



# PI Enabled Multi-Cloud Data Pipelines for Analytics

Embassy of Things



# Agenda

- **Introduction**
- **Business Challenges**
- **PI, Applications & Data Pipeline**
- **Twin Talk**
- **Highlights, Best Practices & Lessons Learned**
- **Summary**

# Production Surveillance Applications

Development and Exploration Predictor Map & Advanced Process Analytics



Intelligent Production Surveillance and Optimization (IPSO) Onshore



Intelligent Production Surveillance and Optimization (IPSO) Offshore

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Optimize well performance analysis and calculate diagnostics through real-time surveillance and automated algorithms



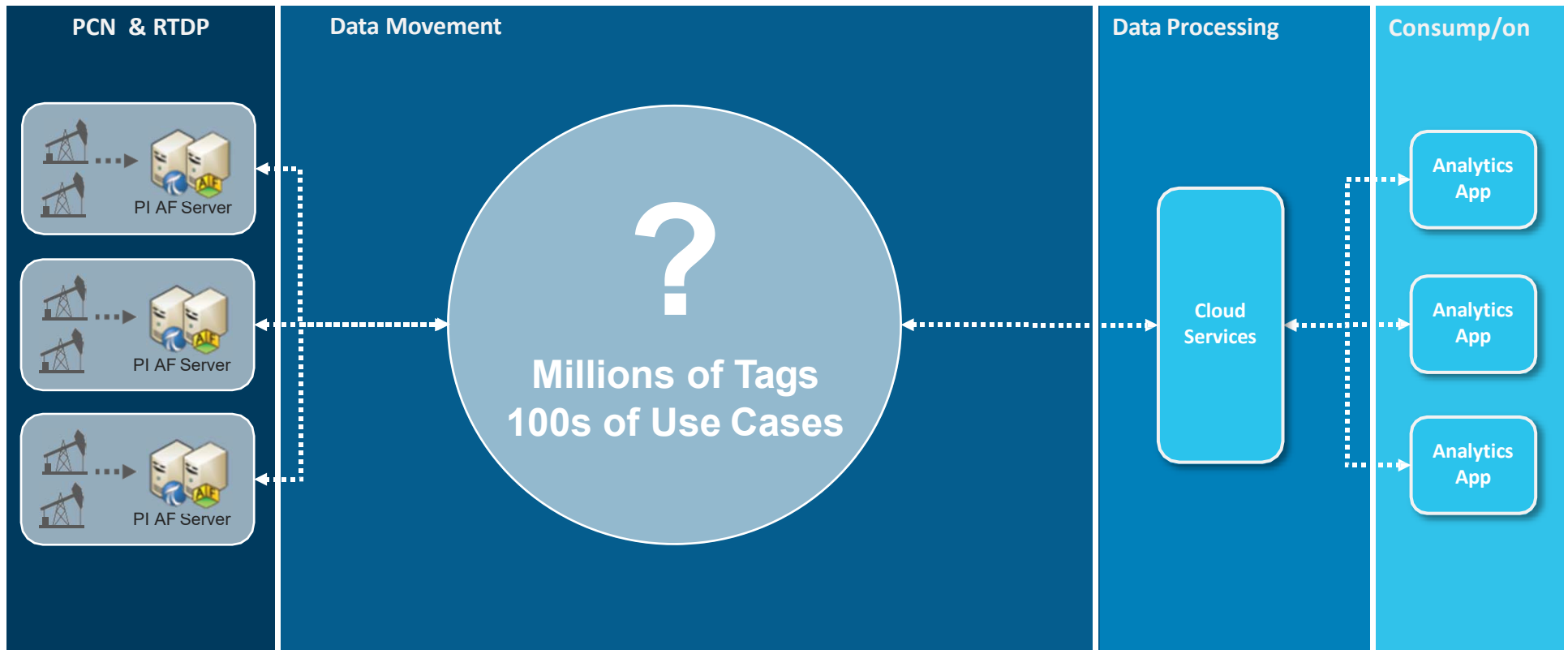
*Developed by Advanced Analytics and Emerging Technologies Team*

# APA - Anomaly Detection System

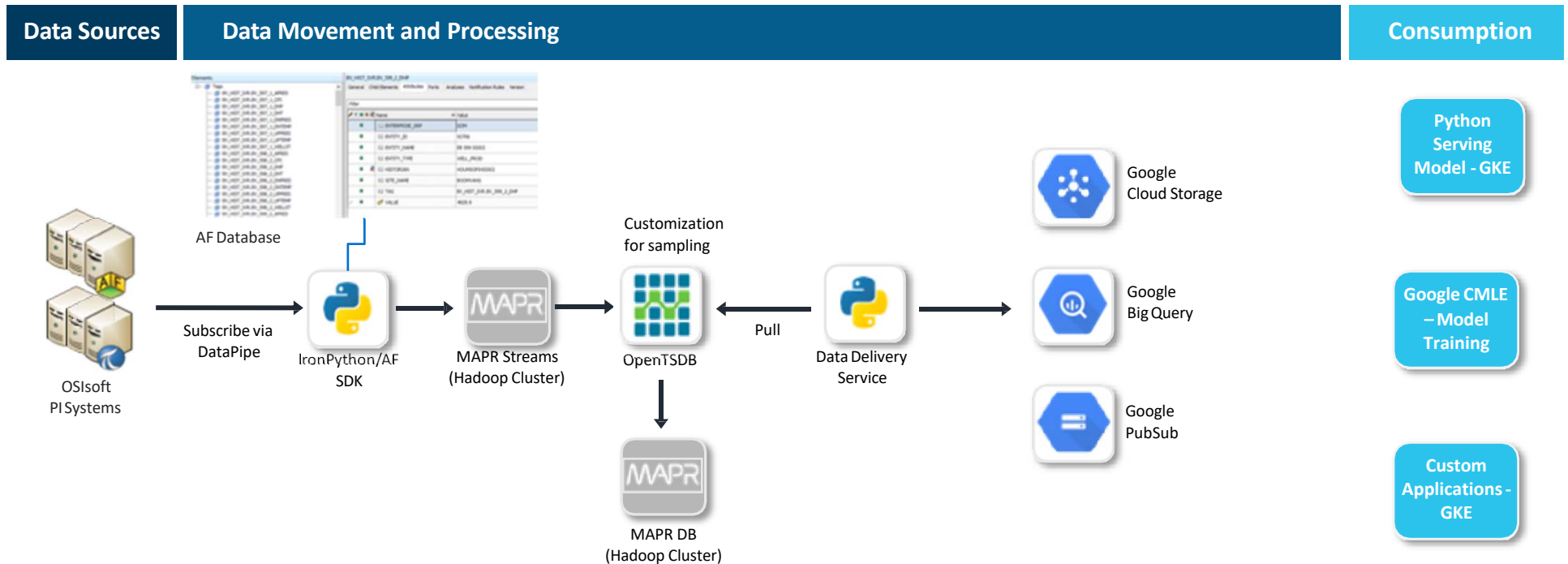
- Goal: provide assistance in performing root cause analysis (RCA) after equipment outages, and lay the foundation to enable preventive measures
  - Increase uptime via lessening unplanned outages
  - Shorter maintenance cycles
- Applied to high value operational assets
  - Offshore Platforms - e.g. pipeline pumps, compressors
- Consumable to all applications, e.g. Onshore, Offshore, etc
- ML training (weekly, daily, hourly)
  - hyperparameter tuning
  - automated threshold calculation
- AF - Equipment/Asset Tag structure

# Business Challenges Addressed

Transferring PI Data to Applications that Maximize Operational Efficiencies



# APA Data Pipeline - Original Approach



# APA Data Pipeline - Challenges to Address

## Data Sources



## Data Movement and Processing

### Initial Data Pipeline from PI to Cloud

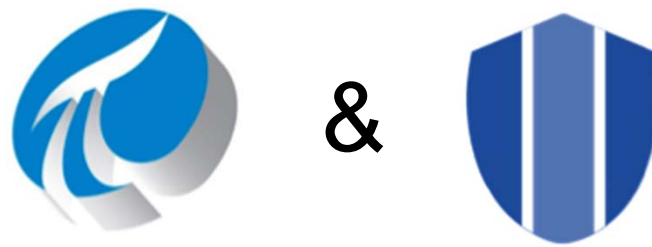
- Custom developed code, non-HA
- Unique, non-redundant skills
- Manual touch Backfill process
- Increased Technical debt
- More Operational monitoring points

## Consumption

Python  
Serving  
Model - GKE

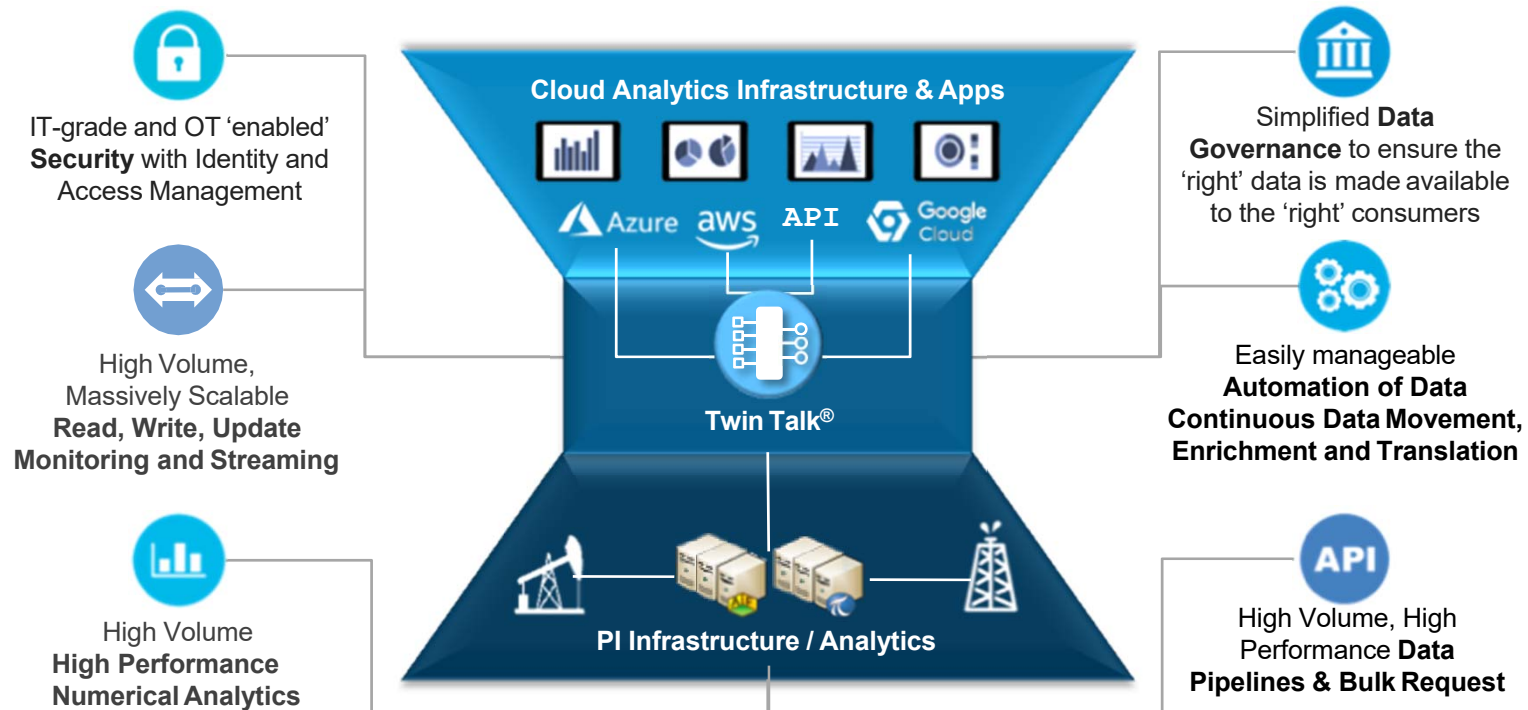
Google CMLE  
– Model  
Training

Custom  
Applications -  
GKE



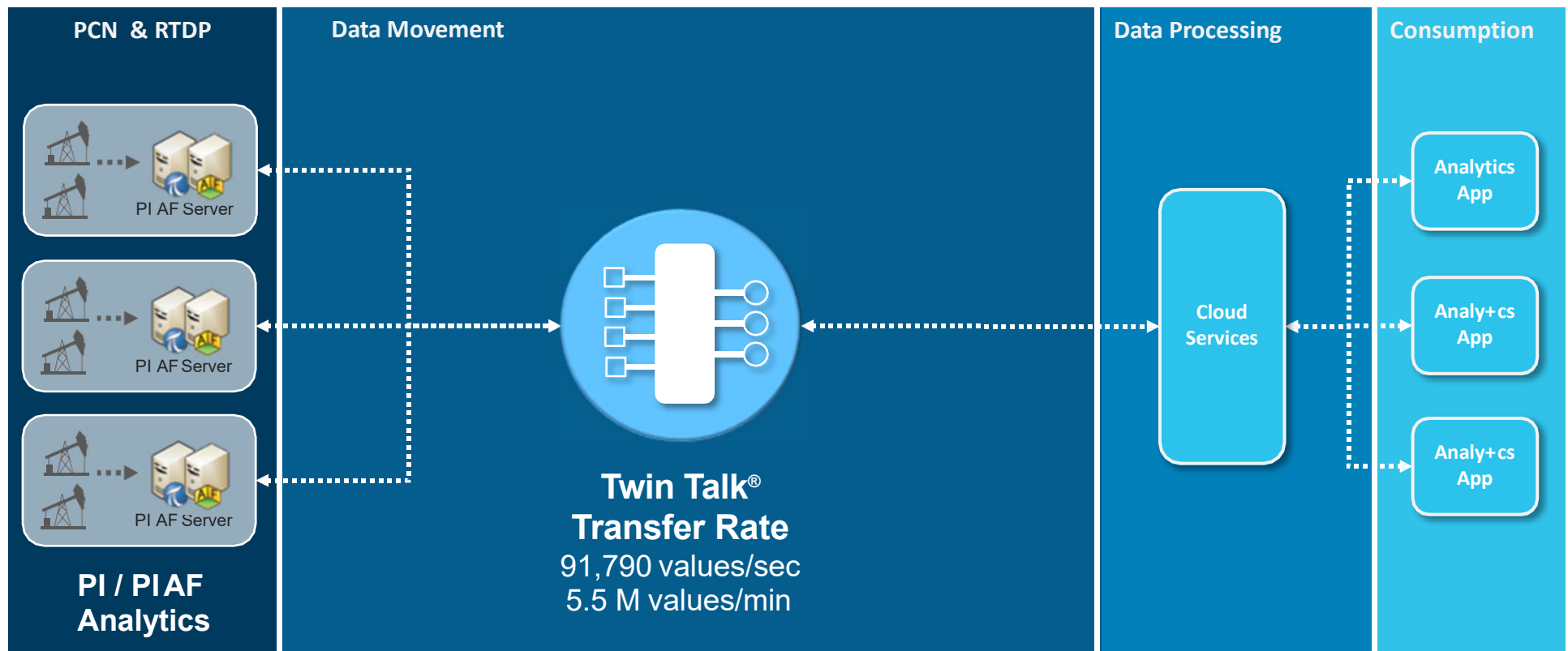


# How PI / PI AF Analytics + DMP Twin Talk® + CloudAnalytics Enable Rapid Implementations and Iterations of PoVs as well as Production Deployments



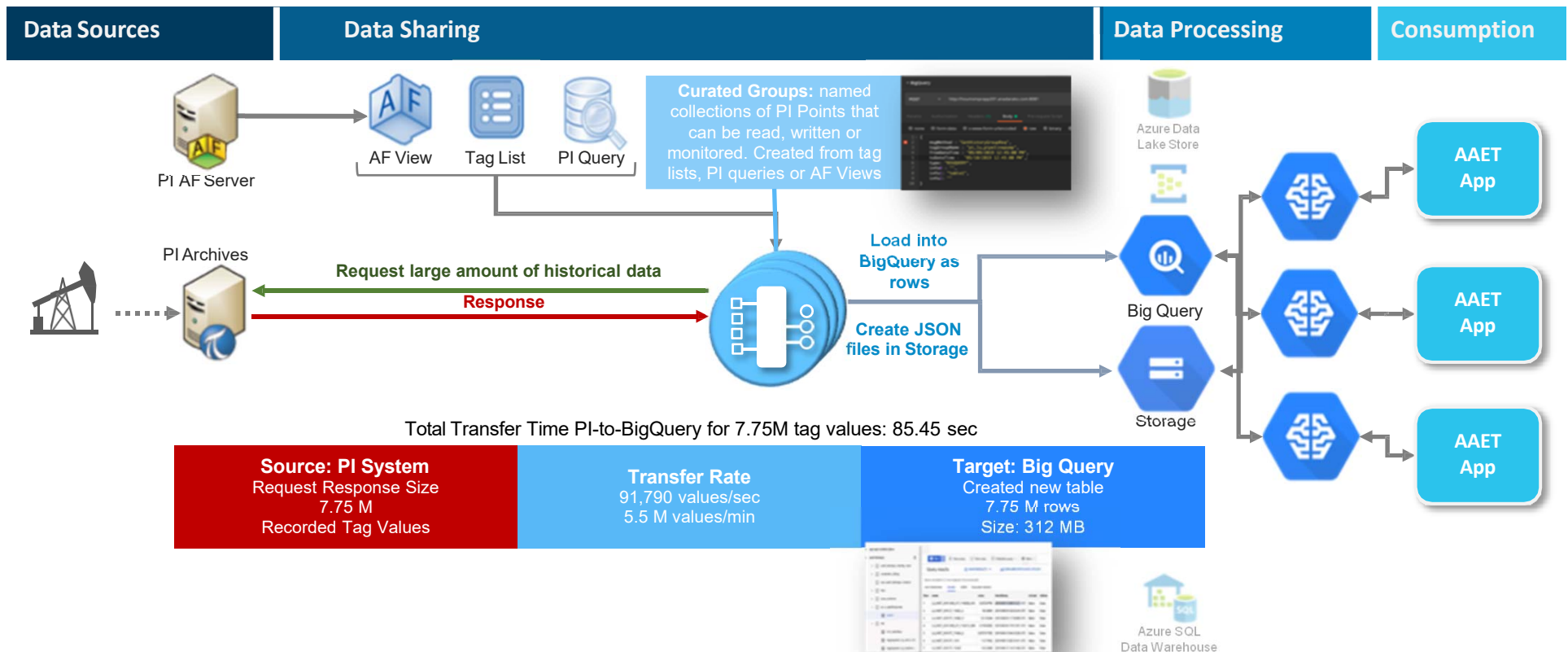
# Data Transfer Example: 7.75 Million Tag Value in 85.45 Seconds

Inserted rows into data base table in the cloud with 7.75 M rows size 312 MB



# Results - Load Large Amount of Recorded Values into BigQuery

## Setup: Transfer 7.75M Values from PI System into BQ Table

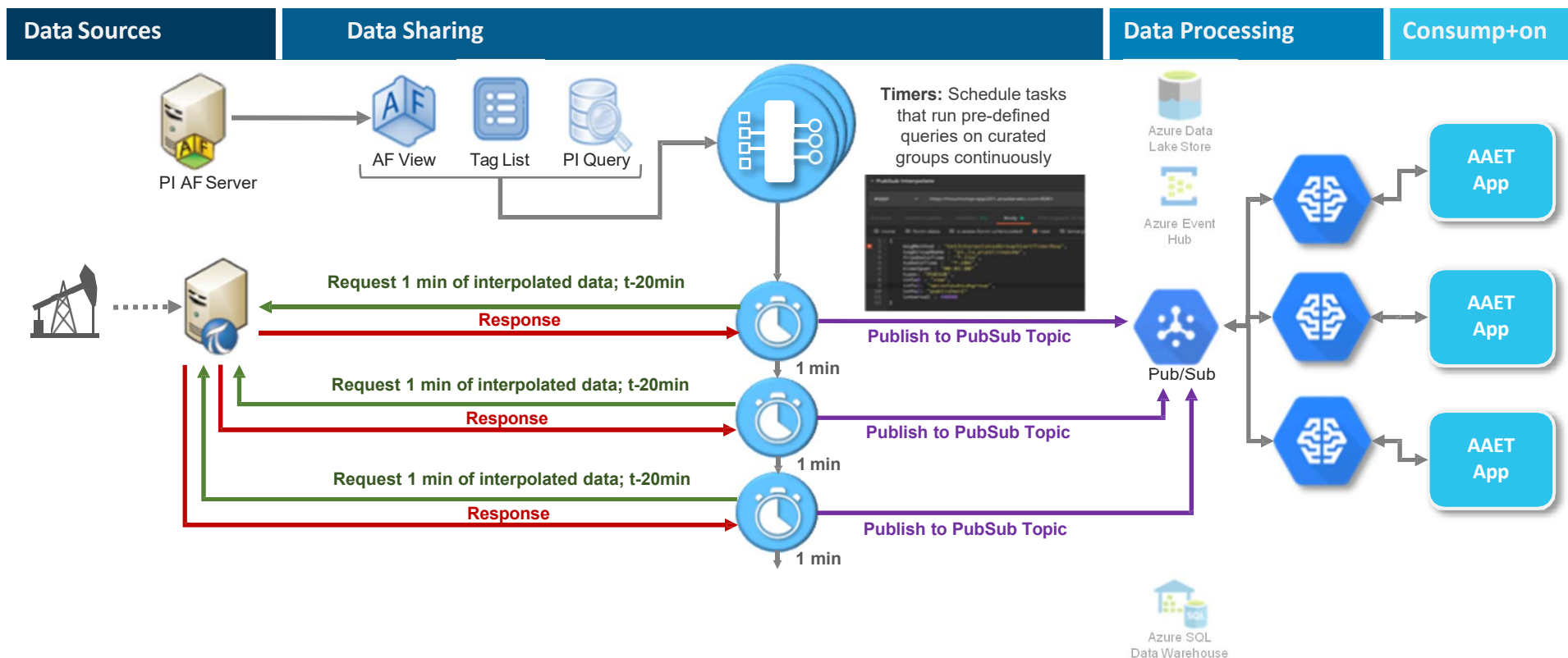


## Last Minute Interpolated Data Operation Computed Before Data is Stored in PI System



# Results: Publish Interpolated Data from PI - Google PubSub Continuously

## Setup: 20 min Lagging / 1 Min Time Windows



## Scaling IoT Programs from PoV to Production is not easy

- ## Realizing Digitization ROI when Moving from Field to Cloud for Analytics



# PI Enabled Multi-Cloud Data Management

## CHALLENGES

- Enterprise PI: Query Across Multiple PI Systems
- Lost Data Mystery
- Spiraling Technical Debt

## SOLUTION

- Integrated PI Systems with Cloud Analytics Infrastructures
- Set up operational data pipeline for 100s of business cases

## BENEFITS

- Analytics/business users can self-procure operational data
- Cloud-based applications are fed real-time operational data
- Addressed data governance and security

# Speakers

- **Eric Garcia**

- Cloud Engineering Manager at Occidental



- **Matt Oberdorfer**

- CEO at Embassy of Things Inc.





## Questions?

Please wait for  
the **microphone**

State your  
**name & company**



## Save the Date...



AMSTERDAM  
October 26-29, 2020



