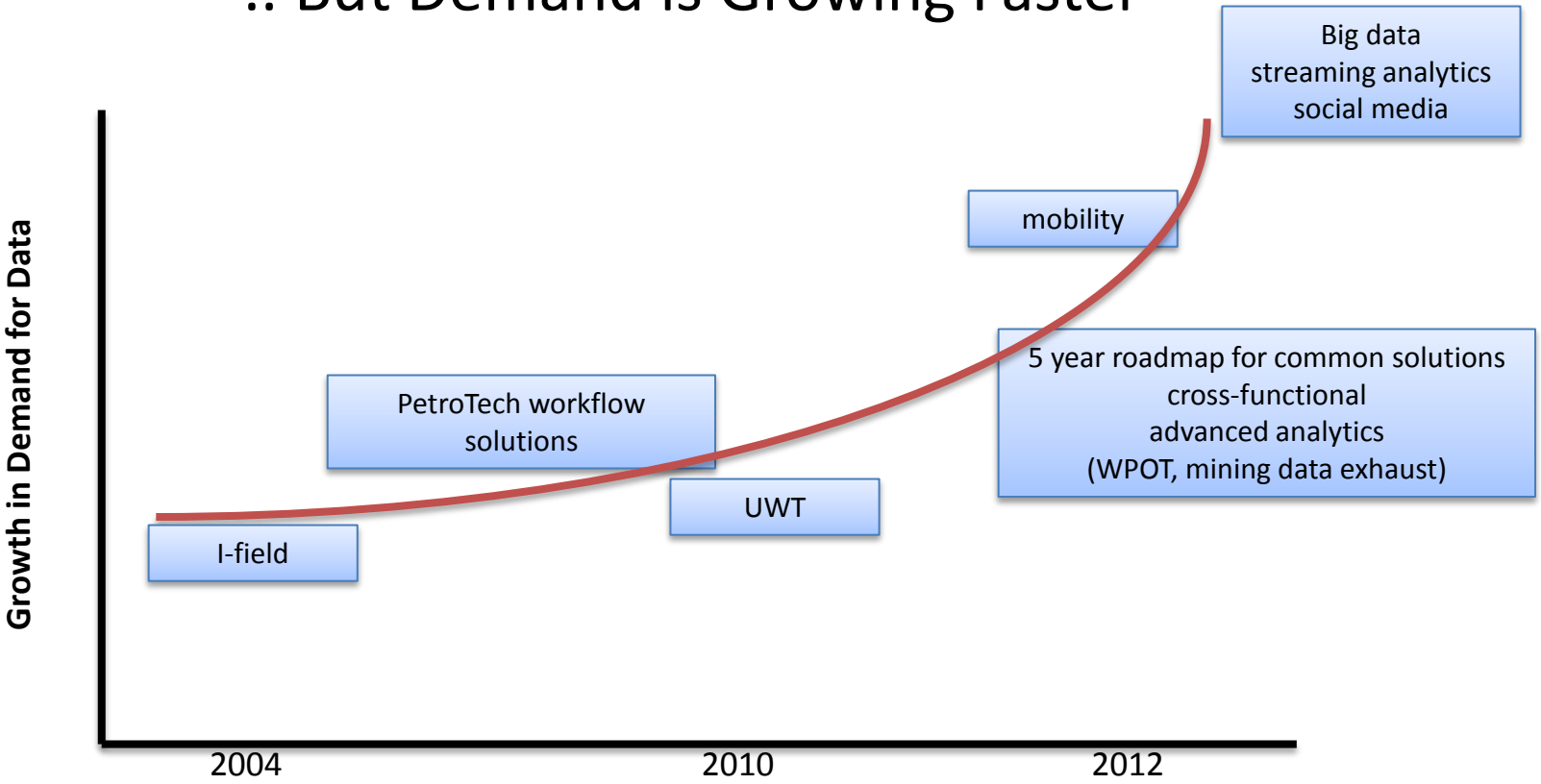
High Performance Computing



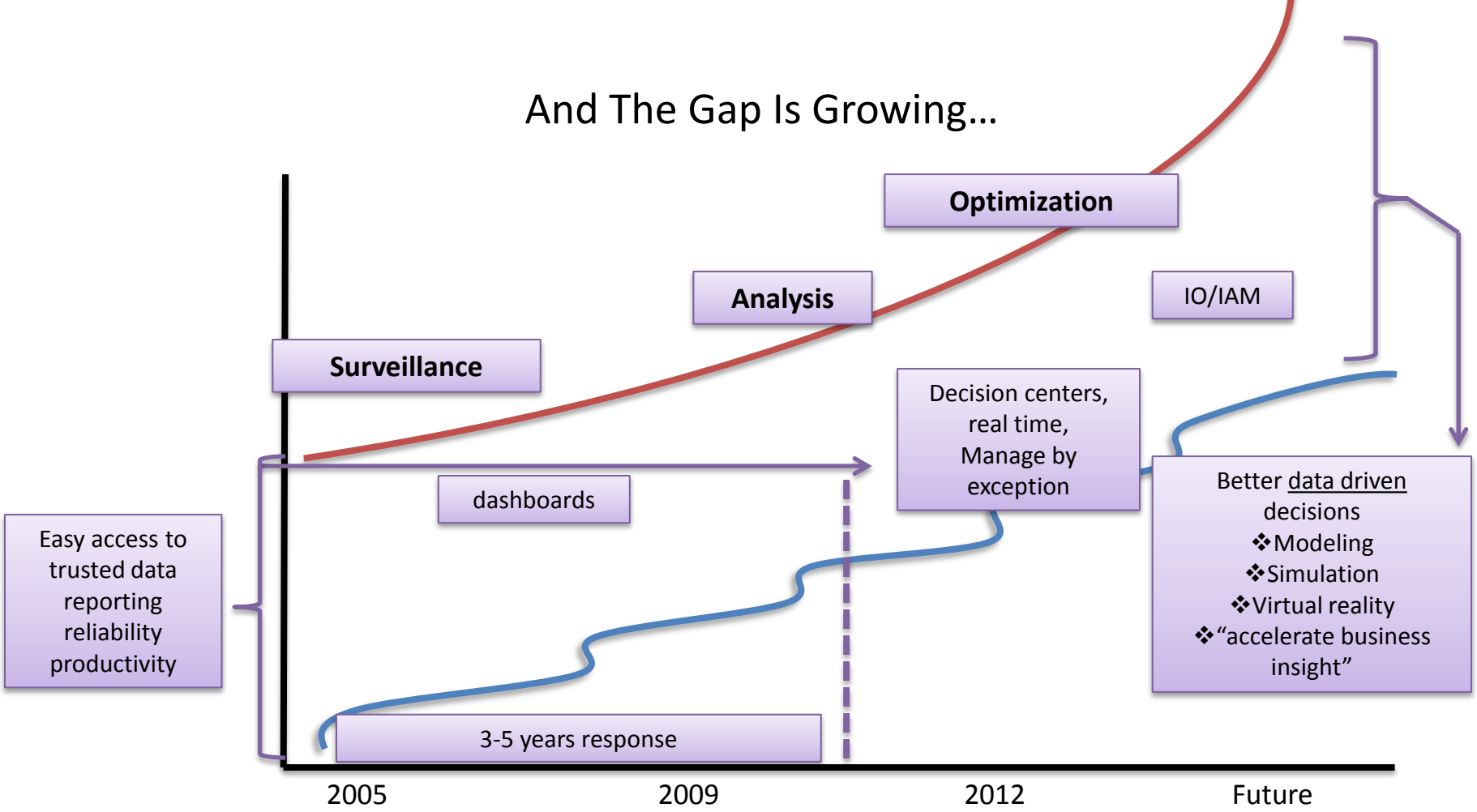
What Will The Future Bring?



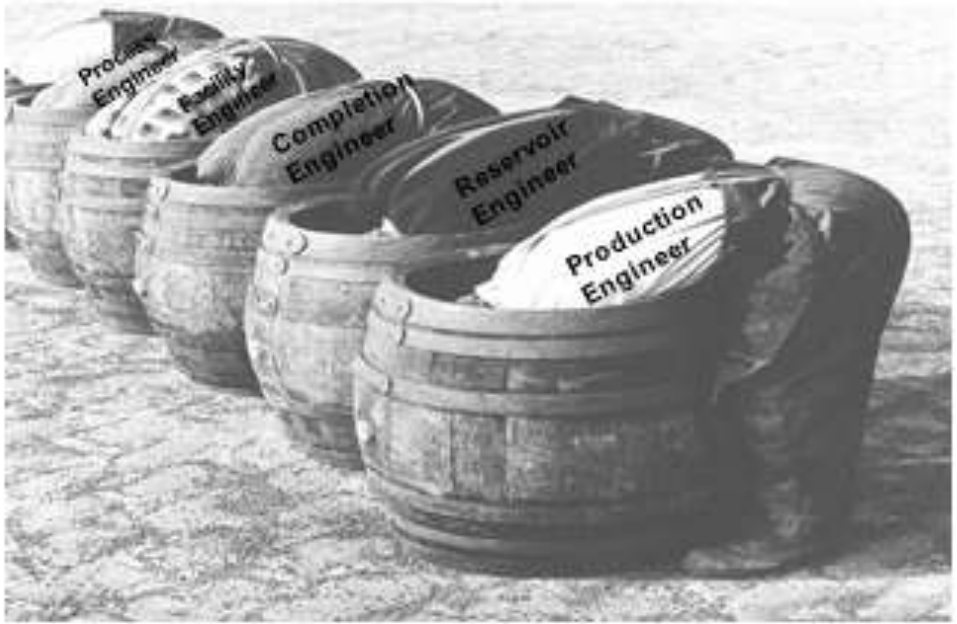
.. But Demand is Growing Faster



And The Gap Is Growing…



Work Process Change
The Challenge of Integration

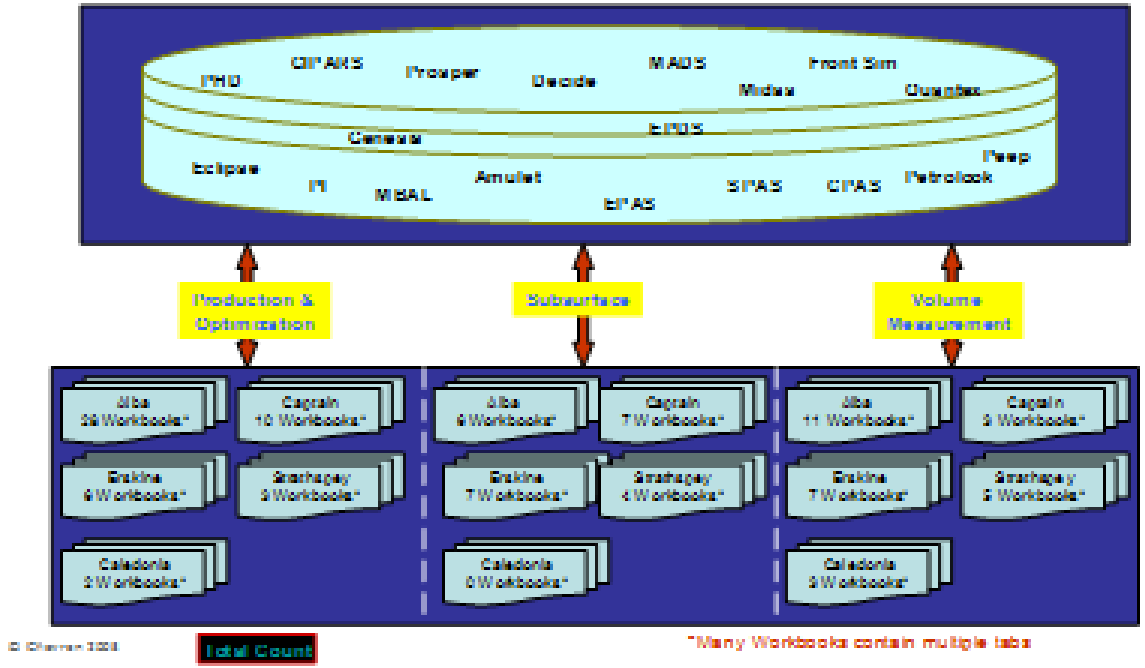


Tearing down the fences between professions is only possible if the technological barriers are removed

Adapted from Adolfo Henriquez

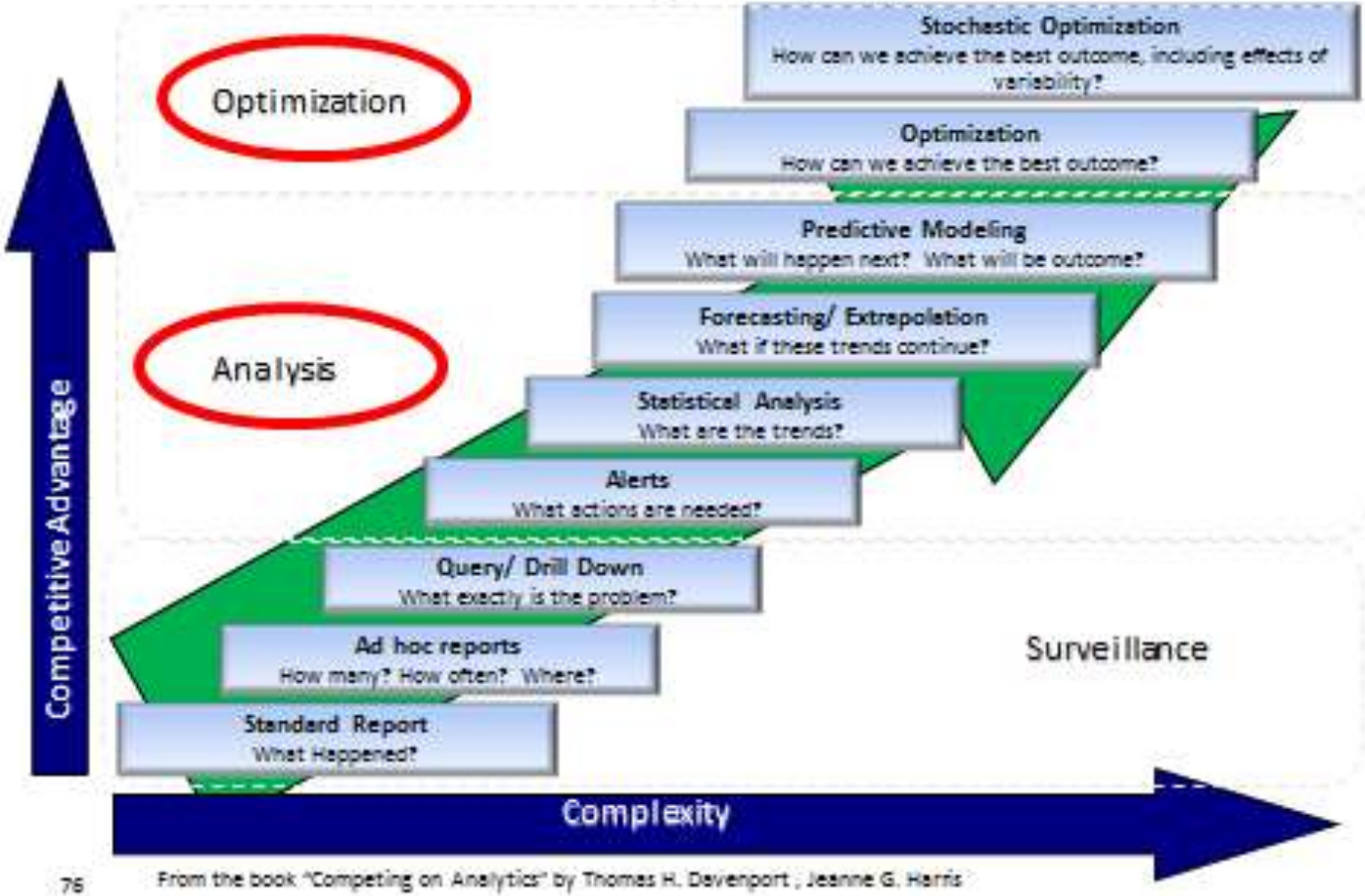
The Whole Truth

Current Environment – World of Excel



What is Modeling and Analytics?

When is Modeling and Analytics applied?



From the book "Competing on Analytics" by Thomas H. Davenport , Jeanne G. Harris

Analytics – Current State at Chevron

Stage 1: Analytically Impaired

Organization lacks one or several of the prerequisites for serious analytical work, such as data, analytical skills, or senior management interest

Stage 2: Localized Analytics

There are pockets of analytical activity within the organization, but they are not coordinated or focused on strategic targets

Stage 3: Analytical Aspirations

The organization envisions a more analytical future, has established analytical capabilities, and has a few significant initiatives under way, but progress is slow – often because some critical DELTA factor has been too difficult to implement

Stage 4: Analytical Companies

The organization has the needed human and technological resources, applies analytics regularly, and realizes benefits across the business. But its strategic focus is not grounded in analytics, and it hasn't turned analytics to competitive advantage.

Stage 5: Analytical Competitors

The organization routinely uses analytics as a distinctive business capability. It takes an enterprise-wide approach, has committed and involved leadership, and has achieved large-scale results. It portrays itself both internally and externally as an analytical competitor

Three Analytical Camps in Upstream

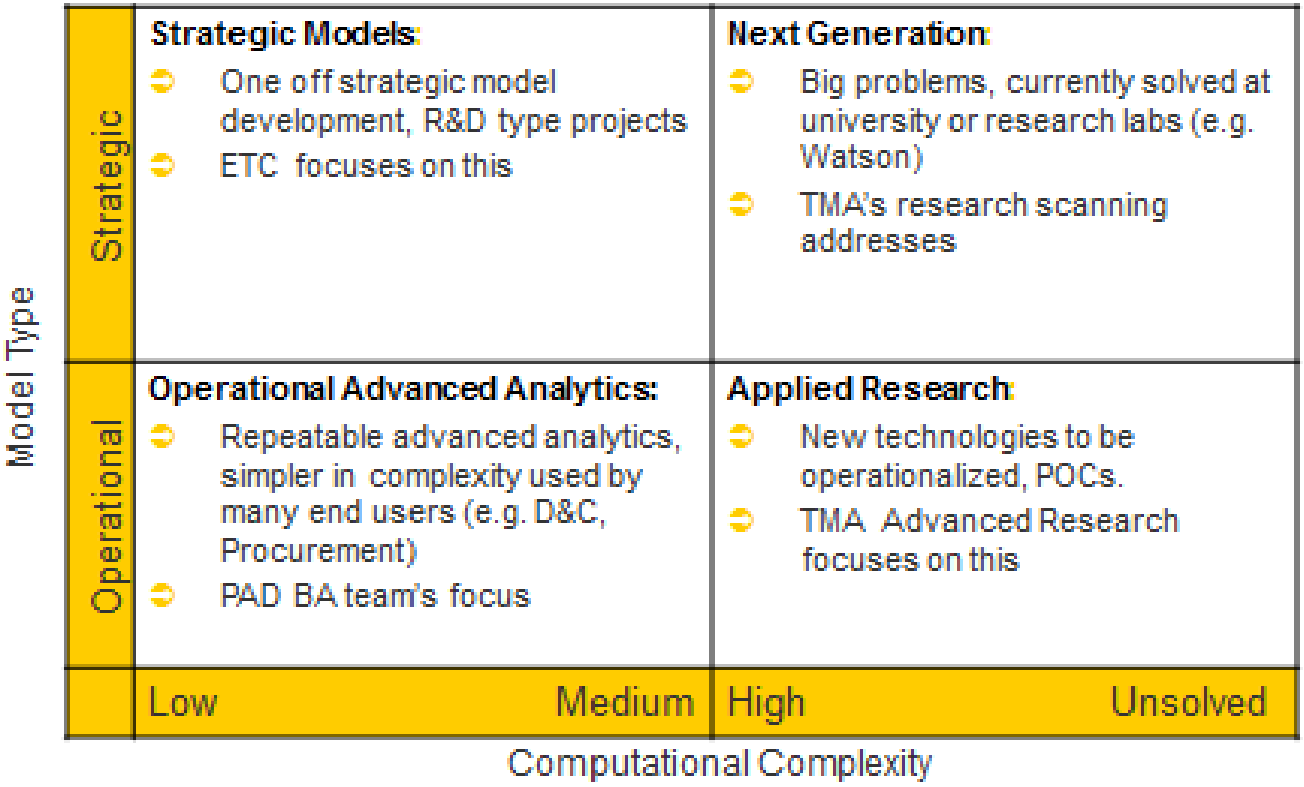
- The "Wizards": physics 1st principle based (D'Arcy's Law, Mass Balance; Chears, Eclipse, Intersect, Hysis)
- The "Statisticians": data driven proxy models (SmartSignal)
- The "Analysts": skip the models, drive right to the specific analysis (Bubble Maps for waterflood pattern analysis)

Business Challenges

Applications of Modeling and Analytics

- Predicting equipment failures
- Mining volumes of data for insights
- Scheduling:
  - Rigs
  - Drill ships
  - Tankers
- Planning:
  - Portfolio optimization
  - Facilities Usage Planning
  - Water Injection Planning
- Blending

Role and Space Definition for Advanced Analytics @ Chevron



Digital Exhaust –

Digital Information created as a result of doing something.

01010100 01101000 01100101
00100000 01100011 01101100
01100101 01100001 01110010
00100000 01101100 01100101
01100001 01100100 01100101
01110010

Digital Asset

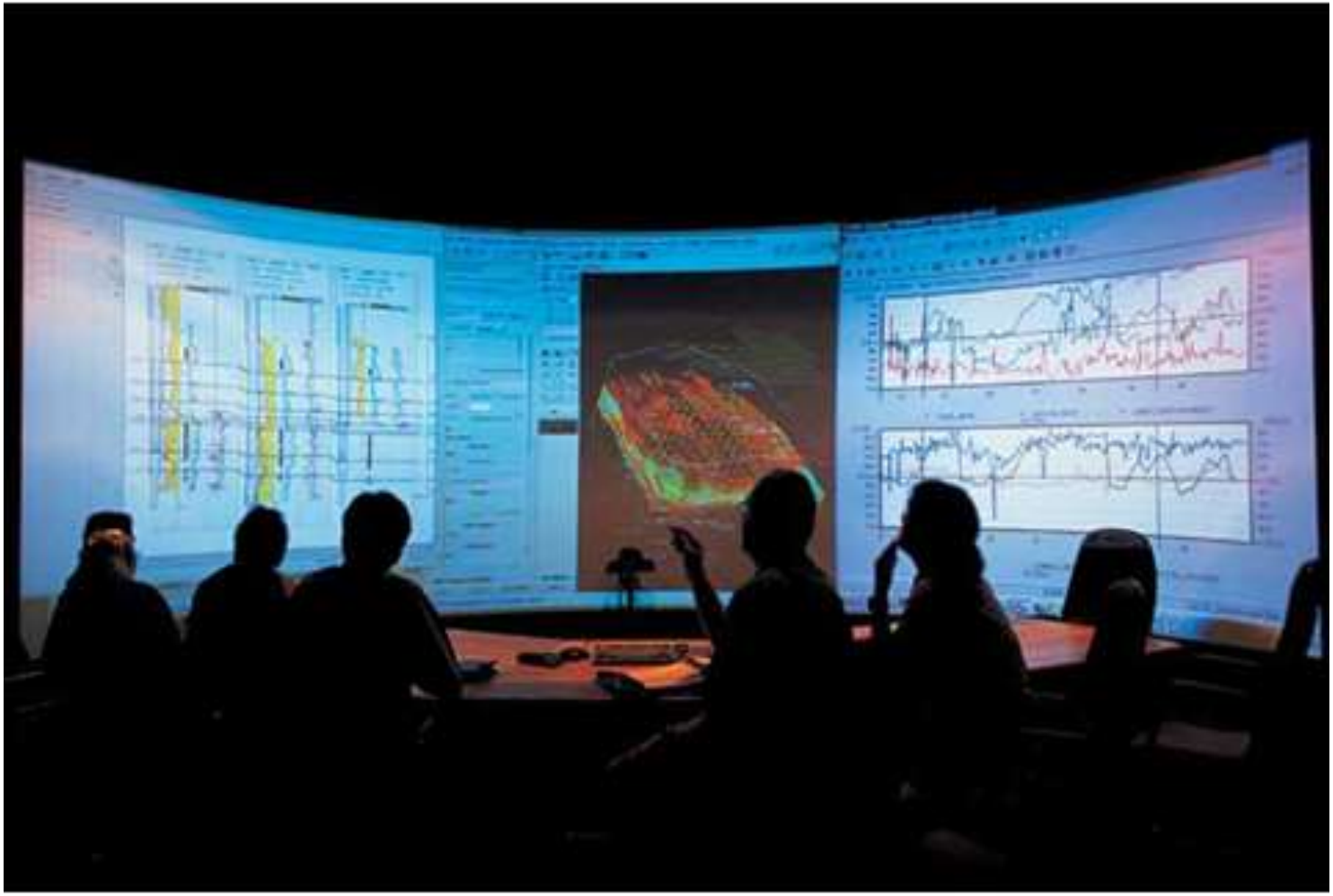
Physical Asset

Analytics in Exploration & Production

- Seismic
- Drilling Complex Wells
- Production Optimization (Heavy Oil)
- Advanced Process Control
- Common Earth Model/ Reservoir Simulation
- Integrated Operations

Digital Oil Field: The "Fourth Paradigm"

- Thousand years ago science was empirical: describing natural phenomena
- Last few hundred years theoretical branch: using models, generalizations
- Last few decades a computational branch" simulating complex phenomena
- Today: data explosion (eScience) unify theory, experiment and simulation
  - Data captured by instruments or generated by simulator
  - Processed by software
  - Information/knowledge stored in computer
  - Scientist analyses database/files using data management and statistics



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C. Dewey Forrester

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Thriving with Cloud Services

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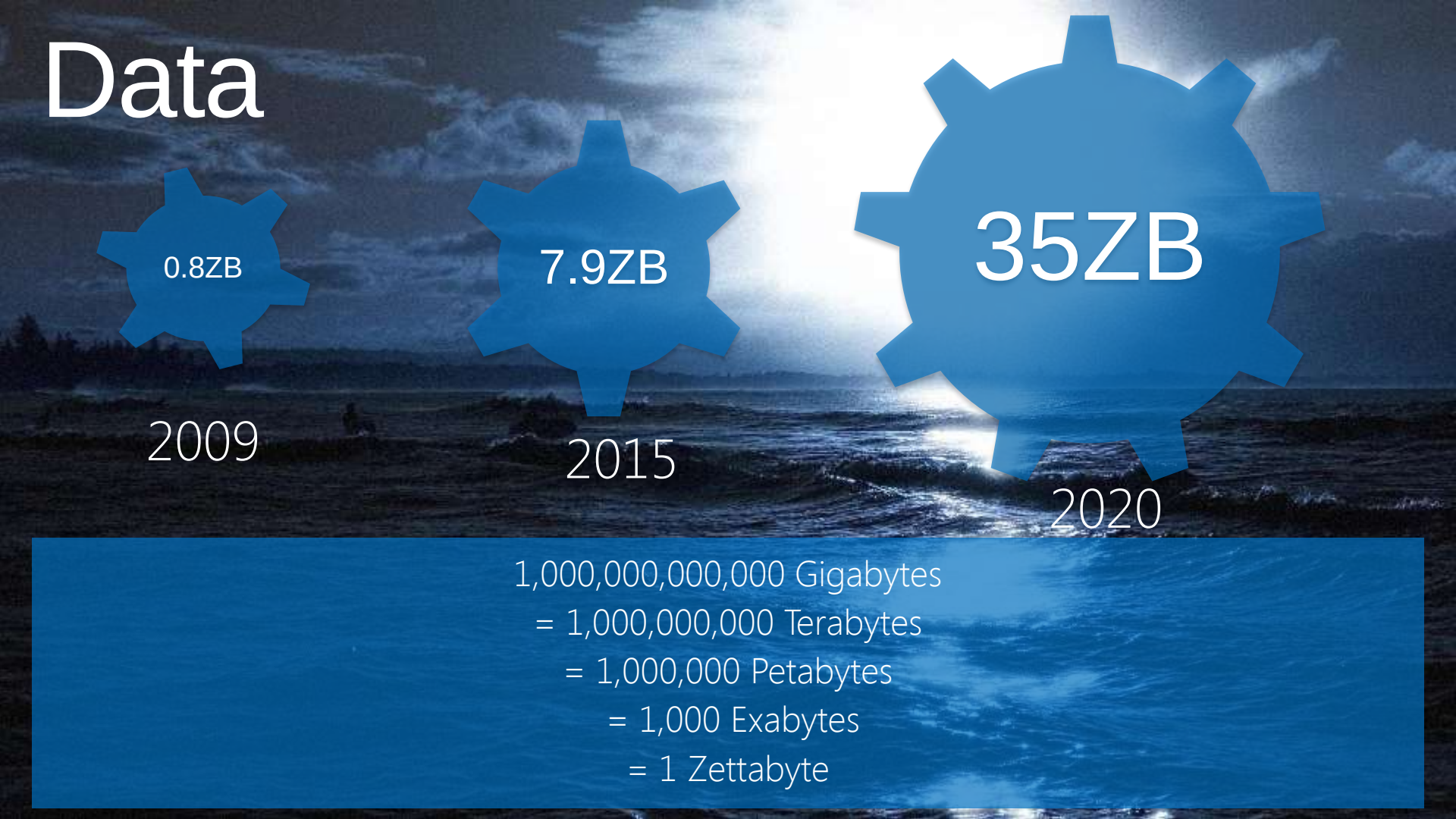
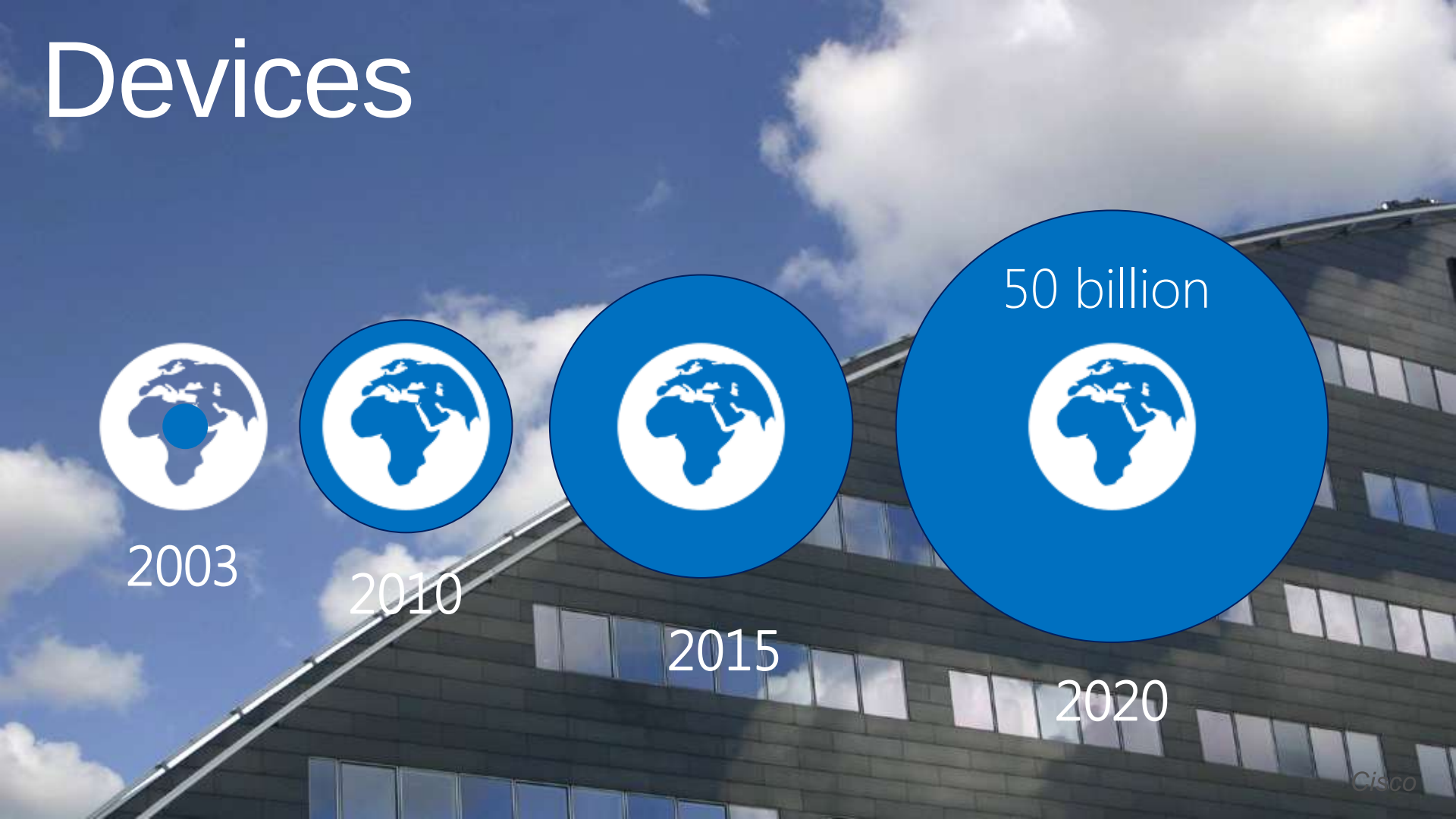
Data



1,000,000,000,000 Gigabytes
= 1,000,000,000 Terabytes
= 1,000,000 Petabytes
= 1,000 Exabytes
= 1 Zettabyte

Devices



Services

"SaaS will grow nearly five times faster than the software market as a whole reaching $67.3 billion by 2016."

"By 2016….nearly $1 of every $5 spent on applications will be consumed via the cloud."

Microsoft Picture

300
petabytes
Bing data

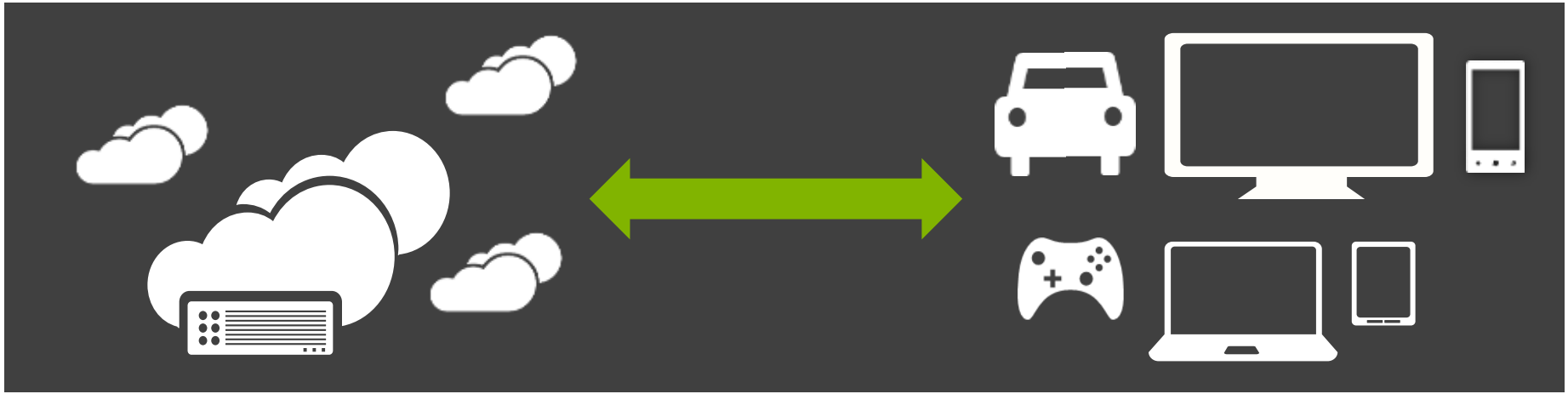
200+
services
online 24/7

350
million
email accounts

40
million
Xbox Live users

5.5
billion+
monthly searches

Continuous Services - Connected Devices



- World class service
- Hybrid IT
- Supports with open source, including Hadoop, Mongo, and mySQL

- Cloud-connected
- Supports multiple device platforms, including iOS and Android

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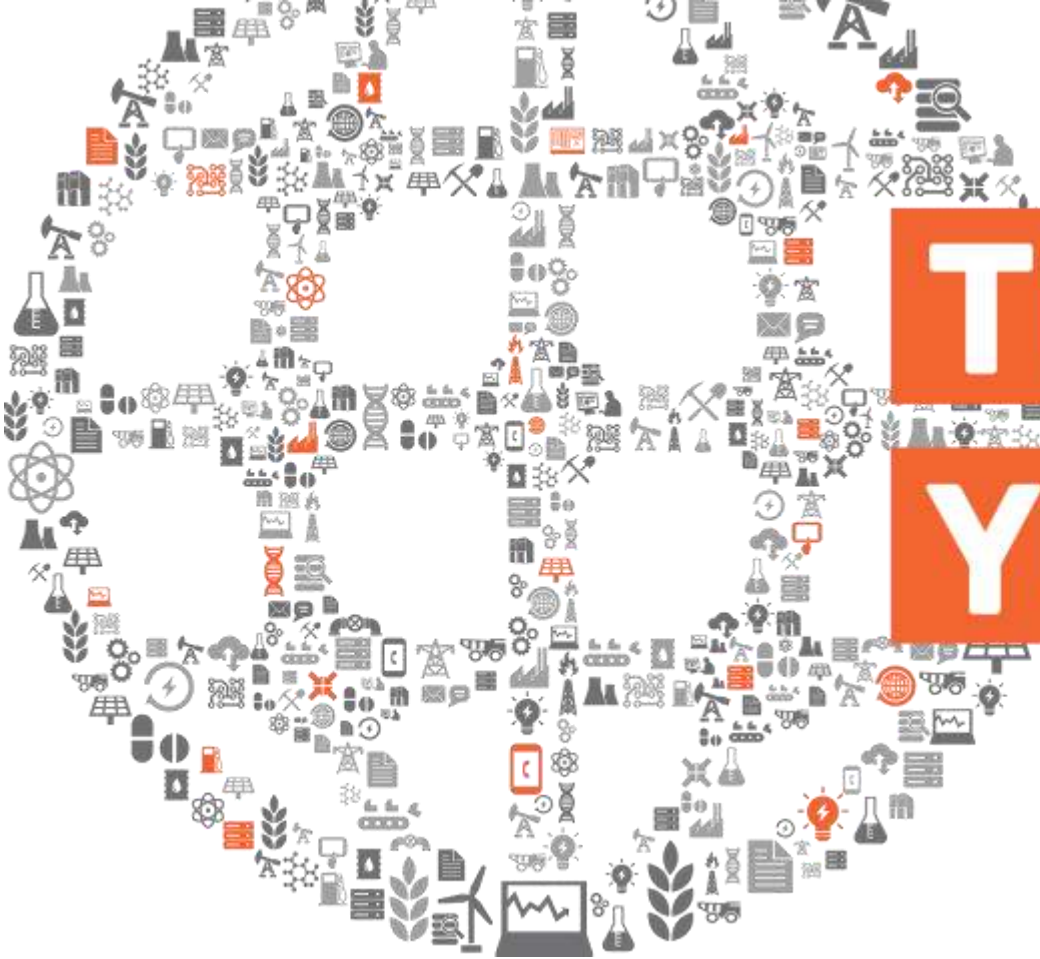

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