# Environmental Management In the Era of Big Data

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“In God We Trust, Everyone Else Bring Data”

“Data is To the Information Age What Fuel was to the Industrial Age”

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# “THE FUTURE AINT WHAT IT USED TO BE”

-Yogi Berra

# What is “Big Data”

- *“data sets so large and complex that they become awkward to work with using on-hand database management tools. Difficulties include capture, storage, search, sharing, analysis and visualization”*

# Big Data Attributes

- Volume
  - Amount of data
- Velocity
  - How quickly generated
  - How quickly analyzed
- Variety
  - Text, video, voice, emails, social media, sensors
  - Most data unstructured (unseachable)

# The Problem

- Exponential Growth of Data
- Most information is unstructured
  - Spreadsheets, file folders and cabinets
  - Different sources and formats of data
- Corporations have multiple content silos
- Different stakeholders requiring different data and reports (e.g., GHG)
- Different “gatekeepers”
- Difficult to share and analyze

# Enforcement

- State governments generate massive data
- Overwhelmed with volume and velocity of unstructured data
  - Only 2% have Big Data Strategy
  - 50% store but do not analyze
  - 46% need additional capacity
  - 34% need faster computation speeds
- Periodic Inspections
- Citizen Suits
- Retroactive Enforcement Actions

# Big Data Enforcement Paradigm

- Contaminated Site Databases
- Drones (pre-programmed or remote controlled)
  - Radar/Infrared/Chemical sensors/High Resolution Cameras
  - Wildlife/wetlands management
  - Icecap mapping
- Ontario MOE Computer Assisted Mobile Enforcement Office (CAMEO) system
- Crowd-sourcing (China Danger Map)
- Plume Modeling (China Arsenic Hot Spots)

# Big Data Enforcement

- River and Estuary Observatory Network(REON)
- National Ecological Observatory Network (NEON)
- NYC Sewer initiative

# Corporate Compliance-Today

- Regulatory Obligations
  - Data collection
  - Record keeping
  - Reporting
- Paper Files and Spreadsheets
- Facility-based records
- Large Data Sets Analyzed in Batches or “jobs”
- Uncoordinated Software Initiatives

# Big Data Compliance Tools

- Large Data Typically Analyzed in Batches
  - Streaming Analytics Allows real time
- Central Data Warehouse
- Multi-tier Approach
  - Tape Drives for Archiving
  - Traditional Disks for Frequently Accessed Data
  - Solid state storage for rapid analysis
  - Cloud storage for very large data sets

# General Benefits

- Better decisions faster
  - Streaming data enables more accurate decisions
- Improve productivity
- Boost ROI
- Reduce cost of data ownership
- Predictive Analytics
- Data Mining
- Natural Language Processing
- Visualization Tools (dashboards)

# Big Data Compliance

- Real time data to minimize accidental releases/analyze causes
- Quickly identify poorly operating equipment
- Emission Estimator (state, facility, equipment, processes, pollutant, etc)
- Permit management
- Internal Auditing
- Maintain History

# Big Data Compliance Cont'd

- Data Can Be Strategic asset
  - Market Trading
- Merger and Acquisitions
  - Assess process efficiency
  - environmental performance
  - Coordinate with business plan
  - EPA and state audit policies
- Examples
  - Con Ed manholes
  - BP Cherry Refinery
  - Pipeline decay

# Enhancing ROI

- What will it cost to implement now or later?
- What future costs can be avoided or minimized by using different approach?
- Better planning (e.g. emissions)
  - Production schedules
  - Plant capacity
  - Fuel usage
- “What if” scenarios
- Improved Permitting

# Sustainability

- Identify biggest environmental impacts
  - raw materials
  - use and disposal of its products? When and where do
- Where are the biggest impacts
  - Upstream in the supply chain?
  - shipping and distribution
  - Production
  - downstream (customers)

# Due Diligence-Current Practice

- State Paper Files
- Static Databases
- Limited Sampling
- Process Oriented Investigation/Remediation
- Manual Data Rooms
  - Populated by seller/banker
  - “No hunt” clauses

# Big Data Due Diligence

- Electronic Data Rooms
- Predictive Models For Contaminated Sites and plumes
- Profiles for Problematic Dry Cleaners and other uses
- Facebook/Google

# Big Data Remediation

- Site and Portfolio Management
- Environmental Data
- Remediation Compliance
- Finance Information
  - Environmental Obligations (ASC 410-30)
  - Expenditures
  - Recovery and Financial Claims
  - Sarbanes-Oxley

# Lawyer Implications

- Data Driven Case Evaluation Assessments
  - Litigation patterns
  - analyze jury verdict and settlement data
  - Expert witness history
  - MedMal Navigator has interactive Q/A
- TyMetrix Legal Analysis
  - Fee structures
  - Settlements
  - benchmark expenses for similar matters

# Hiring Your Lawyer

- Legal Fees Efficiency
  - Sky Analytics/Right Rate Advisor/Counsel Link Insight
  - Staff Workload Metrics
  - Individual atty history/overtime billing, etc
  - Hourly rates for similar work/firm size/area
  - Spend to Budget
  - Track and Benchmark Timekeeper Rate Increases
  - Diversity needs

# Hiring and Evaluating Your Lawyer

- Firm-by-firm comparisons on
- Average blended rates in total and by matter
- Productivity of lawyers
- Adherence to budgets
- Amount realized through discounts or alternative fee arrangements (AFA)
- number of lawyers per matter
- Partner-to-associate ratios
- Diversity metrics
- Performance ratings of firms by in-house lawyers

# Hiring Your Litigator

- Legal Metrics
  - Where has the attorney litigated in the past?
  - Does the attorney quickly settle, or fight to the finish?
  - How successful is this attorney
- Example:
- Total Case Cost = ƒ(expense + outcome)
- Expense = ƒ(process, rates, role utilization)
- Subject to: economic factors, geography, practice area, industry served, etc