

# Layered Integration Approach for Multi-view Analysis of Temporal Data

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## Problem statement

**A. Real-world datasets are often composed of several heterogenous subsets of parameters**

→ Difficult to fully exploit all properties at once in a clustering task

E.g. endogenous (oil temperature, rotor speed, etc.) vs. exogenous (wind speed, wind direction, outside temperature etc.) measurements of a machine

**B. Datasets originating from different sources can differ in period coverage, resolution, parameters, data quality, technical configuration, etc.**

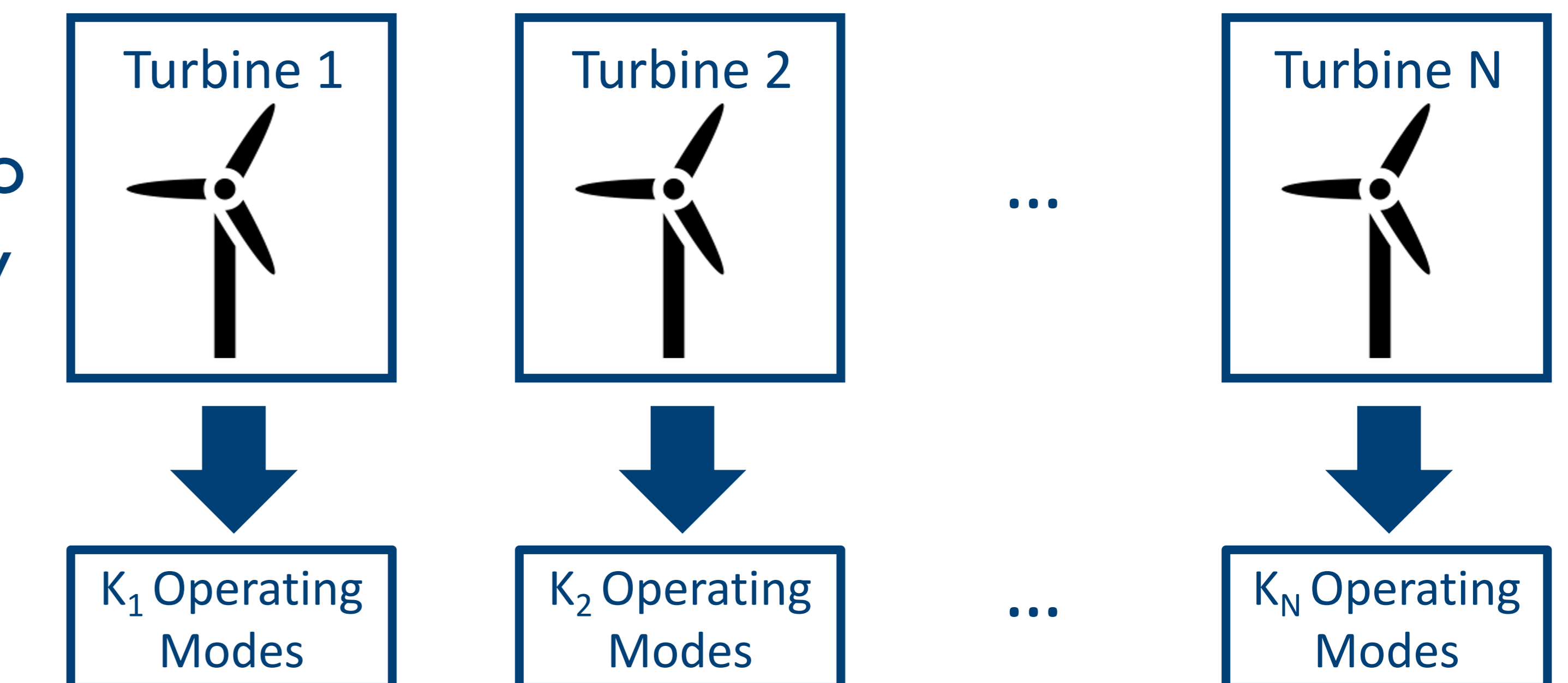
→ Pooling multi-source datasets together requires suitable standardization and normalization. This often results in information loss.

E.g. in a fleet of assets

## Approach

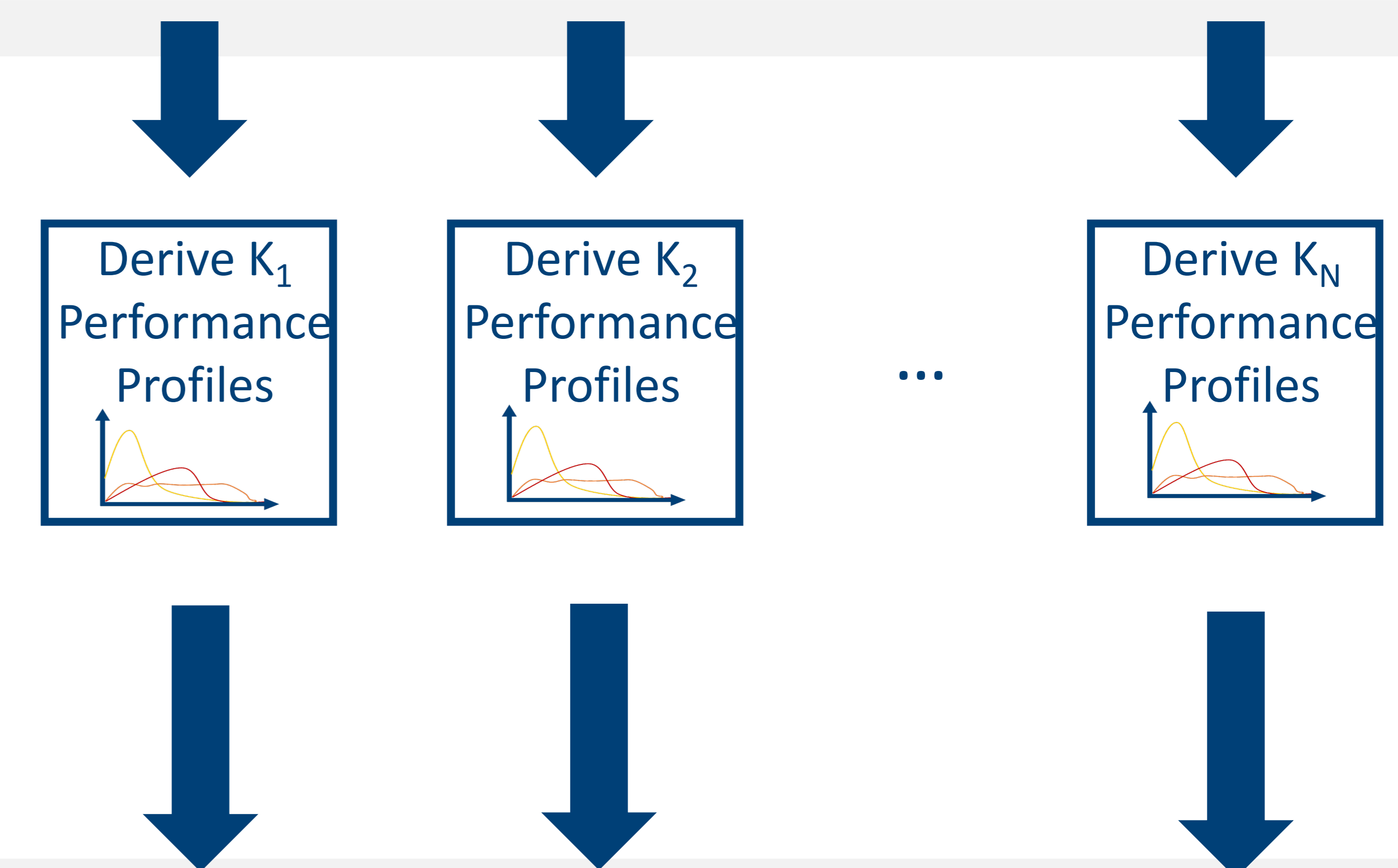
### 1. Individual Analysis Layer:

- Consider a subset of parameters allowing to drill down for insights without the necessity to compromise across sources  
E.g. endogenous parameters
- Individual per source data analysis  
E.g. cluster each wind turbine separately



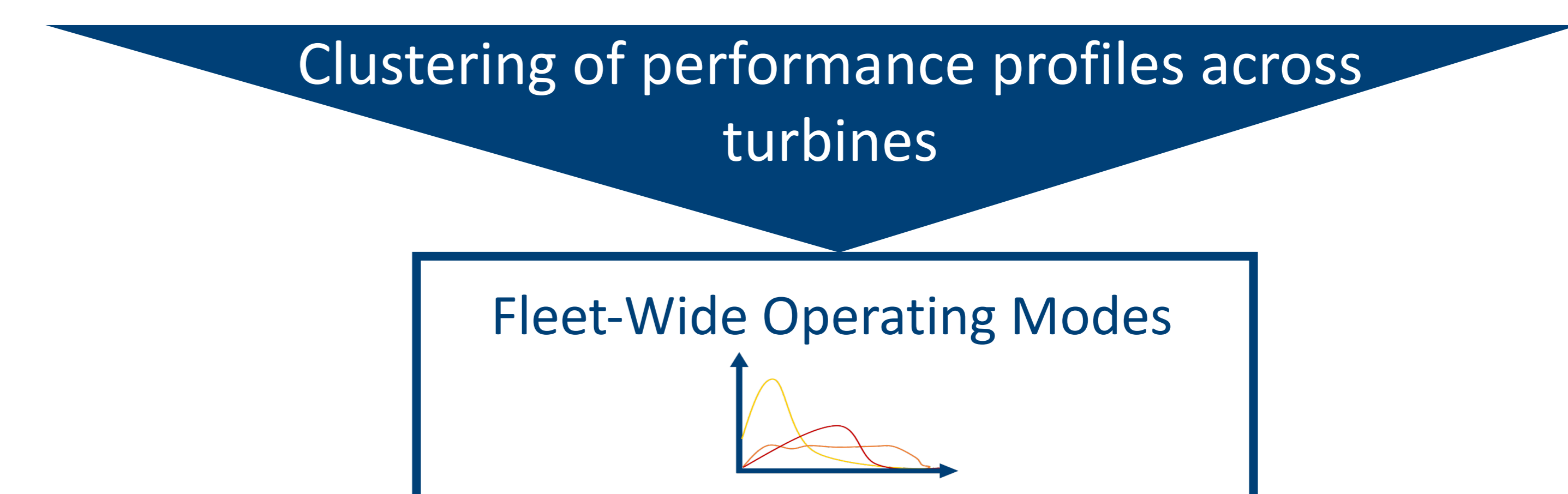
### 2. Mediation Analysis Layer:

- Consider an alternative subset of parameters allowing to derive comparative insights across sources  
E.g. exogenous parameters
- Derive a complementary view of the source specific results  
E.g. construct performance profile per turbine specific operating mode



### 3. Integration Analysis Layer:

- Derive explicit link between results of the previous layers  
E.g. group all turbine-specific performance profiles into fleet-wide operating modes



Use-case: cluster SCADA data from a fleet of wind turbines to define operating modes