

# Architecting a Universal Sensor Analytics Platform for Utilities

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Ping**Things**



Berkeley  
UNIVERSITY OF CALIFORNIA

# Presentation Outline

1. Introduction and Motivation  
Sean Murphy (~10 minutes)

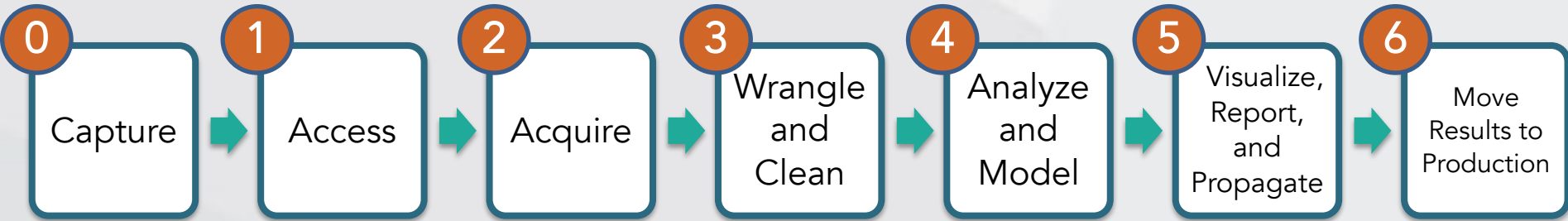


2. Time Series Storage and Analysis  
Michael Andersen (~30 minutes)



3. Q&A(~10 minutes)

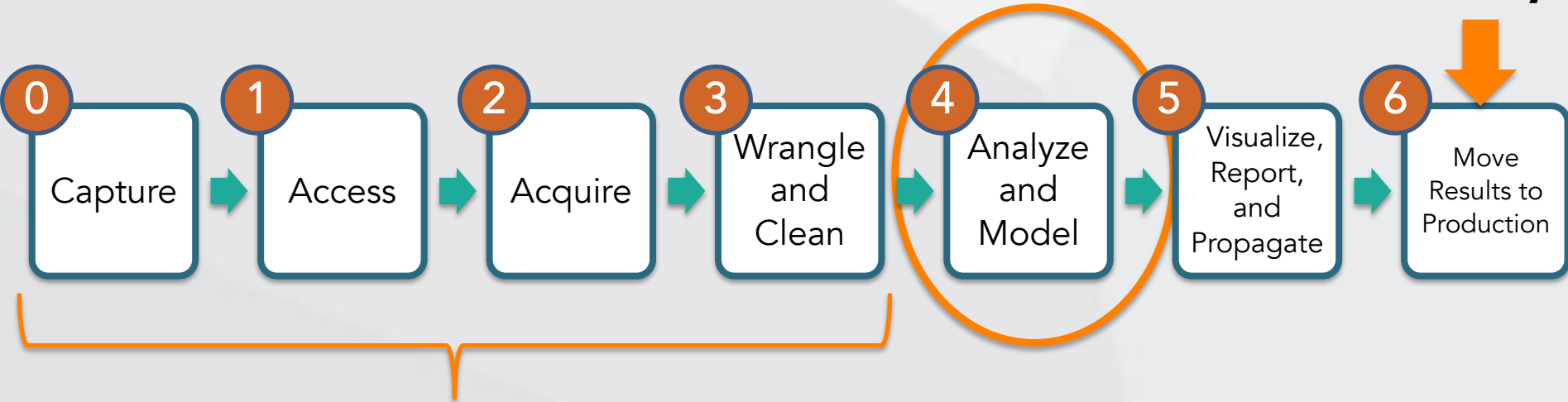
# The Analytics Pipeline



# The Analytics Pipeline

**The Fun Part!!!!  
What people  
care about.**

**What  
makes  
money**



**80-98%  
of time/resources**

# Annual Data Volumes



SCADA

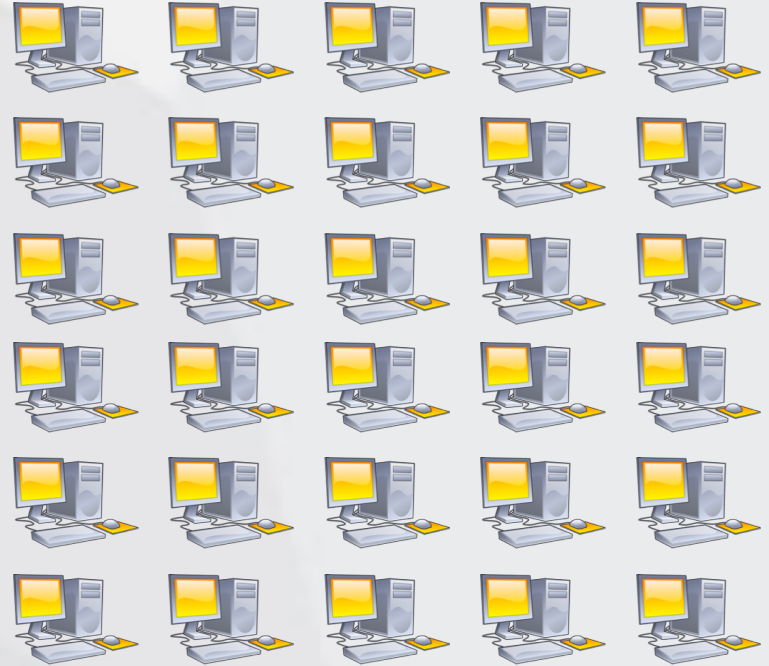
PMU

DFR

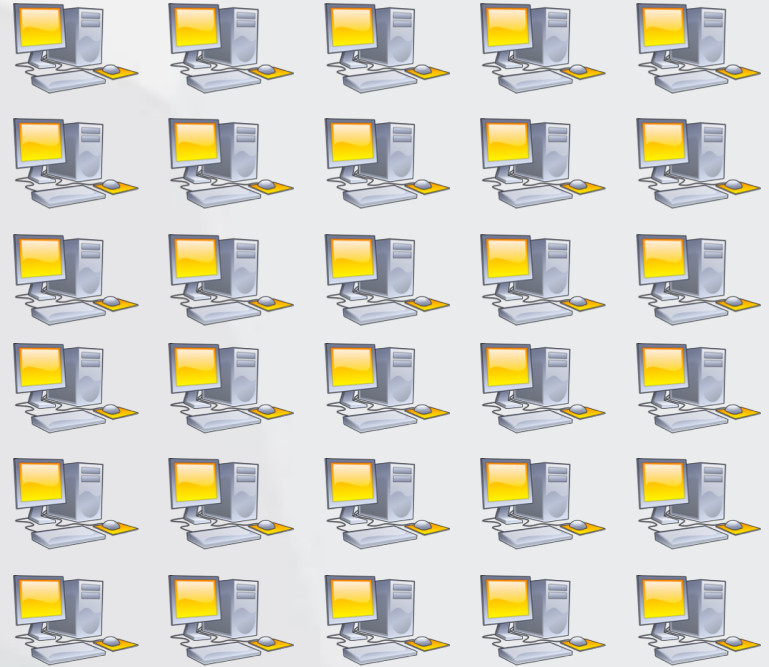
Sampling Rates



# Two Options



# Really Only One Option



# The Three Generations of Big Data Systems

## (1) Hadoop

## (2) Spark

## (3) Custom

### Workload

Batch processing

Iterative processing

Continuous processing

### Dominant Analytics Paradigm

Classic Business Analytics

Machine Learning

ML and Deep Learning

### Features

Map reduce  
Disk oriented  
Generic

In memory  
Better tooling

Data type specific  
Industry and application focused

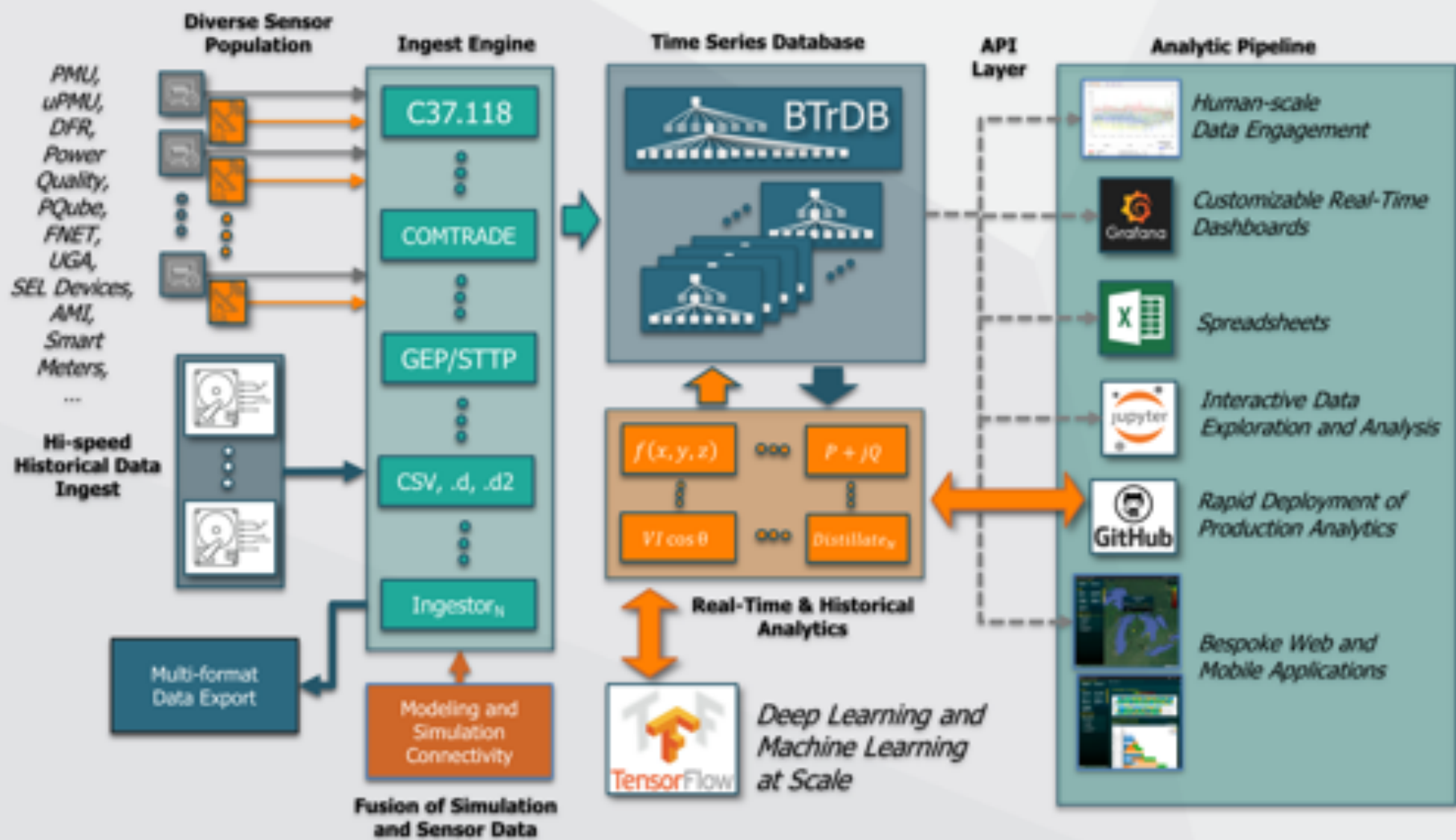
### Limiting Reagent

Disk bandwidth

Memory capacity

Compute





# Jevons Paradox

In 1865, a twenty-nine-year-old Englishman named William Stanley Jevons published a book, "The Coal Question," in which he argued that the bonanza couldn't last. Britain's affluence, he wrote, depended on its endowment of coal, which the country was rapidly depleting. He added that such an outcome could not be delayed through increased "economy" in the use of coal—what we refer to today as energy efficiency. He concluded, in italics, "*It is wholly a confusion of ideas to suppose that the economical use of fuel is equivalent to a diminished consumption. The very contrary is the truth.*"\*

"occurs when technological progress increases the efficiency with which a resource is used (reducing the amount necessary for any one use), but the rate of consumption of that resource rises because of increasing demand"

# Thank You!

Any questions?

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