Building a Resilient Property Protection Program at your District

AKA: Learn from my mistakes..

Keith Langlotz
Director of Facilities III
Williamsville CSD

Quick Background:

Facilities Director in Public K-12 for over 23 years
Worked in Small Rural, Medium Suburban, and Large Suburban settings as Director
Previous life as Stationary Engineer with City of Buffalo Schools (think really old buildings, yes Coal burning boilers!)
Past President of NYSSFA
NYSERDA Consultant, BOC Instructor
Managed over $300 Million in Capital projects including 14 acres of Artificial Turf, 5 new Tracks, and 40,000 sq. ft. of concert hall grade Music spaces

Where to Start….

There are 3 basic types of ways to build resilience as it relates to your school facilities:

Construction

Technology

Human

What is Property Protection and where to start?

Generically it is what it sounds like, how do you as a Facilities Director protect the properties of your District from damage and loss.

Specifically, how do we safeguard to the best of our ability the massive asset that is your District Buildings and Grounds?

Like all large tasks, you start by observing and collecting data….

Talking to your staff about the History of the District and the stories about the “Great Flood of 2008” or the “Super Bowl Pipe Freeze of 2019”

Talk to your mechanics and Head Custodians about the times they came in after the big storms or events. What did they have to fix (the corner room of the Elementary building UV, or the hose bib in the 200 wing of the HS)

Talk to your CFO and Insurance Carriers Representative about historic losses in the District

- What you are trying to identify is your known issues, those will often lead to the other items that are either similar conditions (identical buildings with same build flaws) or point to flaws in BMS or like mechanical systems (undersized pumps, bad control valves, Walk in cooler that is on a bad distribution breaker, etc.)

- When talking to staff ask questions about exterior UV damper function, Piping repaired multiple times in same spot, Freeze Stats (remote and manual), building envelope issues, and poorly insulated spaces (think 2 and 3 exterior wall situations)
- Take a walk with a pad and pen. Pretend you know nothing, open doors, look behind stuff, be curious!

So now you may have some ideas of issues, what do you do?

- Look for low cost easily solved issues (adding insulation, caulking gaps, fixing dampers, re-routing piping)
- Install more shut-off valves at intersections and appropriate places while doing other work or when the systems are drained.
- Review mechanical systems either with staff or engineering assistance if needed. Can you do piping, insulation, or other modifications to make the system less prone to failures?
- Work with BMS vendor on alerts, shutdowns, “cracked valve protocols”?

So we have talked with staff, used historical events to try and solve the low hanging fruit issues, now what?

Now we look ahead by using our future Capital and Repair work to help solve/eliminate issues;

So how can manage our Construction efforts to eliminate potential losses?

Get involved in the Construction process early with Design and CM firms

- Make a list of mechanical/building items that need attention and try to incorporate them into the project early so they make the 1st budget
- Be passionate about the need and potential cost savings (energy or losses) that they represent, also explain that complexity or cost takes them beyond your O&M capacity
- Emphasize to Administration that by making these improvements you are helping decrease the likelihood of schools closing due to mechanical/building failures = more state aid!
- Make a standards list and share with design and CM team (more on that later)
- Work with trusted vendors, search out latest technology in trade magazines and at shows and expos
- Talk to your peers, nothing you are experiencing is only happening to you, use your network!

Consider the following strategies with remodel or new construction design;

If using VAV or RTU supply in rooms with Fin Radiation, add gas pack to RTU (normally little cost, but cheap backup if you have a hydronic issue)

Size boiler plant with 1 extra unit than load requires and third pump with valves to take over in case of prime system failure. Make sure you have enough BTU on emergency generator to carry building.

Size Emergency generator (s) to carry mechanical load (Boilers, freezers/coolers, hot water (domestic), and ALL IT loads). This is in excess of the required FA, PA, E-lights (cover bathrooms) and any other code requires. Consider using 2 generators otherwise you need 2 transfer switches to segregate Life Safety from Machine loads.

Incorporate automatic water valves on make-up water circuit for Hydronic systems to prevent perpetual filling with a leak. Easy to override when filling the system, a life safer if used to prevent flood. These work in Glycol systems too!

What is a standards list and why do I need one?

A standards list is a concise way to tell the design team what you want (very specific) as they design the work. This lets you request (not a guarantee) the types and sometimes brands of equipment as well as preserves your Districts existing protocols (FA systems, BMS, RTU style, IT cable color coding, etc.)

Items like:

- HVAC component preferences
- BMS Systems in place (per building)
- Fire Protection Systems in place (per building)
- Camera, door access, door lock systems in place (per building)
- Window film in place
- Plumbing fixtures and piping types (ie copper only). Valve type and location
- Lighting
- Data protocols (fiber type, Cat 6 cable color coding, WAPs,etc.)
- Flooring, Roofing, Building materials

So we have tried to use Renovation and Construction to help eliminate issues, now what?

Now we look to;

TECHNOLOGY

We all have a different comfort level with TECHNOLOLOGY and this depends on many factors

Age

Work History

Previous Experiences (success or utter failure)

What cannot be disputed is that technology can help us do our jobs in ways that were science fiction 10 years ago.

So lets start small and simple….

Work Orders and Preventative Maintenance Scheduling (or CMMS for some people)

Most Districts have some form of Work Order management program already in place. It can be simple or complex, but it can likely provide you the following:

- When was something reported broken
- Who was sent to fix it
- Was it fixed? What did they replace?
- Has it happened several times in a period of time?

These basic facts when it comes to systems can help point us in the direction of potential failures.

For example has the Boilers at building “X” failed to come on from night setback multiple Sunday nights/Monday mornings in the past year?

Have you repaired due to freeze-up the coil in Room 6 several times?

HelixIntel

NYSIR has teamed up with HelixIntel to develop an exciting opportunity for a new type of CMMS program.

This has several unique features such as;

Coordinates Preventative, Reactionary, and Efficiency Maintenance tasks

Helps coordinate vendor/contractor tasks

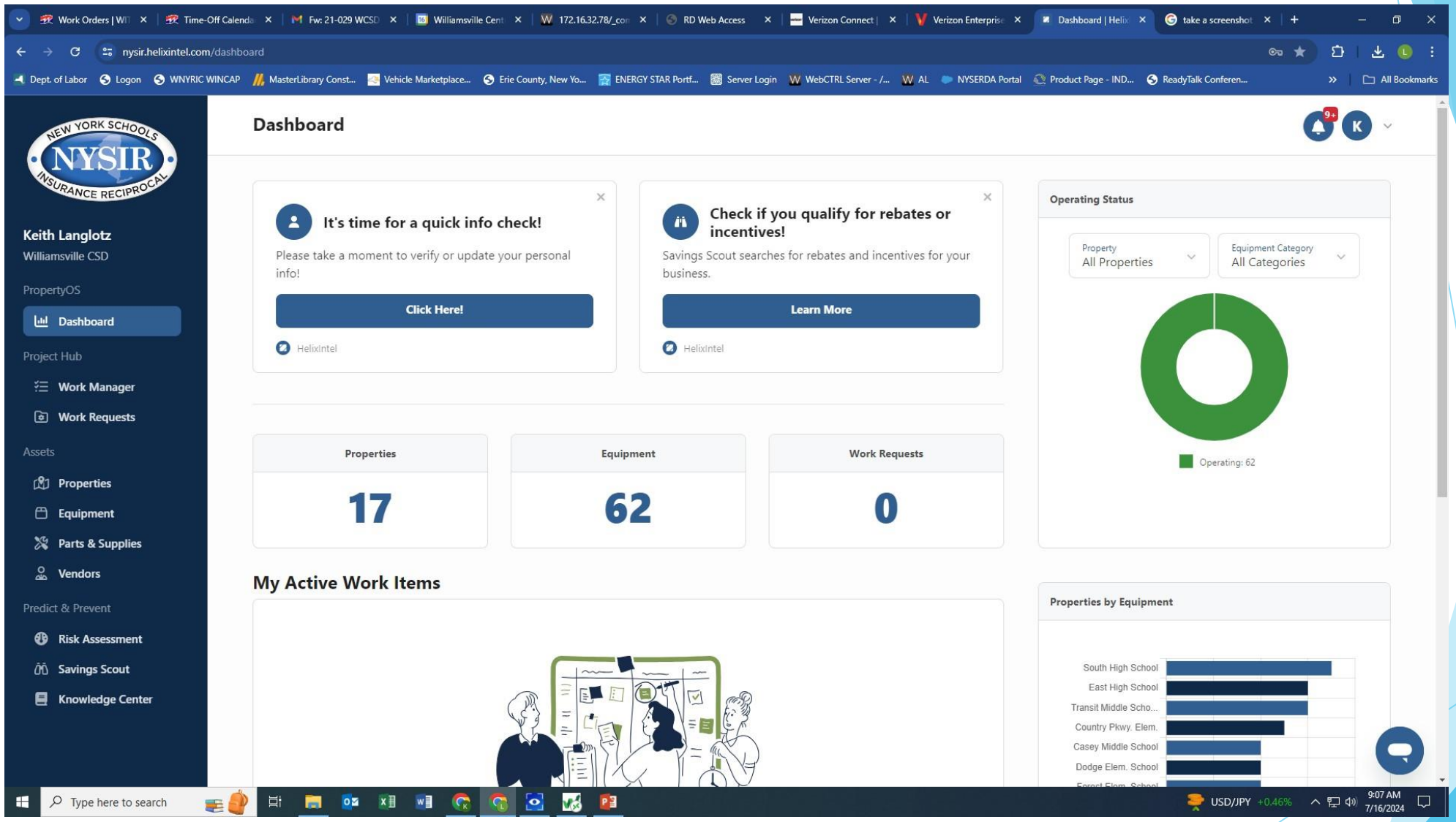
Assists in creating and managing parts inventory and correlates use to specific pieces of machinery

Inventories and centralizes maintenance history and resource manuals for site base machinery

Creates and suggests risk assessment as a focus

Provides savings recommendations with “Savings Scout”

Remember the better data that is in the system, the better the results!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Now that we got you thinking about those examples, what about your building management systems?

We all have a company (or in my case multiple companies) systems managing our HVAC (and more) via DDC or a BMS system.

Have you ever sat down an realized the massive amount of data these collect? Here are some ways to utilize this resource to prevent failures;

- Alerts when rooms or systems behave outside programmed parameters
- Calls to staff when those alerts persist beyond a prescribed period of time or are off-hours
- Installation of sensors on Freezers/coolers to send alerts
- Installation of water sensors in mechanical areas (more on that later)

What is the next steps in utilizing BMS to predict/prevent failures?

Data Analytics

Subscription based service on a per point basis that reviews trends in equipment and utilizes formulas to analyze performance of critical components (boilers, pumps, AHU/RTU, etc.) to increase/maintain peak efficiency and predict failures (also directing maintenance activities in advance of failures).

AI

AI is everywhere, and the current and next generations of BMS systems are using AI to enhance data analytics beyond formulas into true learning of trends to make real time adjustments and predict failures with frightening accuracy.

IoT Sensors

The ability to deploy sensors for temperature (or lack of), and moisture protection has never been easier or more cost effective

Your BMS likely has the ability to export text messages, emails, and even phone calls when certain criteria are met (ie. High or low temperature in a space, water detected etc.).

NYSIR has worked with Hartford Steam Boiler (HSB) to offer a sensor IoT program that is excellent. These sensor create a separate network with cellular connectivity backup to support the detection and notification of issues regardless of building infrastructure status. These include both temperature sensors as well as moisture/water sensors. Especially helpful is the escalation of notification from text message and email to a real life person calling your contact list to ensure someone responds to the issue.

So we have talked about Construction and Technology, now for the most important facet…

Human Intervention and Planning for Emergencies

What can we do to help prevent if possible, mitigate if needed a major damaging event at our buildings?

Use Your Greatest Asset, your staff!

By empowering your staff to help identify and solve your buildings issues, you multiply the amount of data and possible solutions. You are good at your job, but having a 100 more eyes and ears helping cannot be replaced by you working 24/7

Have specific and detailed conversations with both your Maintenance and Custodial staff to report what is wrong, and notice what has changed from yesterday. Give them a clear path to report issues via a chain of command structure or CMMS

Strategies for preventing Issues

- Create clear reporting structure for observed issues

  Chain of command (report to supervisor via phone or email)

  CMMS (submit Work Order)

  Log book entries as a fail-safe

- Confirm with follow up or “closing the loop” that someone reviewed the issue and what the outcome is/was (real or not). This builds confidence in staff that you are listening and value their work.
- Create structure of coverage for building use for as many hours per day as possible, consider alternate shift or off shift staff when possible by contract (Maintenance and Custodial)
- <u>Building Checks</u>
  - A Human walking the halls and spaces is the best. Encourage them to walk every space with no headphones and their eyes and ears open. Staff familiar with the building are best, but anyone can be trained.
  - Computer check of BMS and cameras if possible is good

Strategies to React to an Issue

- Clear Chain of command, contact points clearly posted in building for staff to access (in case your number is not in their phone)
- Answer your phone, or have someone dedicated to “cover” the weekends or nights
- Have simple building map with main utility shut offs clearly labeled (color coded is best). Think basic, put sign over backflow preventer or main incoming water valve that says “Main Water Valve Shut Off Here” so its’ bulletproof.
- If you have “wings” or isolate areas that have zone valving indicate above ceiling locations with color coded dots on Grid and correlate with Map.
- Make simple directions for Main Power locations that require more than “flipping a breaker” to re-energize the breaker (see next pic)
- Buy and keep at least two (2) commercial dehumidifiers and deploy them ASAP
- Call in more people than you think you need, not everyone shows and its’ easier to send people home than keep calling for more.

The switch should now look like the picture below:

Within 10 minutes the Emergency Generator should shut down.

Considerations for Disaster Response

- Chain of Command that includes a simple phone or text tree
- Stages supplies either at each building or central location that include;
  - Water Removal machines (floor sucker, walk behind machines, shop vacs, carpet extractors)
  - Dehumidification machines (suggest owning 2, knowing off-hours number to call for more if needed)
  - Fans (floor and pedestal)
  - Pro-Press with valves of all sizes for quick repairs and ability to re-start heating plant if needed. Consider keeping 1 length of pipe in each size and couplers less stop as well.
  - Temporary heaters for spot issues, again rental yard number on-hand for larger issues
  - Prioritize protecting Gym and other wood floors. If wet get them dry ASAP

Remember to document conditions with pictures, take pictures of lost items for both school asset system removal and possible insurance claims before disposing.

In the end we are trying to build a culture of noticing things out of the ordinary and responding in a timely manner to stop small issues from becoming larger.

We also need to foster staff normalizing “paying attention” and knowing what “normal is” and what is “not right” when they are around buildings and mechanical systems.

We can and should use technology and other tools to help, but in the end the Human factor is the single largest preventative practice we can and should encourage.

Having a plan and supplies in place for if/when disaster strikes is also very important and should not be overlooked.

Questions???

Thank you for your time and participation

Should you have any additional questions
I can be reached at:

klanglotz@williamsvillek12.org

Or

716-626-8860