WEA Conference

Scalable Analytics

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ANALYTICS

The discovery, interpretation and communication of meaningful patterns in data. Analytics relies on the application of statistics, computer programming and operations research to quantify performance.

LOOKING AT TODAY

FactoryTalk LogixAI

FactoryTalk Analytics for Devices

Utilizing IIoT 4.0 & Smart Devices

Today’s demonstration includes;

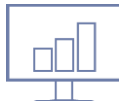
- ControlLogix Controllers
- CompactLogix Controllers
- PowerFlex Drives
- Stratix Switches
- Etap

Analytics by type

Basic Analytics ← → *Advanced Analytics*

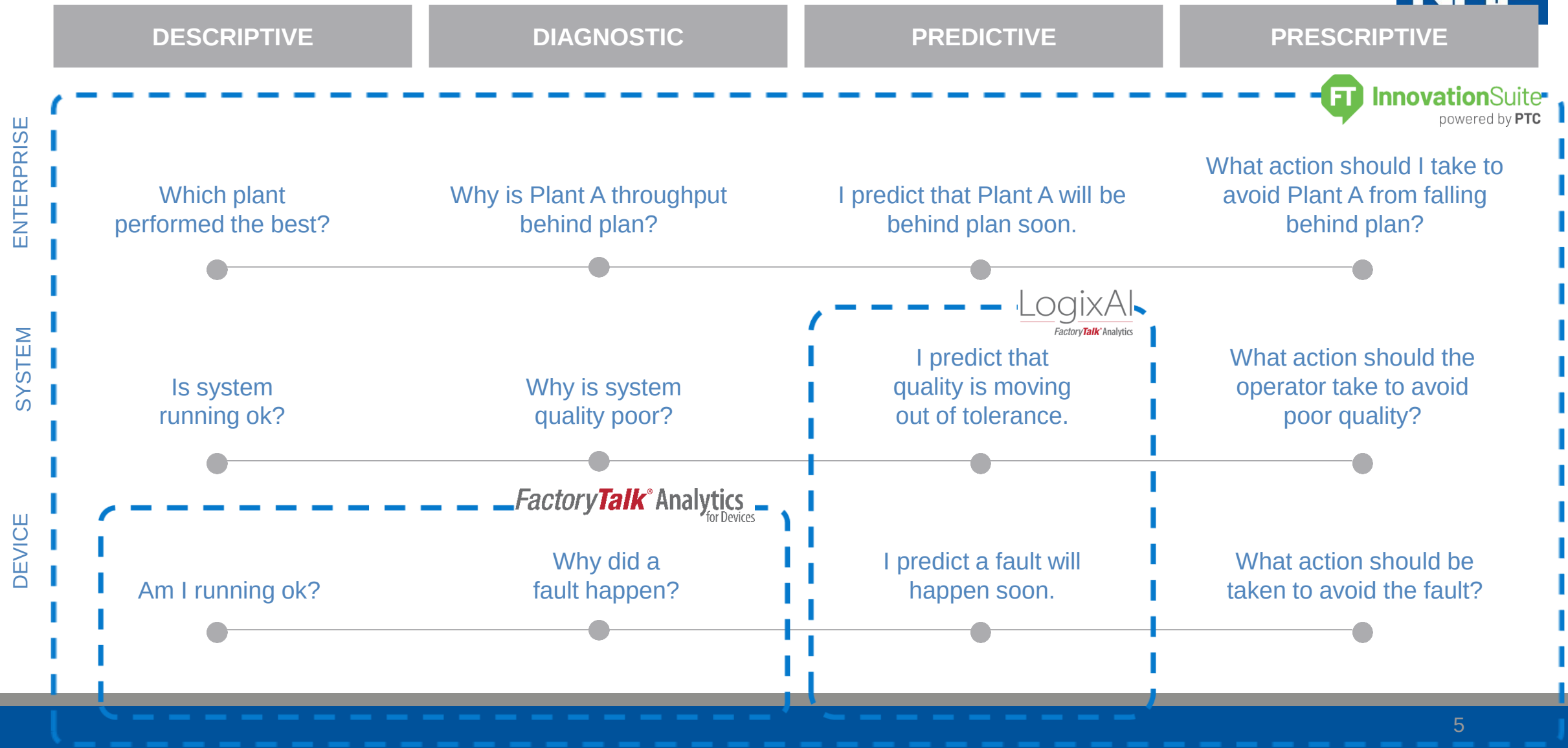
Human Decision Making

DESCRIPTIVE	**DIAGNOSTICS**	**PREDICTIVE**	**PRESCRIPTIVE**
Historical Data	Historical	Future	Future Action
WHAT HAPPENED?	**WHY DID** IT HAPPEN?	**WHAT IS ABOUT** TO HAPPEN?	**WHAT CAN I DO** TO AVOID IT?



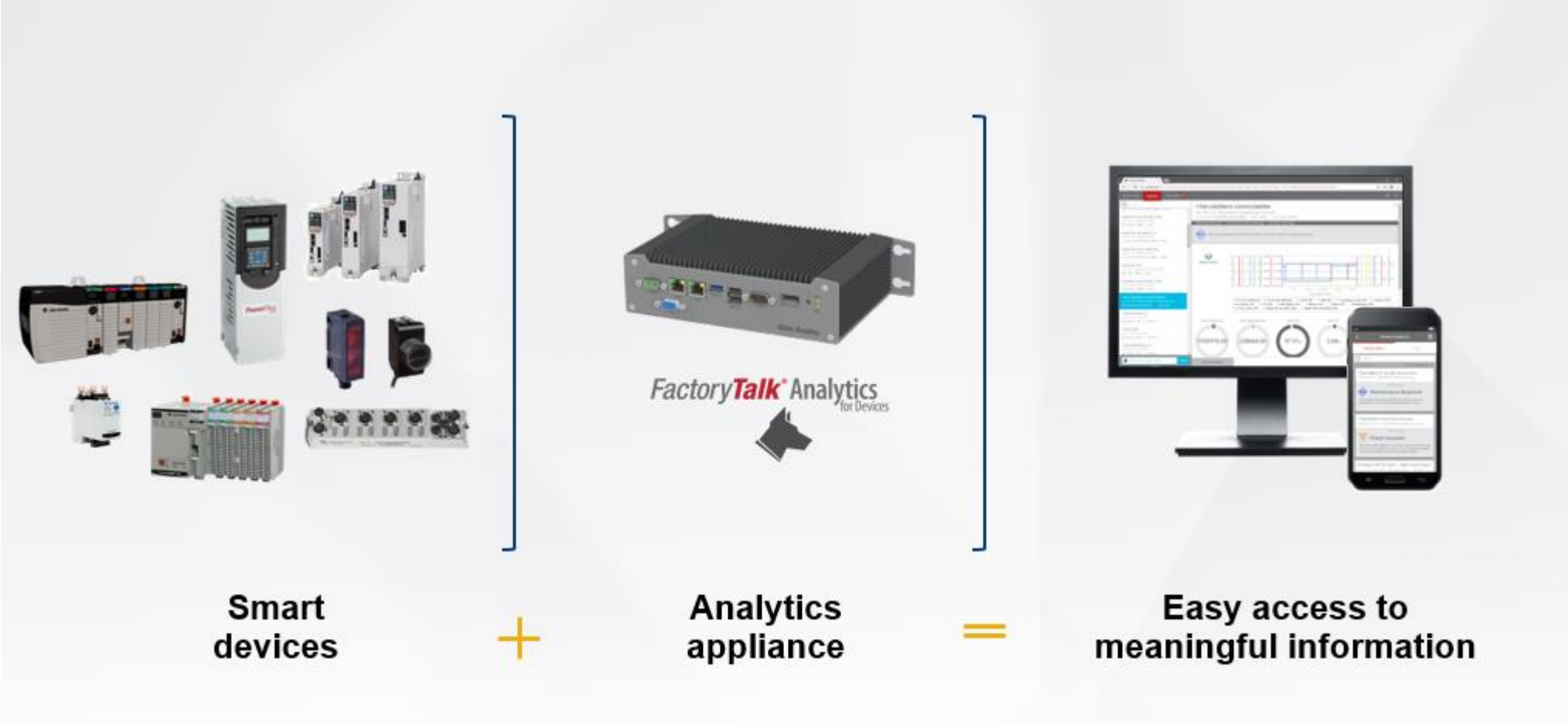
Scalable Analytics

Rockwell Automation® approach for manufacturing operations



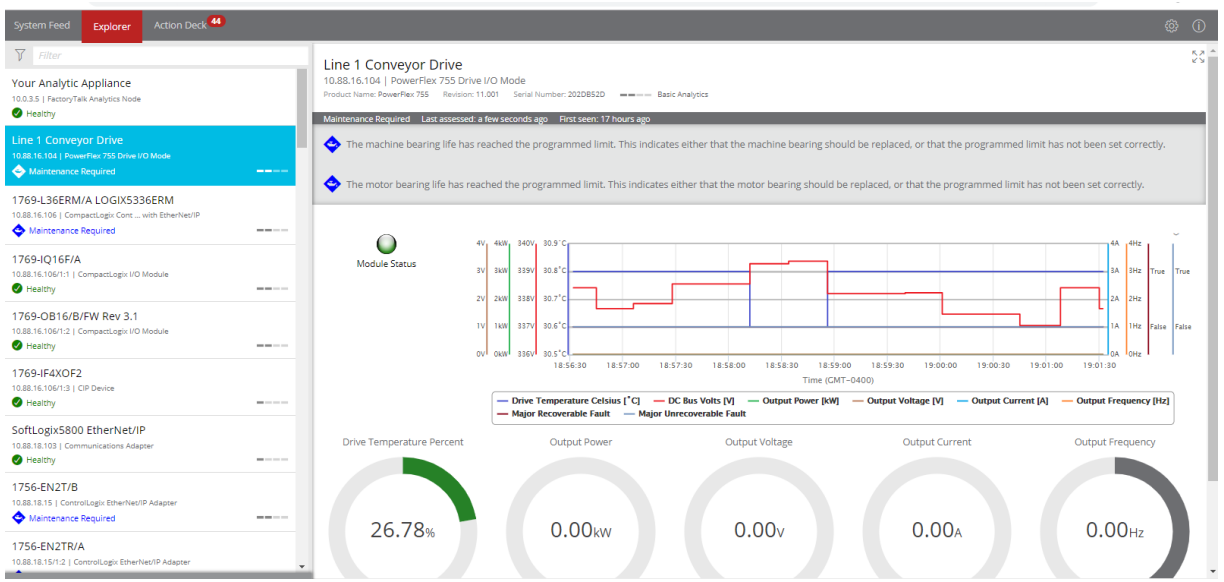
FactoryTalk® Analytics for Devices™

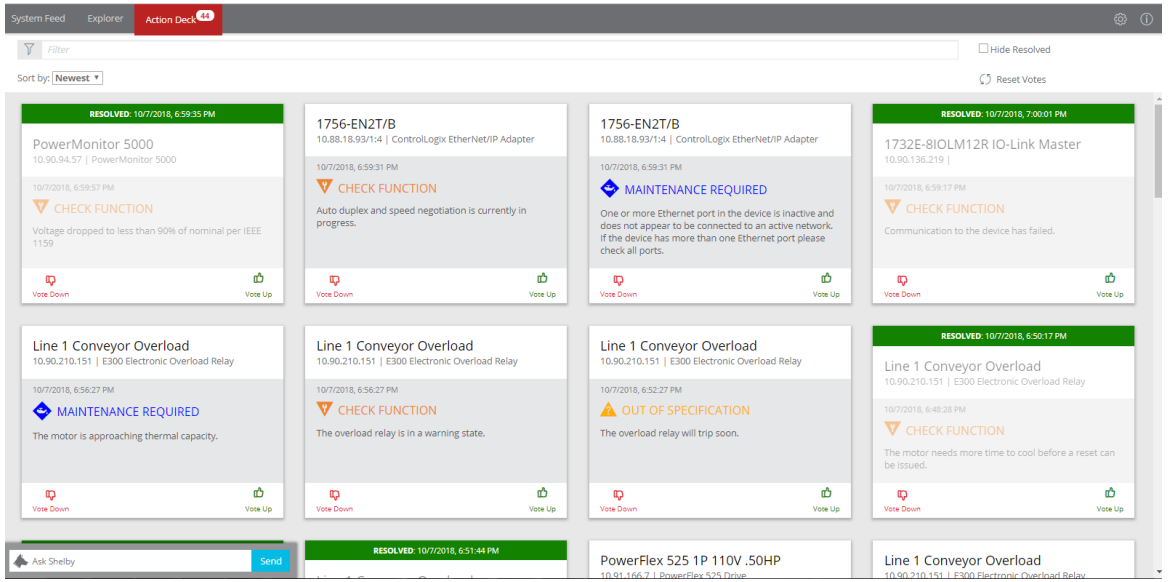
Descriptive | **Diagnostic** | Predictive | Prescriptive



FactoryTalk® Analytics for Devices

MaintenanceSuite





FactoryTalk® Analytics for Devices

FactoryTalk Analytics for Devices DEMO

Embedded Predictive Analytics

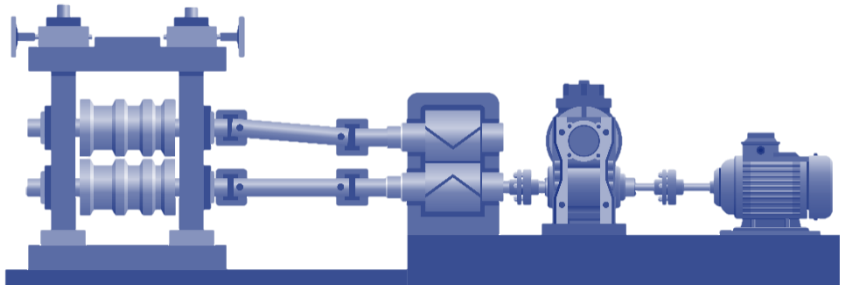
FactoryTalk® Analytics™ LogixAI™

LogixAI
FactoryTalk® Analytics

NHP

The user defines the desired output to be predicted

The user also defines the possible inputs that could impact the output being monitored



The module finds model parameters
The functional dependency
Causally relevant inputs

User friendly – Production/Engineering focused

FactoryTalk® Analytics™ LogixAI™

Descriptive | Diagnostic | **Predictive** | Prescriptive

Configure

Identify data

Model

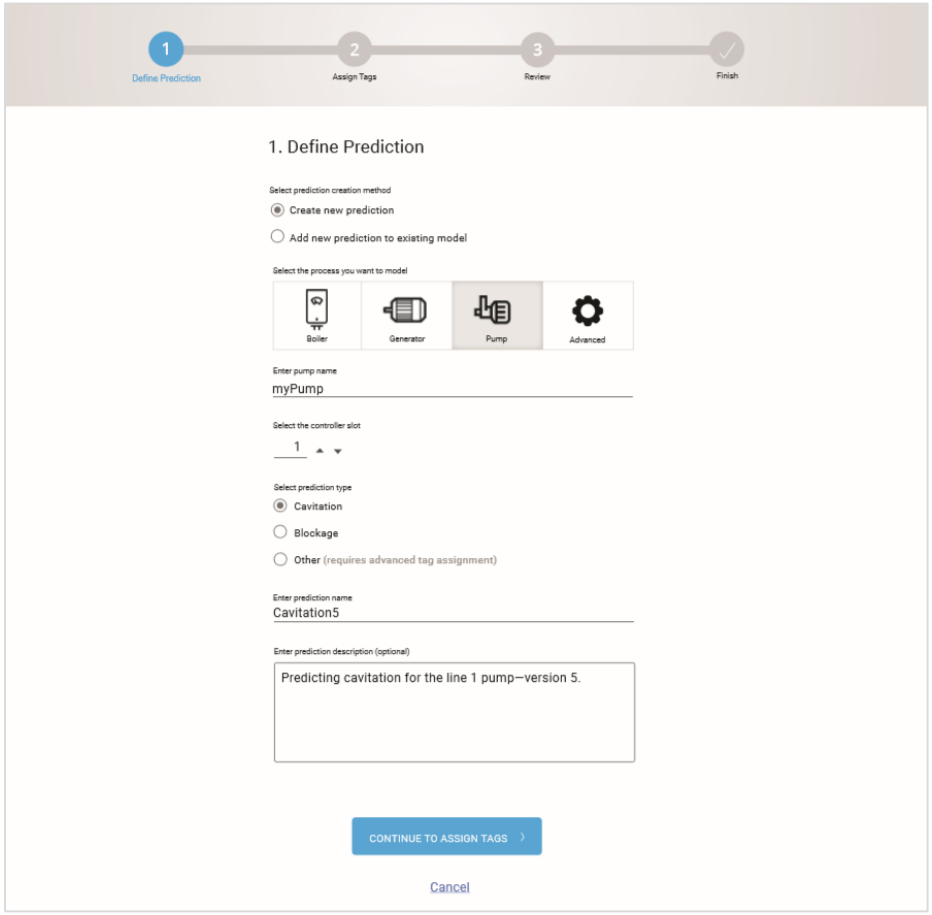
Monitor

Integrate

NO DATA SCIENTIST REQUIRED

How Does FactoryTalk® Analytics™ LogixAI™ Work ?

Descriptive | Diagnostic | **Predictive** | Prescriptive

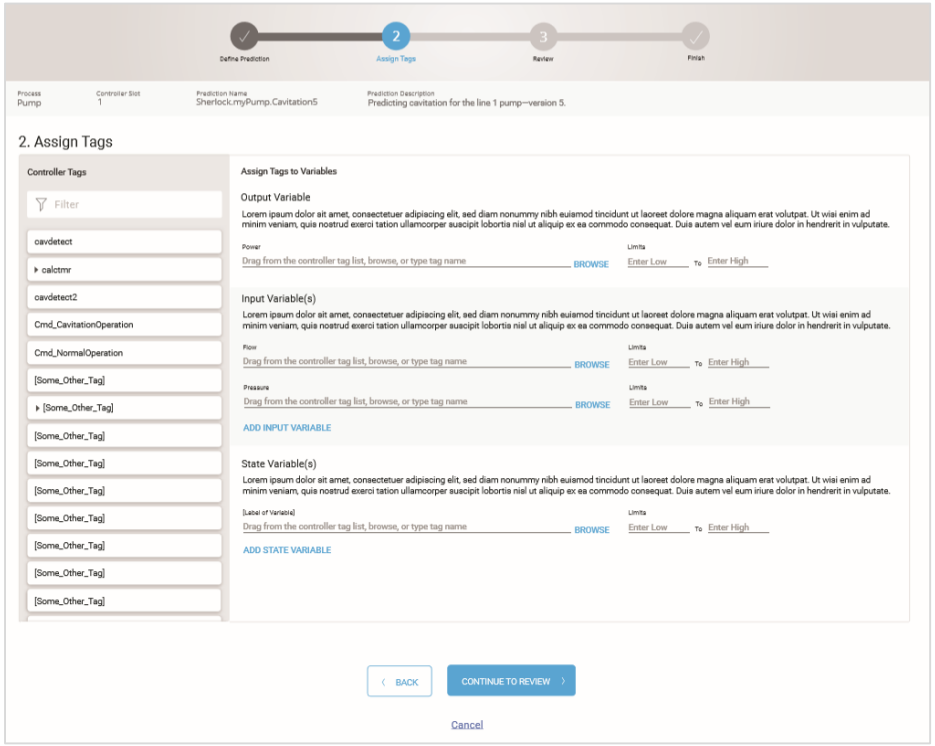


F1

Select **controller output(s)** you care about

How Does FactoryTalk® Analytics™ LogixAI™ Work ?

Descriptive | Diagnostic | **Predictive** | Prescriptive



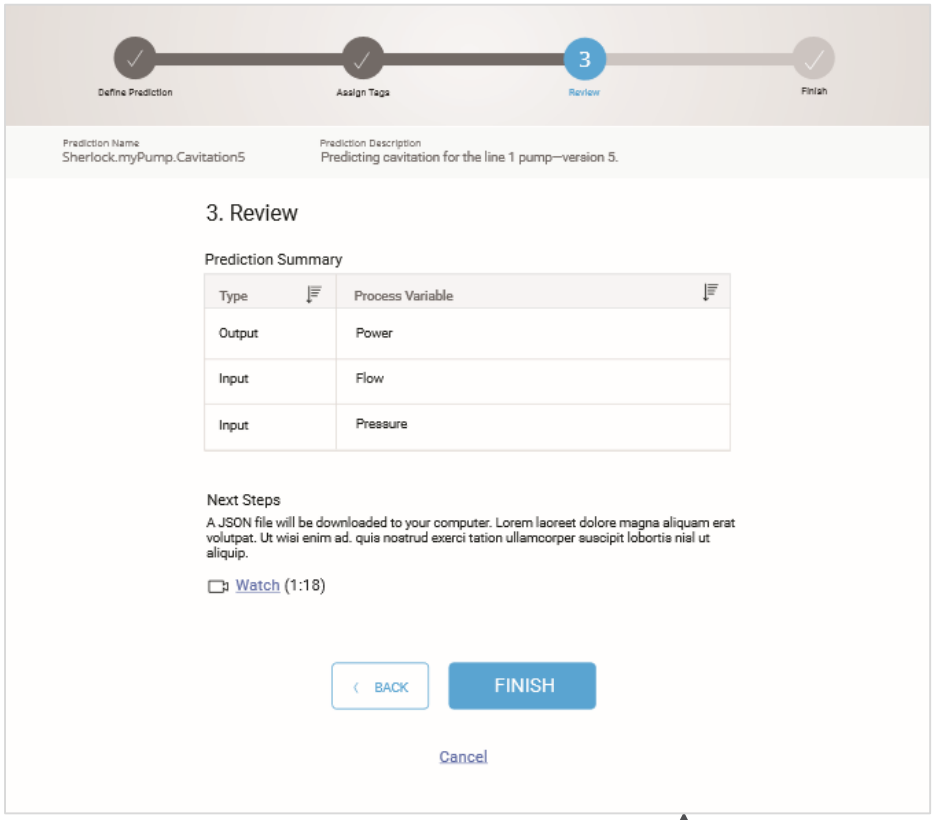
F1

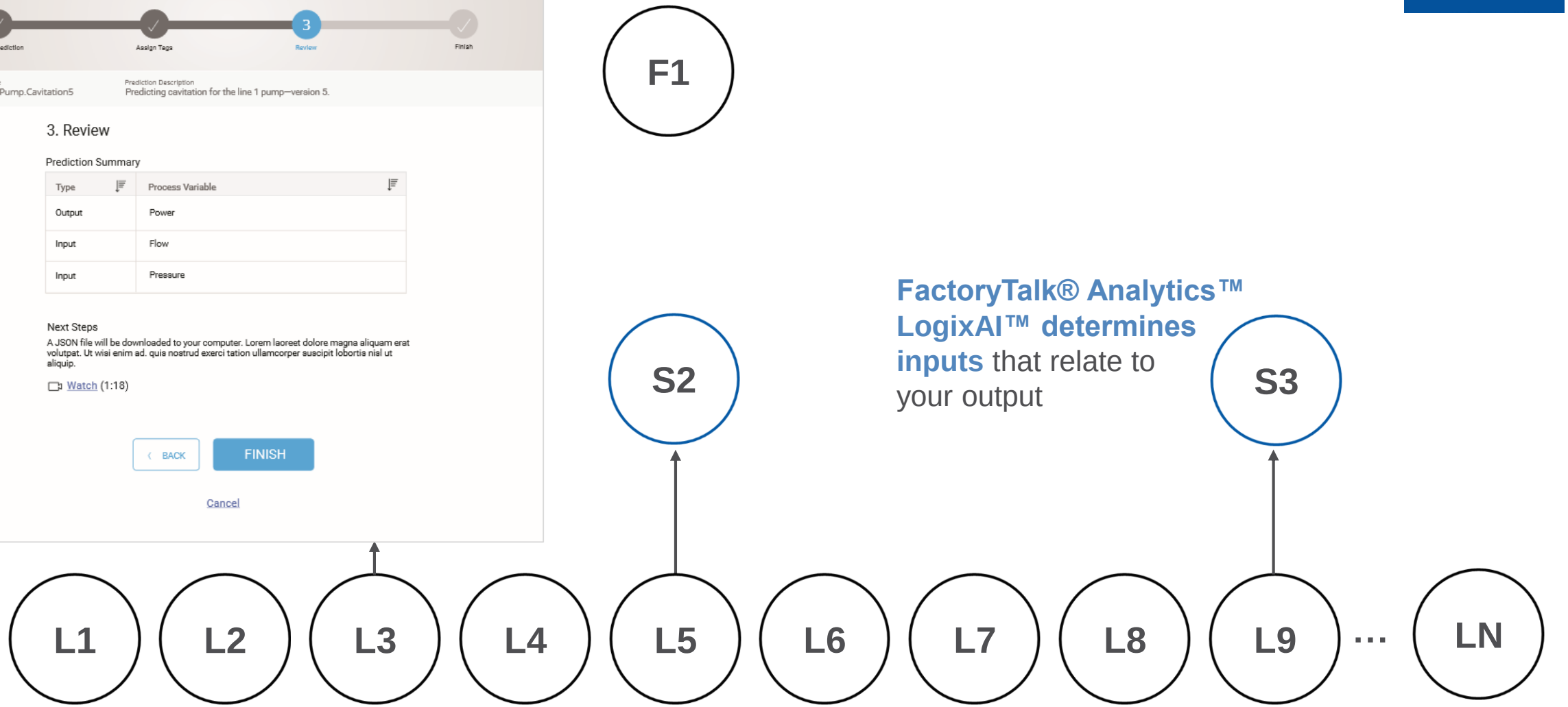
Select potential **inputs or variables** from controller tags

L1 L2 L3 L4 L5 L6 … LN

How Does FactoryTalk® Analytics™ LogixAI™ Work ?

Descriptive | Diagnostic | **Predictive** | Prescriptive

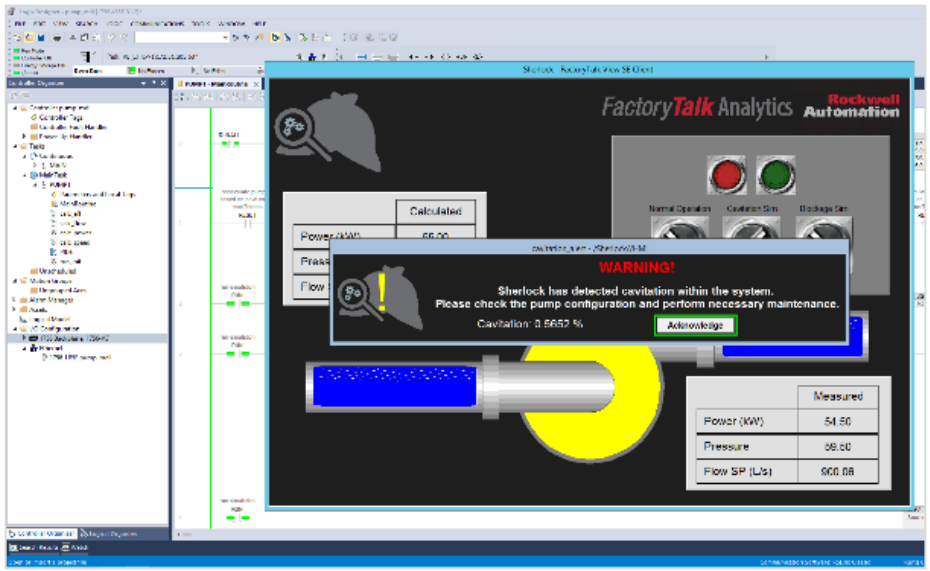


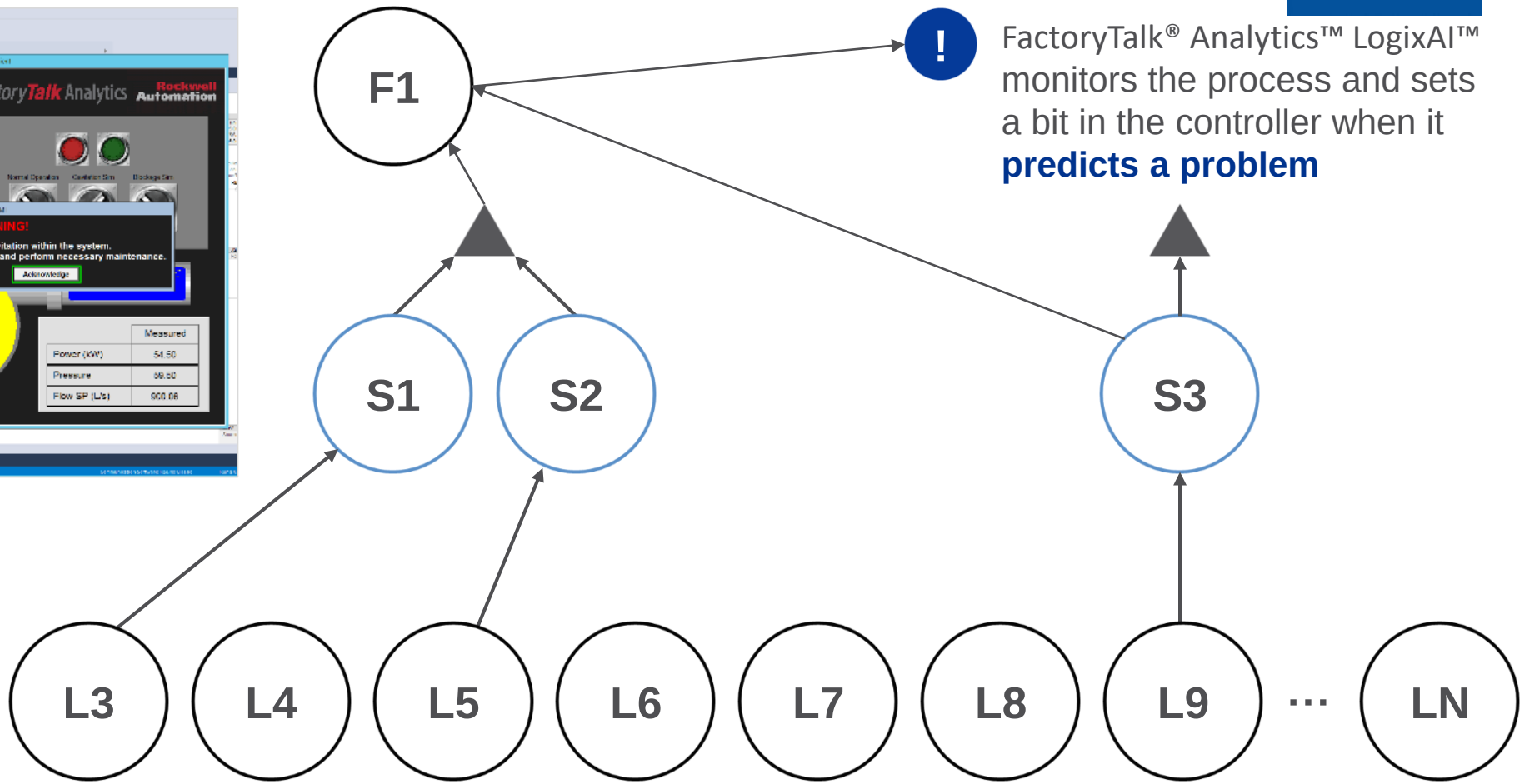


FactoryTalk® Analytics™ LogixAI™ determines inputs that relate to your output

How Does FactoryTalk® Analytics™ LogixAI™ Work ?

Descriptive | Diagnostic | **Predictive** | Prescriptive





FactoryTalk® Analytics™ LogixAI™ monitors the process and sets a bit in the controller when it **predicts a problem**

FactoryTalk® Analytics™ LogixAI™ Models of Operation

Anomaly Detection

Learn what's normal, find deviations from normal.

Anomalous behavior that is not understood and cannot be alarmed upon through typical automation system capabilities can cause scrap, defects, poor quality or undesirable operations.

A predictive model can be utilized to support understanding if an output variable could exceed acceptable operational boundaries.

Pinpointing slow changing deviations that cannot be detected by other means enables proactive thinking to address conditions before production is impacted.

Virtual Sensor

Estimate values from incomplete data.

A predictive model can act as a virtual sensor (aka soft sensor) by estimating output values.

Having a predicted, estimated output value reduces the need for manual effort required to capture and record readings.

A virtual sensor can:

- reduce the need to instrument the operation with expensive or difficult to implement instruments or sensors.
- check the reliability of a physical sensing device where environmental conditions may cause degradation of the physical sensor reading ability (i.e. caused by heat, humidity, debris).
- enable tight control or proactive deployment of resources when the estimated output variable is expected to reach an out-of-specification condition.

Basic approach to modeling

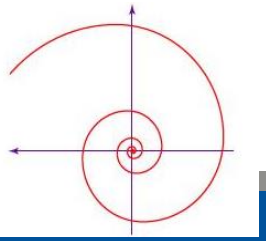
Automated modeling example

LogixAI
FactoryTalk® Analytics
NHP

$$r = ae^{\theta \cot b}$$

- Data modeling is different than object modeling
- LogixAI models operational behavior by creating a mathematical equation
- Other algorithms may build models based upon clusters, regression, etc.
- Applications that follow the laws of physics can be modeled by LogixAI
  - Example: winder applications

A spiral is a plane curve that, in general, winds around a point while moving ever farther from the point.



FactoryTalk® Analytics for Devices

NHP

FactoryTalk LogixAI DEMO

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Rockwell Automation

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LogixAI
FactoryTalk® Analytics

Thank you