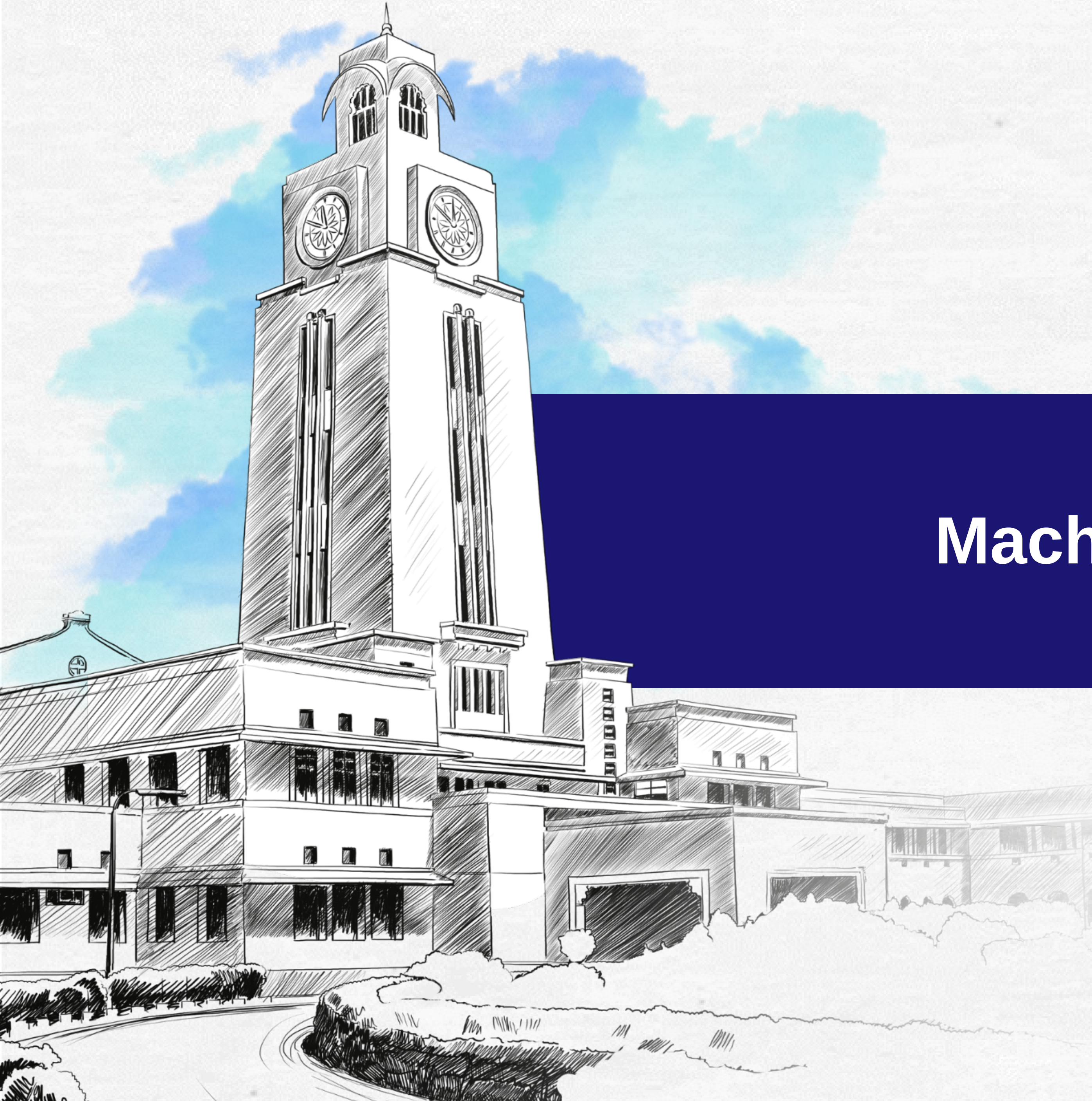

BITS Pilani
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Machine Learning Observability

Pravin Y Pawar

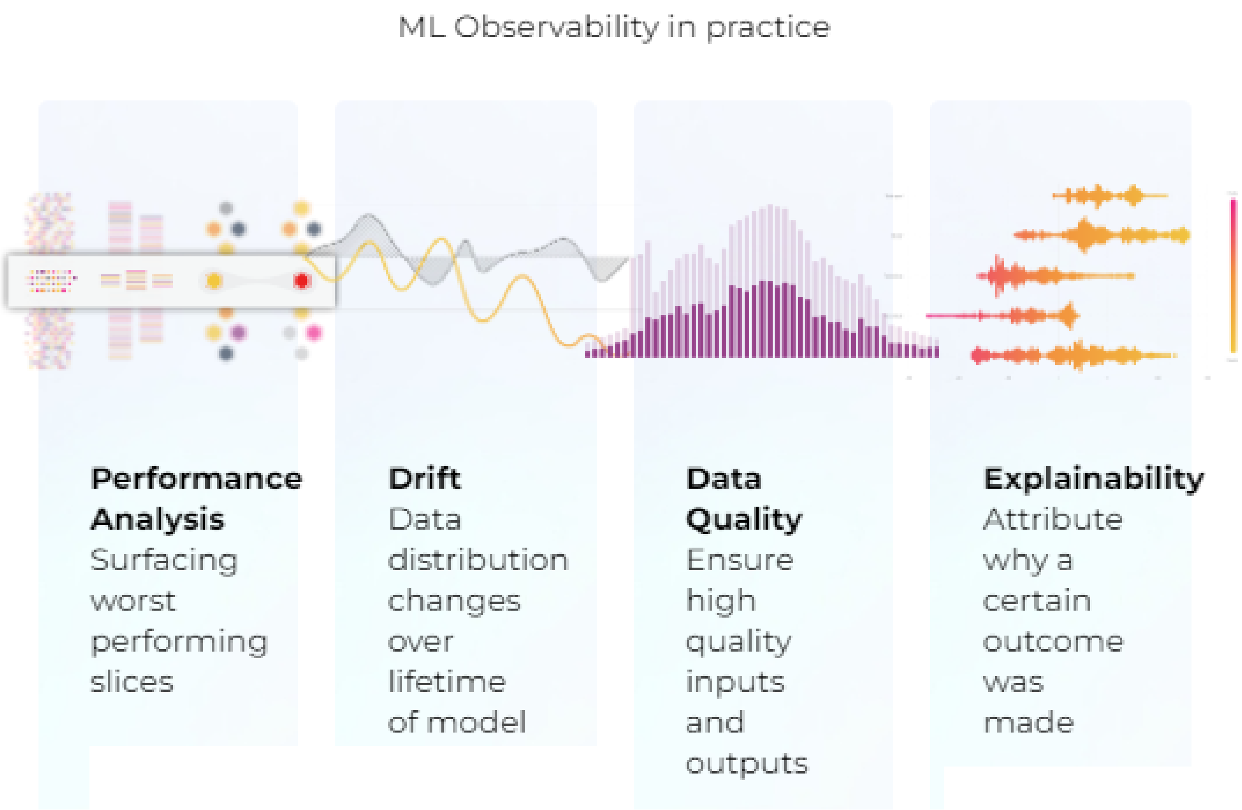
Adapted from [“Machine Learning Observability”]

What is ML Observability?

- ML Observability is a tool used to monitor, troubleshoot, and explain machine learning models
  - as they move from research to production environments

- An effective observability tool should not only automatically surface issues,
  - but drill down to the root cause of your ML problems and act as a guardrail for models in production

4 Pillars of ML Observability



Performance Analysis

- ML observability enables fast actionable performance information on models deployed in production

- While performance analysis techniques vary on a case-by-case basis depending on model type and its use case in the real world,
  - common metrics include: Accuracy, Recall, F-1, MAE, RMSE, and Precision

- Performance analysis in an ML observability system ensures that performance has not degraded drastically from when it was trained or when it was initially promoted to production.

Drift

- ML observability encompasses drift to monitor for a change in distribution over time,
  - measured for model inputs, outputs, and actuals of a model

- Measure drift to identify if models have grown stale, have data quality issues, or if there are adversarial inputs in model

- Detecting drift in models will help protect models from performance degradation and allow to better understand how to begin resolution

Data Quality

- Data quality checks in an ML observability system identify hard failures
  - within data pipelines between training and production
  - that can negatively impact a model's end performance

- Data quality includes
  - monitoring for cardinality shifts,
  - missing data,
  - data type mismatch,
  - out-of-range,
  - and more to better gauge model performance issues and ease RCA

Explainability

- Explainability in ML observability uncovers feature importance
    - across training, validation, and production environments
    - which provides the ability to introspect and understand why a model made a particular prediction

- Explainability is commonly achieved by
    - calculating metrics such as SHAP and LIME
    - to build confidence and continuously improve machine-learned models

ML observability in context

System/Infra Observability

- Infra/App timing as the base of monitoring
- App & system response time issues
- Tracing & troubleshooting response time

DATADOG · dynatrace

Data Observability

- Tables as the base of monitoring
- Monitoring data changes
- Schema monitoring

MONTE CARLO · Bigeye

ML Observability

- Models are the base of monitoring
- Distributions, vs baselines, model version, SHAP analysis and performance
- Deep model performance analysis vs data

arize

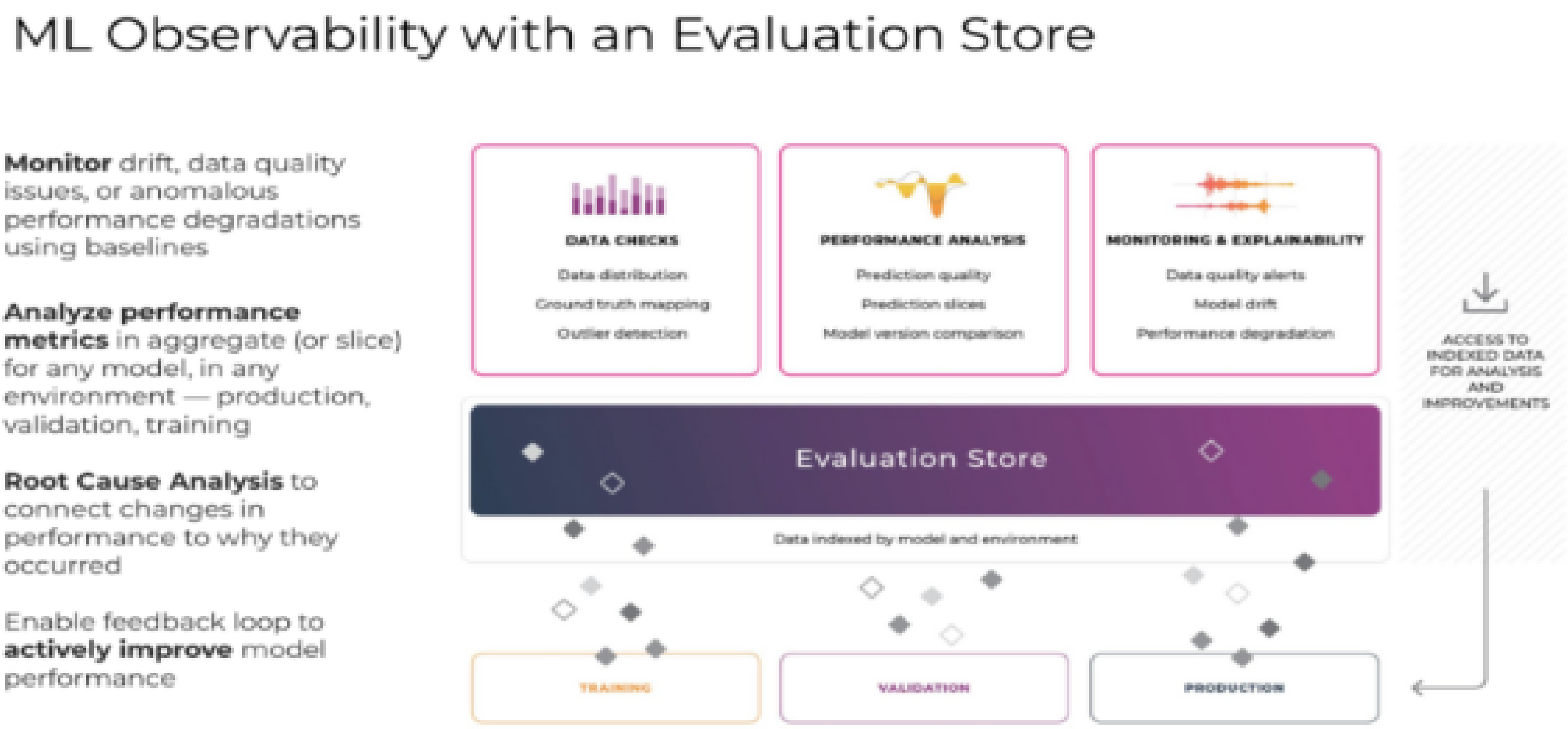
Software/DevOps

Data Eng

ML Engineer & DS

arize

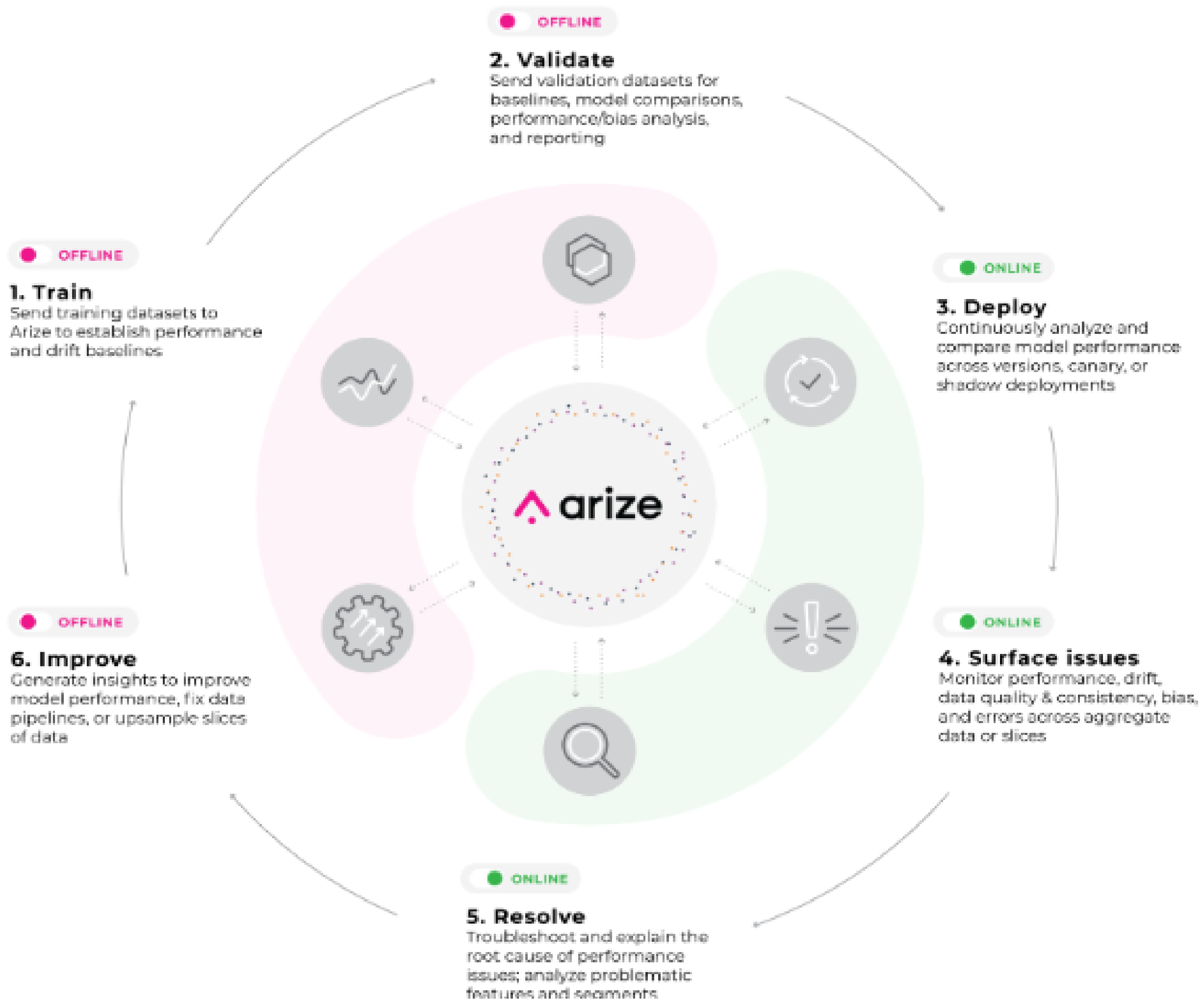
How Can I Achieve ML Observability?



[arize](#)

ML Observability with Arize

- ML Observability is the practice of obtaining a deep understanding into model’s data and performance across its lifecycle
  - o Observability doesn't just stop at surfacing a red or green light,
  - o but enables ML practitioners to root cause/explain why a model is behaving a certain way in order to improve it



Thank You!

In our next session: