

# 3.0.0 MFI Features : Quick View

March 2020

**HITACHI**  
Inspire the Next



# Key Features in 3.0.0

No.	Summary	Value
1	Event Management	Tool to create business events based on configured business rules so that end users can filter and take action on events that actually needs their attention.
2	Analytic Runtime Framework	Runtime environment to accommodate pre-trained ML model and tools to run internal/external analytics models without going through the details on data pipeline required for a specific analytics model and manually configure/customize service to run the model periodically.
3	Technical Features	<ul style="list-style-type: none"><li>• Binary to Container Migration</li><li>• Component Upgrade – PostgreSQL, Druid</li><li>• Mongo DB to Arango DB migration</li><li>• Security Fixes<ul style="list-style-type: none"><li>➤ Cross Site Scripting</li><li>➤ SQL Ingestion</li><li>➤ Insufficient Authorization</li><li>➤ Login Credential Transmitted over Clear Text</li></ul></li></ul>

# Analytics Runtime Framework + Advanced Event Management

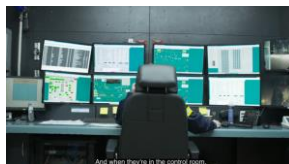
Analytics Runtime Framework + Advanced Event Management enables unified Mfl to 1) leverage advanced machine-learned analytics model to generate events and 2) turn events to business events directly associated to business outcomes.

## Current issues and challenges

- Cannot notify users only when they really need to take action for business outcome
- Users are bothered with event/notification flooding, stopping consuming events/notifications
- Event flooding by simple threshold detection
- Notification flooding by multiple events generated by one single cause
- Large efforts to accommodate ML models trained by third-parties to generate events or notifications in the application
- Need customization to develop data pipeline to run analytics models deployed in the application
- No standard way to run machine-learned analytics models across three solutions in unified Mfl
- No standard way to manage configurations to generate events and notifications



***“There are multiple different systems that I have to run at the same time. The biggest challenges in my job would probably be reacting to information that we have, especially in the control room”***



***“Any ability to give them a bit of pre-emptive warning about something that might be coming, gives them the opportunity then make that change a bit earlier. So we don’t see a loss”***

## What will change?

Users start consuming data-driven events/notifications to take direct actions to generate business outcome

- Event generation/handling can be configured with proven conditions to rationalize event generation
  - multiple thresholds / for logic to generate event / single or multiple open event / condition-based auto-closure
- Notification can be managed with proven configuration to rationalize notification
  - notification escalation / notification suppression based on related notifications
- Simple ML model deployment framework
- Easy data pipeline and scheduler configuration for ML models on Admin Console
- Configuration is available to orchestrate event generation with analytics model outcome

# User Journey in ARF+EM

ARF

01

## Machine Learning model training

Using the training, the data scientist will train a model for the use case and create MFI compatible model file (.pkl)

02

## Deployment preparation

Prepare required files along with the model –

- Properties
- Seldon Python pipeline file
- Environment

03

## Deploy the model

Hit an API and the model gets extracted and deployed by itself. The configurations gets registered in the MFI DB.

04

## Configure analytics model

Configure model in the admin dashboard – inputs, schedule to run and other parameters.

EM

05

## Configure event for the model

Event config have a long list of parameter enabling flexibility – parameter, thresholds, escalation, time, auto-closure

06

## Configure notifications for events

Configure criticality-based notifications - Recipients on different escalation level, event suppression, etc.

07

## ARF and EM Workflows get to pace

Analytics model starts analyzing incoming data

08

## Event Generated

If the conditions satisfy, the system will generate an event and notify about an anomaly or threshold breach.

09

## Post Event generation


Advanced event life cycle – escalations, criticality, auto-closure

# Advanced Event Management

# Event Type Configuration

Ability to define event type and associate it with asset, process or analytical model.

**HITACHI**  
Inspire the Next

 LUMADA

MANUFACTURING INSIGHTS

ADMIN

Asset

Machine Group


Product

Process

Organization

Analytics Model

Event type



Event type List

Overheating

Failure Prediction

AssetEventType\_01

Overheating

Configuration

Entity

Audit

Delete

Name and description

Name \*

Overheating

Applicable on \*


asset

Description \*

Temperature sensor breach events

# Event Entity Definition

Ability to define multiple event entities to Event Types

 LUMADA

MANUFACTURING INSIGHTS

ADMIN

Asset

Machine Group


Product

Process

Organization

Analytics Model

Event type



Event type List

Anomaly Detection Events - F19

AssetEventType\_02

L1M1 Sensor breach

Overheating

Failure Prediction





AssetEventType\_01

Anomaly Detection Events - F19

Configuration

Entity



Audit

Event name	Entity name	Configurati...	Status	Action
Anomaly detection Line 1 - F19	Anomaly detection - Machine Line 4E	1	inactive	 
Anomaly Detection Line 2 - F19	Anomaly detection - Machine Line 4E...	1	inactive	 



Show

10

rows


1 of 1

# Event Entity Configuration - 1 (Basic Details)

Ability to define configure Event Name, Description , enable/disable event

**HITACHI**  
Inspire the Next

 LUMADA

MANUFACTURING INSIGHTS

ADMIN Asset

Machine Group


Product

Process

Organization

Analytics Model

Event type



Asset List

Company

India Factory

IF Line 1

IFL1 Machine 1

IF Line 2

IF Line 3

India Factory 2

Test Factory

Bajaj\_Reg\_Factory

IFL1 Machine 1

DB Id : 4

Event type and description

Event Type \*

L1M1 Sensor breach

Event Name \*

L1M1 Sensor Event

Enable event \*

OFF ☒ ON

Description \*


L1M1 Sensor model breach across machine line



# Event Entity Configuration - 2 (Thresholds)

Ability to define configure thresholds for Output Parameters

Ability to define Time Settings for Event Time Delay and Even Suppression

 LUMADA

MANUFACTURING INSIGHTS

ADMIN Asset

Machine Group


Product

Process

Organization

Analytics Model

Event type



Asset List

Company

India Factory

IF Line 1

IFL1 Machine 1

IF Line 2

IF Line 3

India Factory 2

Test Factory

Bajaj\_Reg\_Factory

IFL1 Machine 1

DB Id : 4

Parameter

Add Parameter

Parameter name \*

L1M1 Sensor 1

Delete

	Severity	Condition	Value 1	Value 2
<input checked="" type="checkbox"/>	Critical	Greater than or equal to	40	0
<input checked="" type="checkbox"/>	Warning	Between	21	39
<input checked="" type="checkbox"/>	Info	Between	10	20

Time settings

Event time delay

00:00:10

Event suppression

00:30:00

# Event Entity Configuration - 3 (Escalations)



Ability to define escalations for Events

## Escalation

Enable escalation

OFF ☒ ON

Add level

Escalation level	Time	
Default	00:00:00	
Escalation level 1	00:30:00	
Escalation level 2	01:00:00	

# Event Entity Configuration - 4 (Open Events and Auto Closures)

Ability to open single or multiple events on the same asset for the same event Type

Ability to define thresholds for auto closure of events

## Open events

Single or multiple open events? ⓘ

☒ Single ☐ Multiple

## Auto-closure condition

Enable auto-closure

OFF ☒ ON

Automation ⓘ


☐ Continuous ☒ Regular

Time to check for auto-closure

01:30:00

# Notification Configuration

Ability to define multiple notifications for previously created events

 LUMADA

MANUFACTURING INSIGHTS

ADMIN

Asset

Machine Group


Product

Process



Organization

Analytics Model

Event type



Analytics Models



Failure Detection on Haul Truck

Status : Ready

Entity :

Anomaly detection - Machine Line 7E

Status : Ready

Entity :

Anomaly detection - Machine Line 4E

Status : Ready

Entity :

Failure Detection on Haul Truck




Configuration

Notifications

Events

Audit



Add More

Asset Name	Parameter	Level	Frequency	Mode	Recipients	Actions
Failure Detection on Haul Truck	Failure prediction Haul Truck - Line 4	critical	immediate	email	3	  



Show

10

rows



1 of 1




12

© Hitachi Vantara LLC 2020. All Rights Reserved.

# Notification Configuration

Ability to define notification configurations for event parameter – Parameter, Severity level, Frequency, mode, destinations (email addresses/user IDs), Suppression settings

 Add Notification

×

Analytic Modal Name\*

Failure Detection on Haul Truck

Parameter \*

Event-Failure Prediction Haul Truck

Level \*

Critical

Frequency \*

Immediate

Mode \*

Email

Email Address \*

Enter new email address

Add email

Destination

Escalation level	Destination	Time
0	sk@hv.com	00:00:00
1	jack@hv.com	00:20:00
2	carljacob@hv.com	00:30:00

Suppression by relating event notification

Add More


Add

Cancel

# Event Configuration Audit

Ability to audit and track configuration changes



 LUMADA

MANUFACTURING INSIGHTS

ADMIN

Asset

Machine Group


Product

Process

Organization

Analytics Model

Event type



Event type List

AssetEventType\_02

L1M1 Sensor breach

Overheating

Failure Prediction

AssetEventType\_01

L1M1 Sensor breach

Configuration

Entity

Audit

Date

User

Action

Source

# of Changes

Details

20 Apr 2021 12:51

mi\_admin

Create

Admin

5 Changes

[View](#)

Show

10

rows

<

>

1 of 1

<

>

# Analytic Runtime Framework

# Analytics model Definition

Ability to define new analytics model configuration – Start, Copy, Delete the models

LUMADA

MANUFACTURING INSIGHTS

ADMIN

Asset

Machine Group

Product

Process

Organization

Analytics Model

Event type

Analytics Models

Failure Detection on Haul Truck

Status: Ready

Entity:

Anomaly detection - Machine Line 7E

Status: Ready

Entity:

Anomaly detection - Machine Line 4E

Status: Ready

Entity:

Failure Detection on Haul Truck

Configuration

Notifications

Events

Audit

Start

Delete

Name \*

Failure Detection on Haul Truck

Description \*

Failure detection on haul truck assembly line.

Content Source\*

Analytics Model

failure-detection-machines

Entity Type

asset

Entity

IF Line 3

Data Mapping

Model Inputs

Name	Entity Type	Entity	Select Data
Sensor_1	asset	IFL1 Machine 1	L1M1 Sensor 2
Sensor_2	asset	IFL1 Machine 1	L1M1 Sensor 1

Please save your changes to continue

Save

Cancel



# Analytics model Configuration – 1 (Basic)

Ability to define new analytics model configuration – Model name, description, start and delete the config



Failure Detection on Haul Truck

Configuration

Notifications

Events

Audit

Start

Delete

Name \*

Failure Detection on Haul Truck

Description \*

Failure detection on haul truck assembly line.

# Analytics model Configuration – 2 (Data mapping)

Ability to define new analytics model configuration – Analytics model, entity association, data mapping (input and output)

LUMADA

MANUFACTURING INSIGHTS

ADMIN

Asset

Machine Group

Product

Process

Organization

Analytics Model

Event type

Analytics Models

Failure Detection on Haul Truck

Status : Ready

Entity :

Anomaly detection - Machine Line 7E

Status : Ready

Entity :

Anomaly detection - Machine Line 4E

Status : Ready

Entity :

Content Source\*

Analytics Model

failure-detection-machines

Entity Type

asset

Entity

IF Line 3

Data Mapping

Model Inputs

Name	Entity Type	Entity	Select Data
Sensor_1	asset	IFL1 Machine 1	L1M1 Sensor 2
Sensor_2	asset	IFL1 Machine 1	L1M1 Sensor 1

Model Outputs

Name

Failure Probability

# Analytics model Configuration – 3 (Schedule)

Ability to define new analytics model configuration – Execution schedule (Begin execution date and repeat)

## Scheduling

Schedule an execution to happen in a specific time in the future

Enable Scheduling ⓘ

OFF ☒ ON

Date

04/23/2021

Time

00:00:00

Repeat

Daily

**HITACHI**  
Inspire the Next 