



**Rockwell
Automation**

GTC Webinar:

 **Analytics™** Augmented Modeler

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Agenda

1 Machine Learning Primer

2 FTAnalytics Data Explorer & Augmented Modeler

3 Anomaly Detection

4 Demo

5 Additional Information



ML Primer

How is Machine Learning Done?

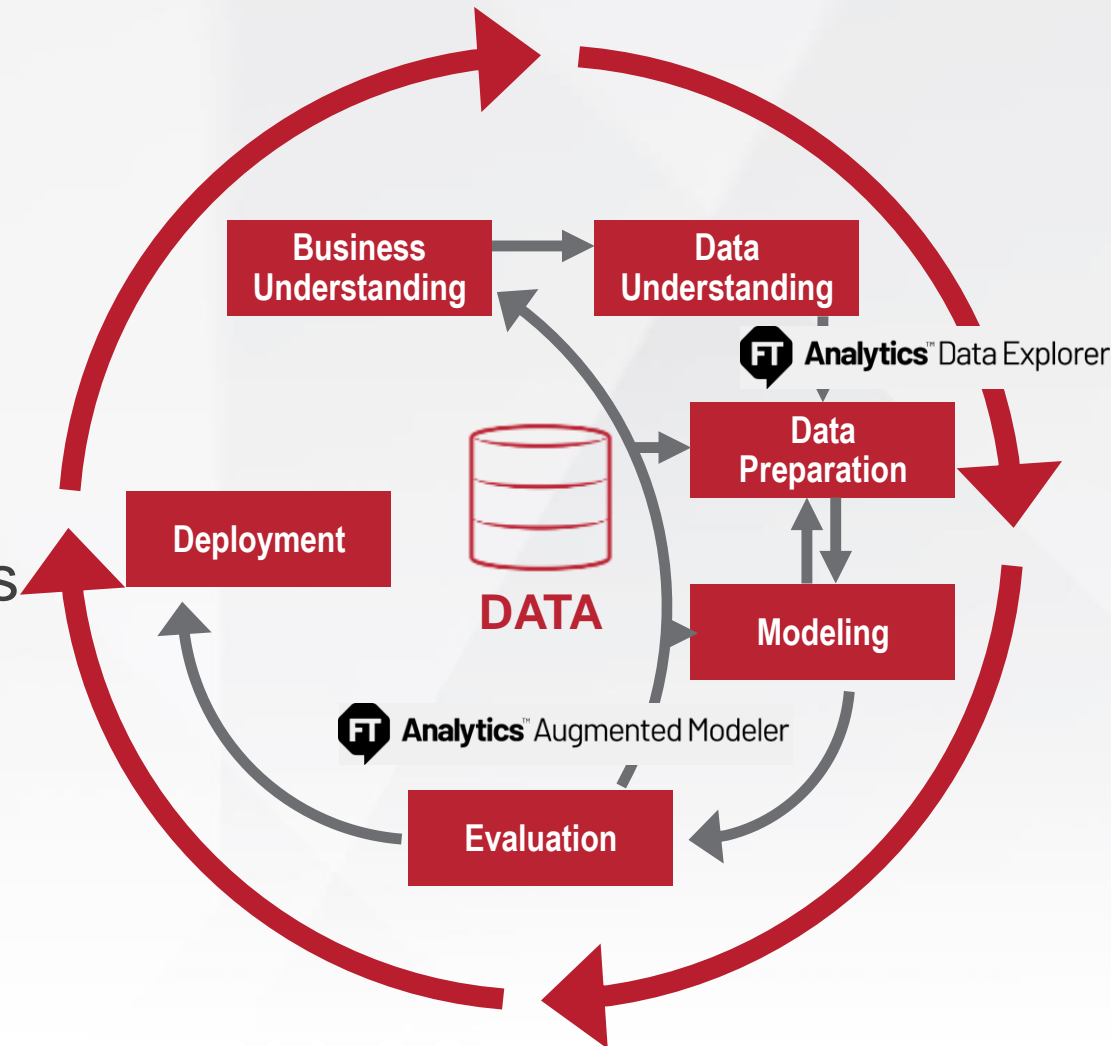
Cross Industry Standard Process for Data Mining

CRISP-DM:

- Define your **business** target
- **Gather** relevant data with context
- **Prepare** data for new discovery
- **Identify** relationships with statistics & models
- **Evaluate** success and enhance as needed
- **Deploy** useful insights or models for actions

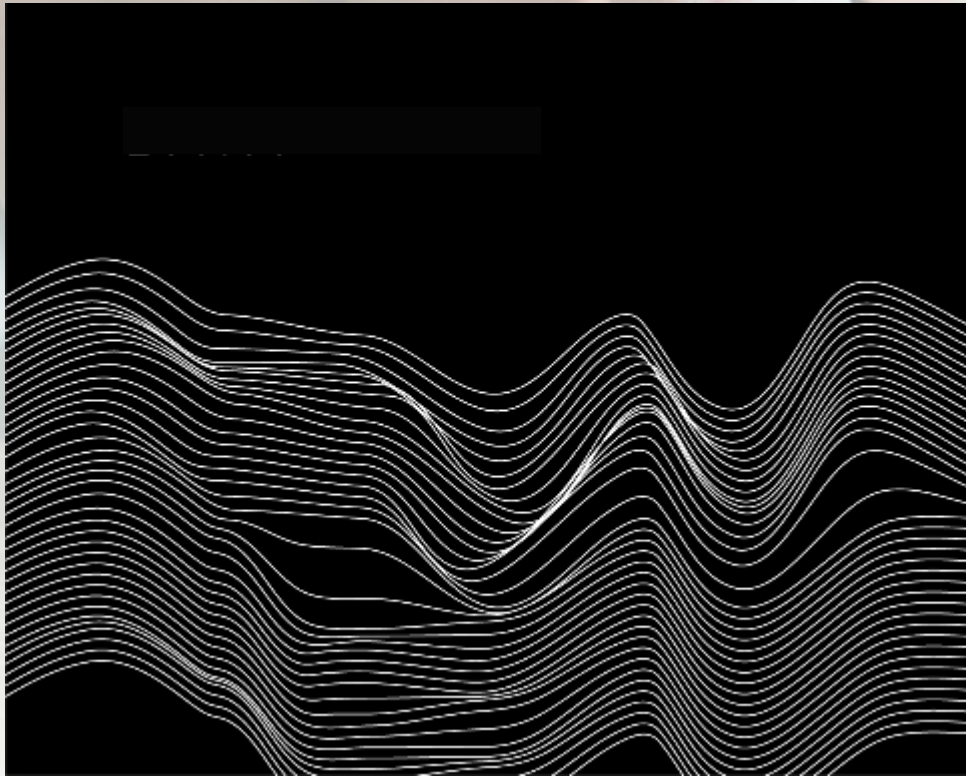
TIME PREPARING
DATA

50-60%



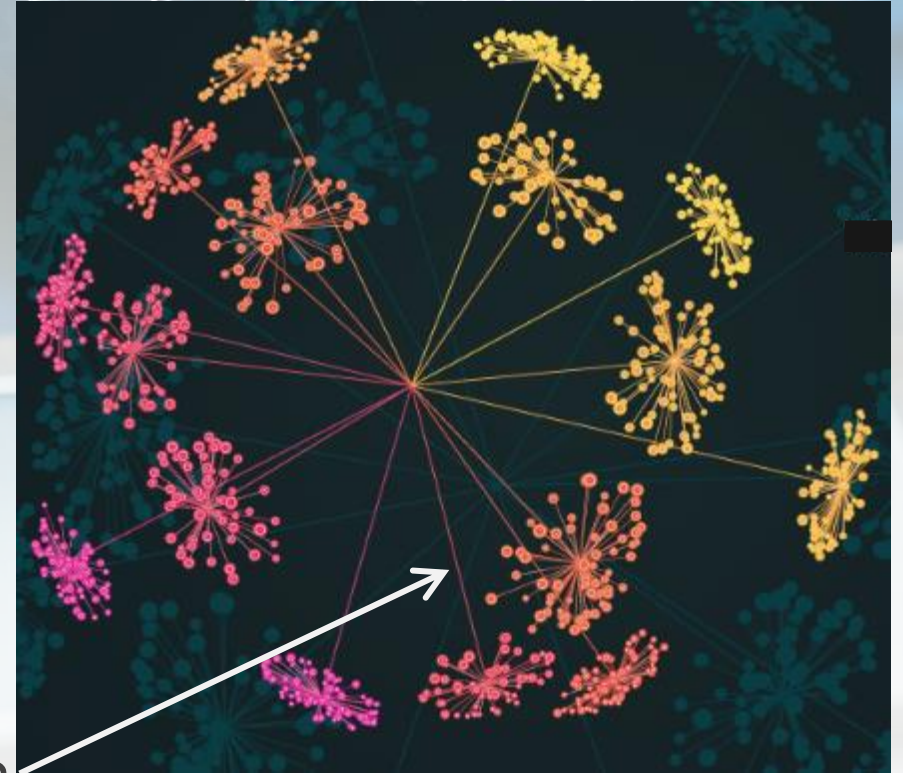
Different Strategies for Normal Models

Temporal Clustering



time →

Spatial Clustering



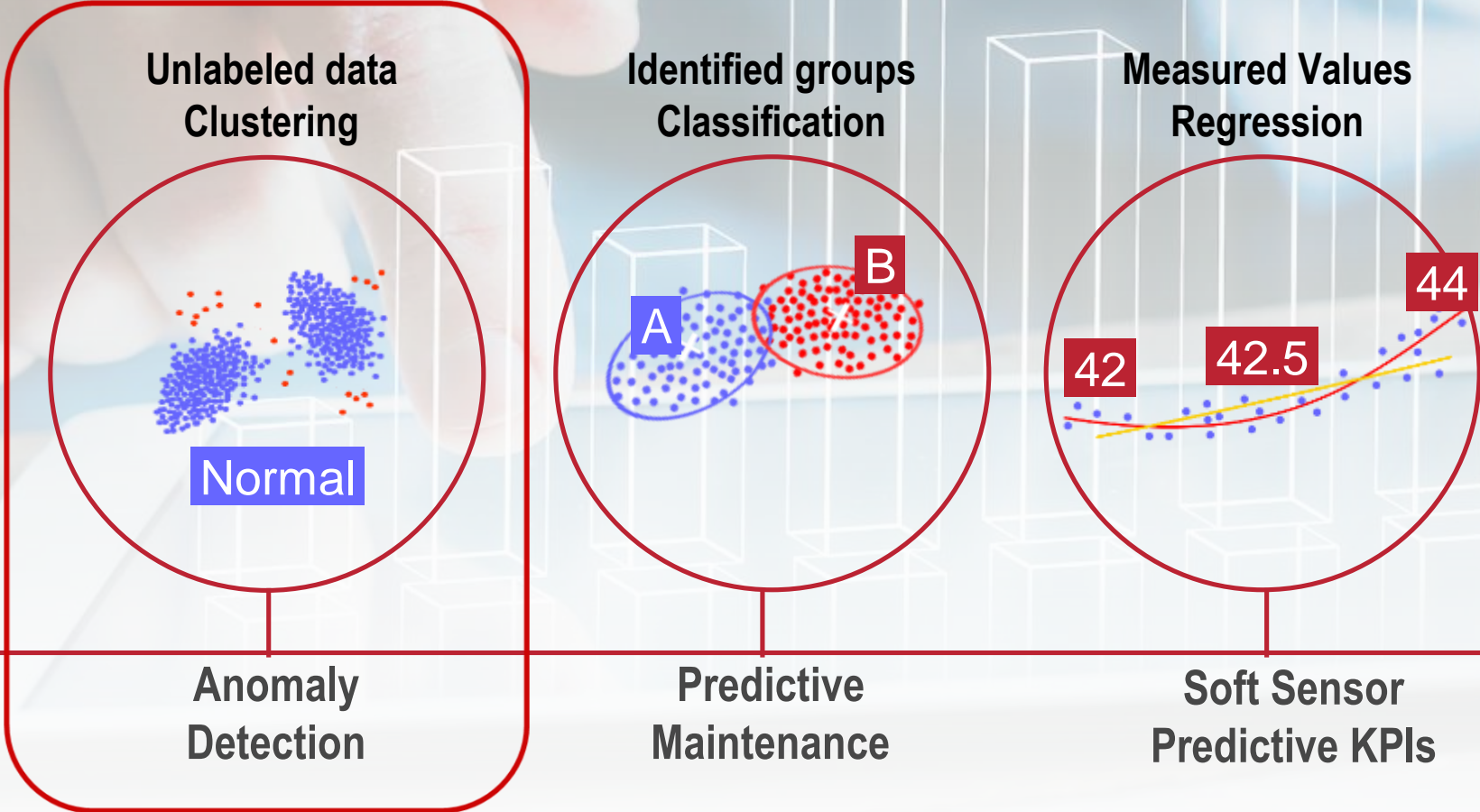
↑ measurement 2

↘ measurement 3

measurement 1 →

No Label; Many Signals

Predictive Analytics Machine Learning Types



Sample Application



Analytics™ Data Explorer



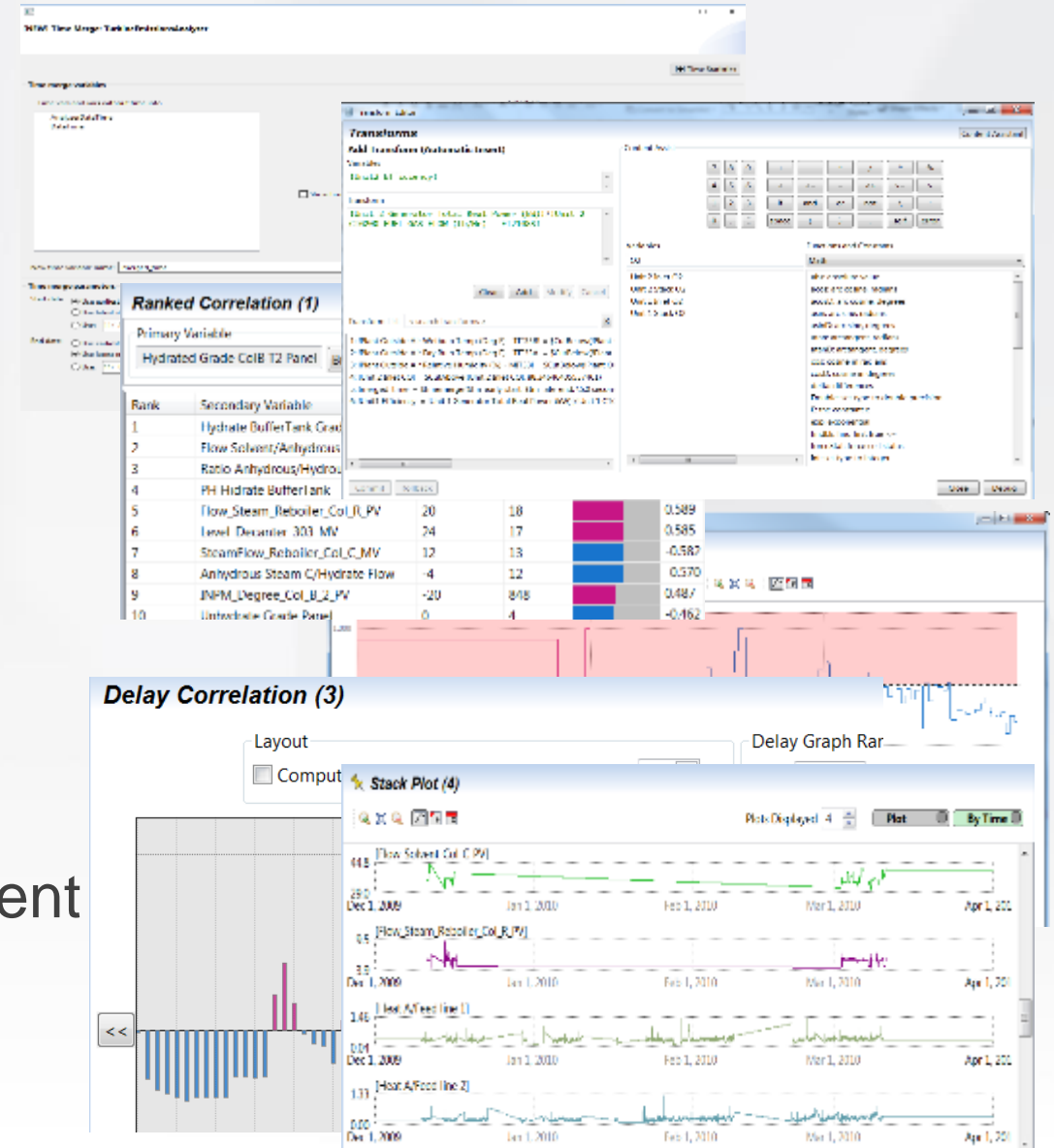
Analytics™ Augmented Modeler



Analytics™ Data Explorer

Interactive Data Preparation for ML

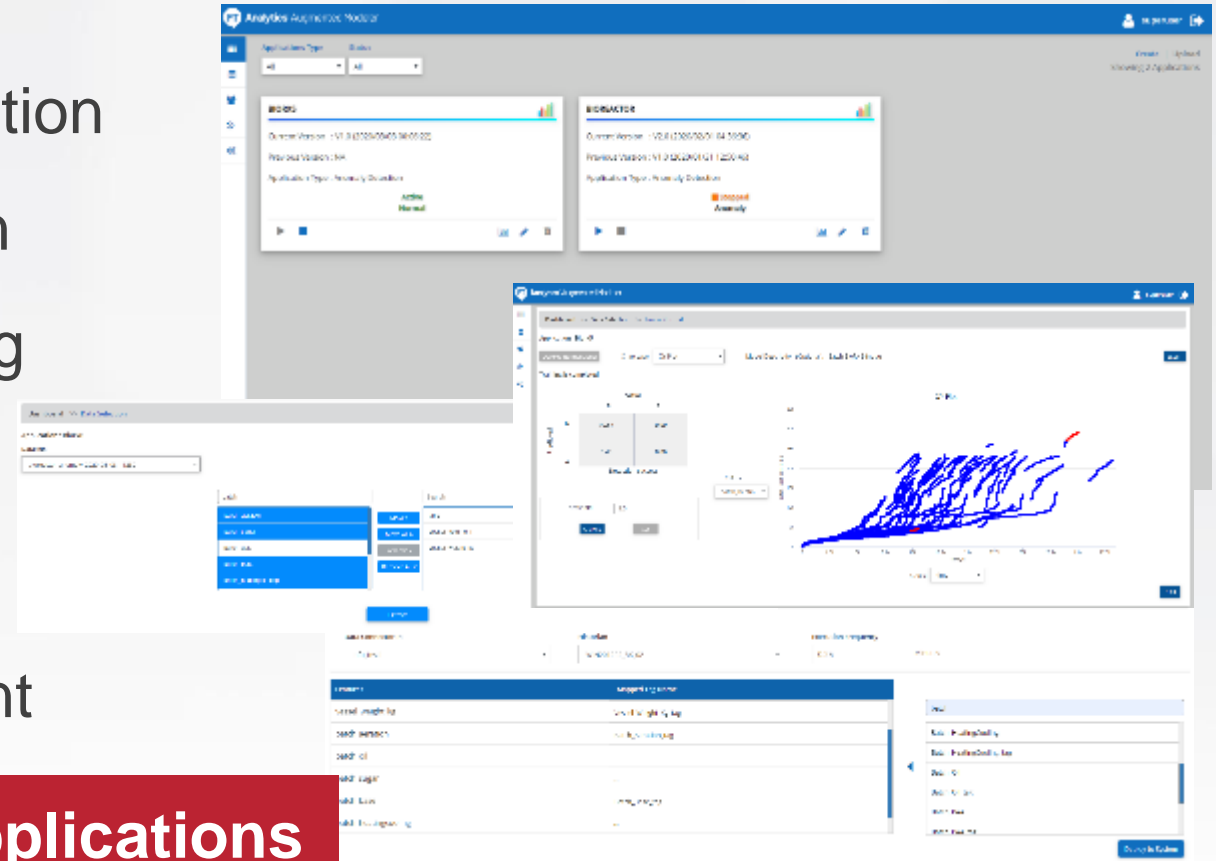
- Visualize past data for discovery
- Clean and filter data graphically
- Wizard for smart, flexible time-merge
- Rich statistical summaries & information
- Correlation and ranking including time
- Programlessly transform data for enrichment



FT Analytics™ Augmented Modeler

Interactive ML Solutions

- Graphical data visualization & preparation
- Visual model development & validation
- Validate & **deploy** without programming
- Version & **execution** management
- Drives ML results toward **action**
- Open scalable **application** environment



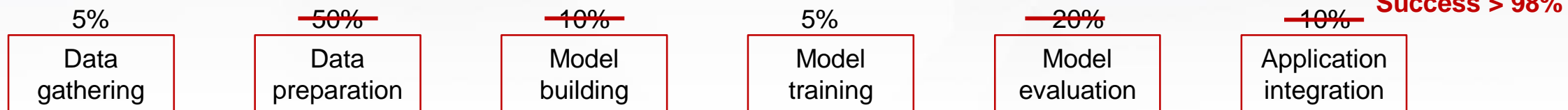
**Simplified DIY Machine Learning Applications
for OT Engineers**

Augmented Modeler what's different?

Application Development, Management & Utilization framework

- ❑ **Ease-of-Use** targeting plant engineers.
 - Leverage your know-how!
- ❑ **Interactive** ML supports application evolution.
- ❑ Integrated **visual data preparation & model evaluation**
 - Show my model on my data.
- ❑ Graphical run-time visualization **targeted to value delivery.**

Time generally spent by data scientists to build a predictive model





Node 1	Web Server Security	Centos 7.4, 64 bit, 4 Core, 16 GB (RAM), 0.5 TB (SSD)
Node 2	Data store	Centos 7.4, 64 bit, 8 Core, 32 GB (RAM), 0.5 TB (SSD)

 **Analytics** Augmented Modeler

Analytics™ DataFlowML **inside**

Guided DIY Machine Learning Workflow



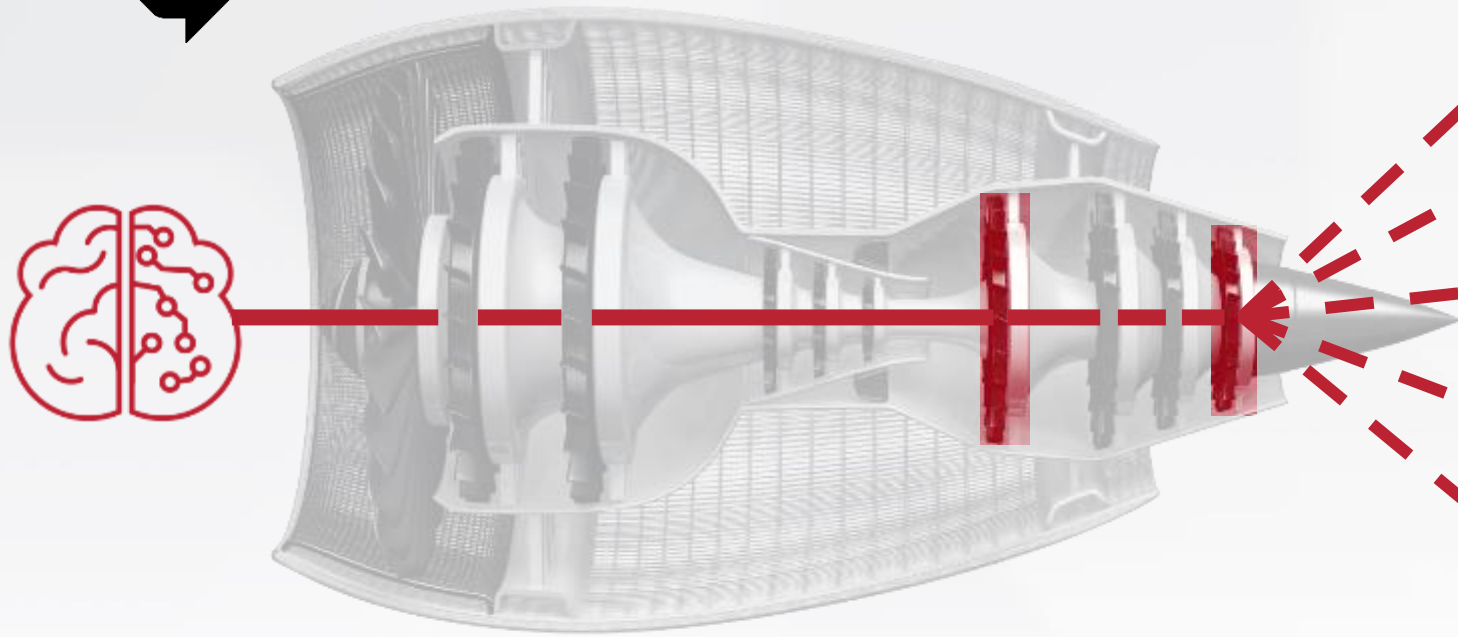
 **Analytics** Data Explorer



Prepares Data for Machine Learning & MPC

Actionable Results

FT Analytics™ Data Explorer



FT Analytics™ Augmented Modeler

MPC
Drive coordinated peak performance

UTILITY OPTIMIZATION
Reduce energy spend

PREDICTIVE KPIs
Predict performance, identify influences

PREDICTIVE MAINTENANCE
Identify equipment issues early

ANOMALY DETECTION
Early detection of abnormal operations

Next
App

**Graphical, Interactive, Informed, DIY Machine Learning
Solutions for plant engineers**



Anomaly Detection

Why Anomaly Detection?

- What just happened?
- Did my start-up go well?
- Were there problems with my last change-over?
- Why doesn't the plant seem normal?
- Are my chemicals the same as usual?
- Is equipment performance affecting production?
- Can we have predictive maintenance without failure data?

Stuff Happens! Detect & resolve earlier.



Anomaly Detection

- System unusual behavior alert
 - Incorrect set-up
 - Wrong/bad feedstock
 - Equipment failing
- Know as soon as something is wrong!
- Report on key indicators (why).

Improve OEE
Availability, Productivity & Quality

