

# Pathian<sup>®</sup> Actionable Insights

Giving your building a voice

Pathian's<sup>®</sup> proprietary building controls and analytics empower engineers, contractors, and in-house HVAC staff to deliver instant energy savings, increased occupant comfort, and healthier environments to their customers. We give you 30 years of experience and patented technology that you can use to deliver your own solutions to your customers.

## Overview

Pathian Actionable Insights give your site a voice to inform you when actions should be taken to correct inefficiencies or to address occupant safety concerns related to air conditions with your building. The Actionable Insights can inform you if occupants are at risk of airborne infectious disease, how many energy dollars are being wasted due to HVAC system inefficiencies, and most importantly what to do about it. Our scoring metrics help you to prioritize each Actionable Insight in three essential categories:

- Enterprise insight rollups
- Building health
- Space health
- Mechanical equipment performance

## Features

- **Easy** setup and configuration with plug & play Haystack tagging
- **Simplified** BAS integration using Pathian's Appliance for the Niagara Framework<sup>®</sup>
- **Fast** data processing for on-demand report generation and real-time corrective action troubleshooting
- **Intelligent** mathematical modeling automatically detects HVAC controls anomalies and building occupant safety concerns

## What's in an Insight?

Every Actionable Insight includes:

### 1. *Pathian AI Score*<sup>®</sup>

The Pathian AI Score is a number between 0 (poor) to 10 (excellent) that can be used to drive dashboards, UIs, issue alerts, or any other business logic applicable to an insight.

### 2. *Insight Description*

The insight description is an easy-to-understand explanation of potential problems or compliance recommendations.

### 3. *Impact*

Every Actionable Insight is tied to a financial or life safety impact. Potential energy savings or losses are calculated from Pathian analytic performance metrics and real-time utility data.

### 4. *Corrective Action*

Corrective action suggestions based upon Pathian's 30+ years of experience. "We make you the expert!"

### 5. *Pathian Curves*

Most insights can be linked to a performance curve that graphically shows how the data associated with the insight compares to the ideal or to similar points operating under the same conditions.

# Pathian<sup>®</sup> Actionable Insights

## Actionable Insight Examples at Each Category

### Enterprise



#### Insight Types

Enterprise insights roll up insights from all buildings / spaces / equipment in your portfolio to provide an “at a glance” view of your assets. Pathian’s machine learning algorithms steer you to what is important.

#### Corrective Actions

Corrective actions for Enterprise AIs funnel down to the builds/spaces/equipment that are most likely to correlate to anomalies in energy usage or occupant safety.

#### Pathian Curves

- Pathian Curves normalize performance data over temperature & geographic location.
- Compare state to state
  - Compare city to city
  - Compare region to region

### Building



#### Insight Types

- Healthy Building Scoring
- Corridor Health Scoring
- Net building envelope - infiltration/exfiltration cost
- Cost of HVAC mechanical system inefficiencies

#### Corrective Actions

- Optimize return fan tracking and economizer control.
- Remove AHU setpoint overrides.
- Check main lobby entrance door operation.

#### Pathian Curves

- Compare actual neutral plane elevations against ideal neutral plane position.
- Compare infiltration / exfiltration to ASHRAE norms.

### Space



#### Insight Types

- Healthcare - ASHRAE 170 critical space and corridor compliance monitoring and scoring system
- Healthy building space and corridor monitoring scoring system based upon ASHRAE standard groups 55 and 62

#### Corrective Actions

- Space health trending out of compliance based on low humidity scoring. Evaluate AHU humidifier operation.
- Room pressurization too high creating unhealthy pressure imbalances in space. Implement Pathian pressure control directives.

#### Pathian Curves

- Compare space RH levels to AHU humidifier operation.
- Compare space temperature to humidity compliance scoring curves.
- Run space excessive pressure cost curves.

### Equipment



#### Insight Types

- Return air fan actual vs ideal speed control cost
- Economizer actual vs ideal operation cost
- Cost cooling and heating inefficiencies

#### Corrective Actions

- Optimize return fan speed control per Pathian engineering and commissioning directives.
- Eliminate economizer stratification issues and save xx dollars per month in operating cost.

#### Pathian Curves

- Return air fan ideal vs actual speed and operating cost comparisons.
- Ideal mixed air temperature vs actual operating cost comparisons.

### Common to All



#### Insight Scoring

Insight scores help you to prioritize your actions.

- All scores are 0 to 10 base representing poor to excellent ratings.
- Scores can be applied to individual limits, or it can be expanded to combine standards from several sources.

#### Impact

All impacts include at a minimum, one of the following:

- Potential Energy savings/losses in KWH.
- Potential dollar savings/losses based upon regional utility rates.
- Life safety insight impacts measured in potential occupant discomfort or potential loss of life.

# Pathian<sup>®</sup> Actionable Insights

## Environmental Health Insights

### Why is it important?

Commercial buildings can be an ideal environment for pathogens<sup>1</sup> to breed, mutate, and spread through airborne transmission. With the advent of metagenomic measuring tools, buildings old and new alike have been found to house hundreds of millions of microbial variants. Many of which are pathogenic. This is 10 to 100 times higher than previous estimates. Recent studies have also confirmed the calamitous effects of poor humidity control upon pathogens and humans. Pathogens prefer either low or high humidity. Human biological and immune systems do not. In fact, when humidity levels are **less than 35%** or **greater than 60%**, building occupants may face the following consequences:

- Lower immune system efficacy
- Elevated stress levels
- Lower productivity
- Sleep deprivation
- Higher risk of catching airborne infectious diseases
- Increased likelihood of dehydration causing cognitive deprecation and fine motor skill reduction
- Heightened allergenic symptoms

To add to the seriousness of this list, in **dry conditions, airborne pathogens can live longer and can travel much greater distances**. All of these are impacted by the volume of airflow between rooms & hallways and by the control of relative humidity in buildings. It stands to reason that HVAC mechanical systems play a huge role in controlling the spread of airborne infectious diseases.

<sup>1</sup>Infectious diseases are caused by pathogens, which include bacteria, fungi, protozoa, worms, viruses, and even infectious proteins called prions.

### Pathian AI Score

Before corrective measures can be taken, potential problems need to be identified and prioritized. Pathian uses the latest ASHE and ASHRAE standards combined with the latest advances in metagenomic research to create health insight scores based upon:

- Building pressure imbalances
- Airflow between spaces & buildings
- Room pressurization of critical spaces, OR rooms, etc.
- Relative humidity
- Infiltration / exfiltration leakage rates of the exterior building envelope

The flexible Pathian AI scoring system can be applied to individual limits, or it can be expanded to combine standards from several sources into a single score that can be used to show in dashboards or drive business logic.

