

*Intelligent Services:
Optimizing
Performance by
Leveraging
Technology*

FEFPA

Winter 2019



Agenda

The
Internet of
Things

Market
Landscape

Questions

Current
Market
Challenges

Evolution
of Facility
Operations



Agenda

1. Current Market Challenges
2. Internet of Things
3. Evolution of Facility Operations
4. Market Landscape
4. Closing / Q&A

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An aerial photograph of a city with several green circles overlaid. The largest circle on the left contains the text 'Current Market Challenges'. Five smaller circles are arranged in an arc to its right, each containing a specific challenge: 'Aging Infrastructure', 'Deferred Maintenance', 'Capital & Operating Budget', 'Shrinking Skilled Labor Pool', and 'Community Responsibility'.

Aging
Infrastructure

Deferred
Maintenance

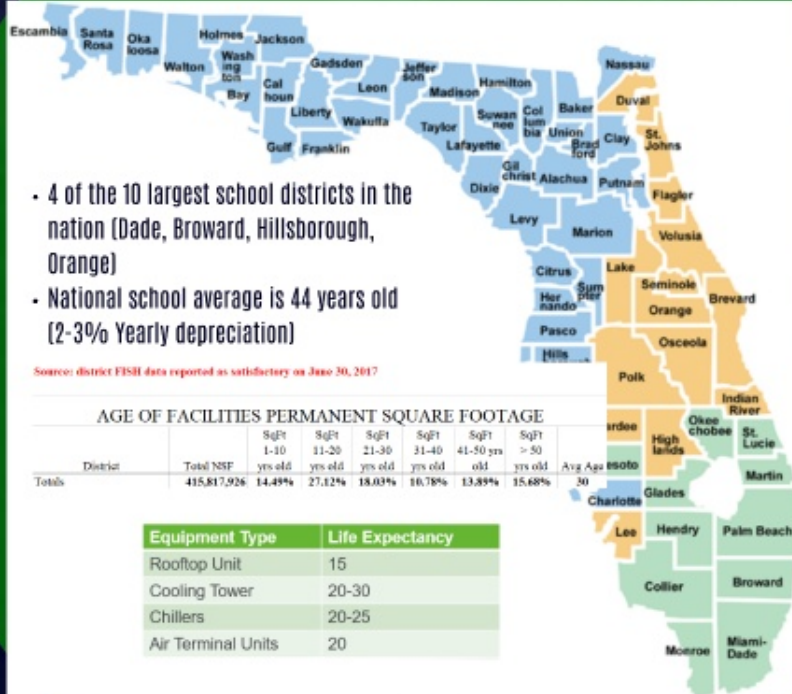
Capital &
Operating
Budget

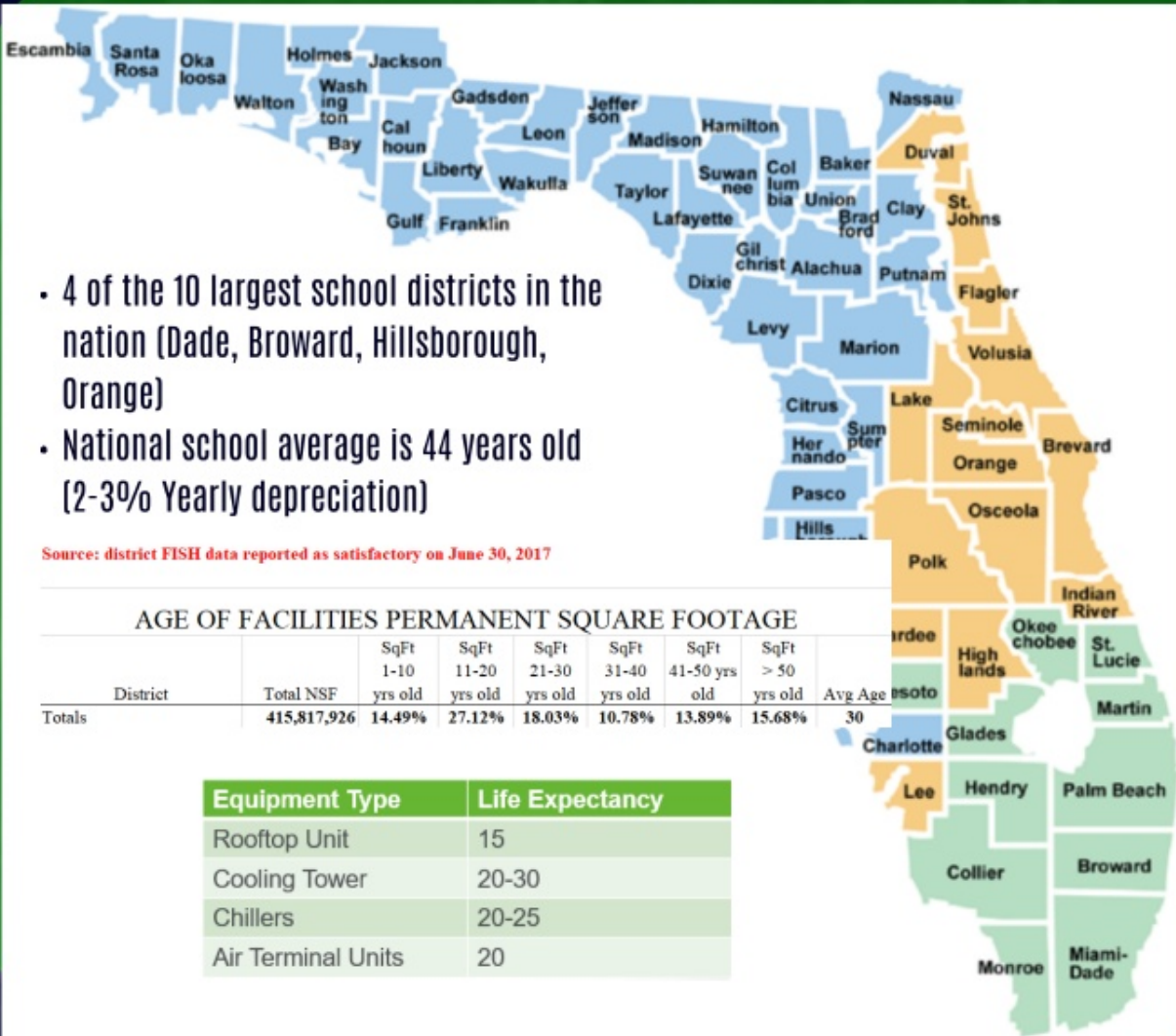
Shrinking
Skilled Labor
Pool

Community
Responsibility

Current Market
Challenges

Aging Infrastructure





- 4 of the 10 largest school districts in the nation (Dade, Broward, Hillsborough, Orange)
- National school average is 44 years old (2-3% Yearly depreciation)

Source: district FISH data reported as satisfactory on June 30, 2017

AGE OF FACILITIES PERMANENT SQUARE FOOTAGE

District	Total NSF	SqFt 1-10 yrs old	SqFt 11-20 yrs old	SqFt 21-30 yrs old	SqFt 31-40 yrs old	SqFt 41-50 yrs old	SqFt > 50 yrs old	Avg Age
Totals	415,817,926	14.49%	27.12%	18.03%	10.78%	13.89%	15.68%	30

Equipment Type	Life Expectancy
Rooftop Unit	15
Cooling Tower	20-30
Chillers	20-25
Air Terminal Units	20



Deferred Maintenance

- Limited Funds - M&O, upgrades and repairs deferred
- Impact on Health and Well-being of occupants
- Systems failing before their expected life
 - For every \$1 of DM - \$4 of Capital Renewal
 - Increase backlog of critical projects - emergency repairs (3 - 4 times + expensive than planned)
 - NCES estimates \$550 Billion needed in investments to correct current deferred Maintenance issues in schools



Capital and Operating Budgets

- Safety in schools becoming a main priority
- Classroom for Kids Program - Class size reduction
- Report from the Florida Association of District School Superintendents
 - The “base student allocation,” the primary source for general operational activities, only increased by 47 cents per student statewide, a fraction of the overall funding increase of \$101.50 per student.
 - “With only a 47-cent increase in the BSA, superintendents will be forced to cut their budgets --- cuts that will impact students, schools and communities that are served,” the report said.



Shrinking Skilled Labor Pool

 BUREAU OF LABOR STATISTICS

- In the HVAC industry specifically, mechanic and installer jobs nationwide are expected to grow 15 percent from 2016 to 2026
- This growth is much faster than the average for all occupations and is driven by commercial and residential building construction.
- Not only is the demand increasing, but the current workforce is preparing to retire within the next 10 years, leaving positions open.

Community Responsibilities



- Maintain / Increase student grades and graduation rates
- Human Capital - Teachers / Principals
- Safe Environments
 - Personal integrity
 - Environmental Safety / IAQ
- Environmental Sustainability
 - Clean and efficient use of resources
 - Reduction in operating costs



**SAFE SECURE
SCHOOLS**



**KEEP
CALM
AND
OPTIMIZE
RESOURCES**

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Trends


The
Connected
Building
Strategy

IoT




The Value of
Data



An aerial photograph of a dense city skyline, likely New York City, with numerous skyscrapers. A large, semi-transparent green circle is overlaid on the center of the image. The text "How do you define IoT?" is written in white serif font inside the green circle. A solid green semi-circle is also visible at the bottom of the image.

How do you define IoT?



How do you define IoT?

Connected?
Remote Accessible?
Automation?
Learning Systems?
Convenience ?
Awareness?

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Connected?
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Awareness?

Examples:
- Residential
- Wearables
- Smart Cities

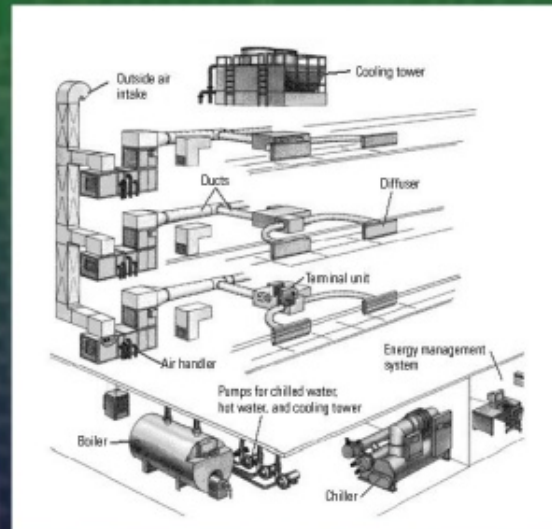
How do you define IoT?


Connected?
Remote Accessible?
Automation?
Learning Systems?
Convenience ?
Awareness?

Examples:
- Residential
- Wearables
- Smart Cities

By 2020 there will be over 26 billion connected devices

Where is the IoT in your Schools?



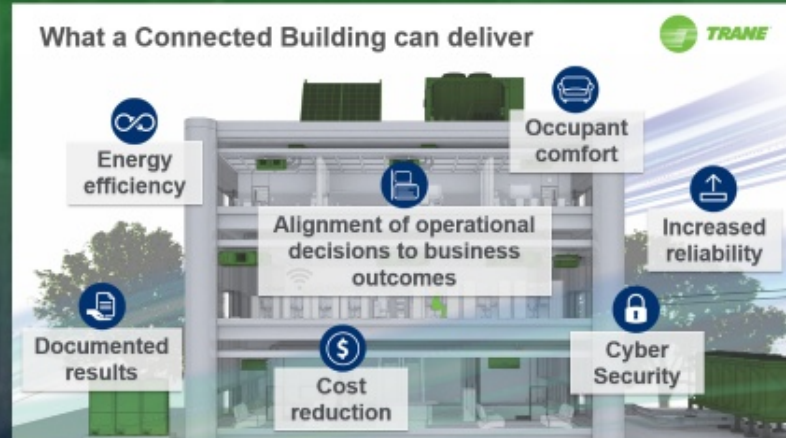


Where is the IoT in
your Schools?

Where is the IoT in your Schools?

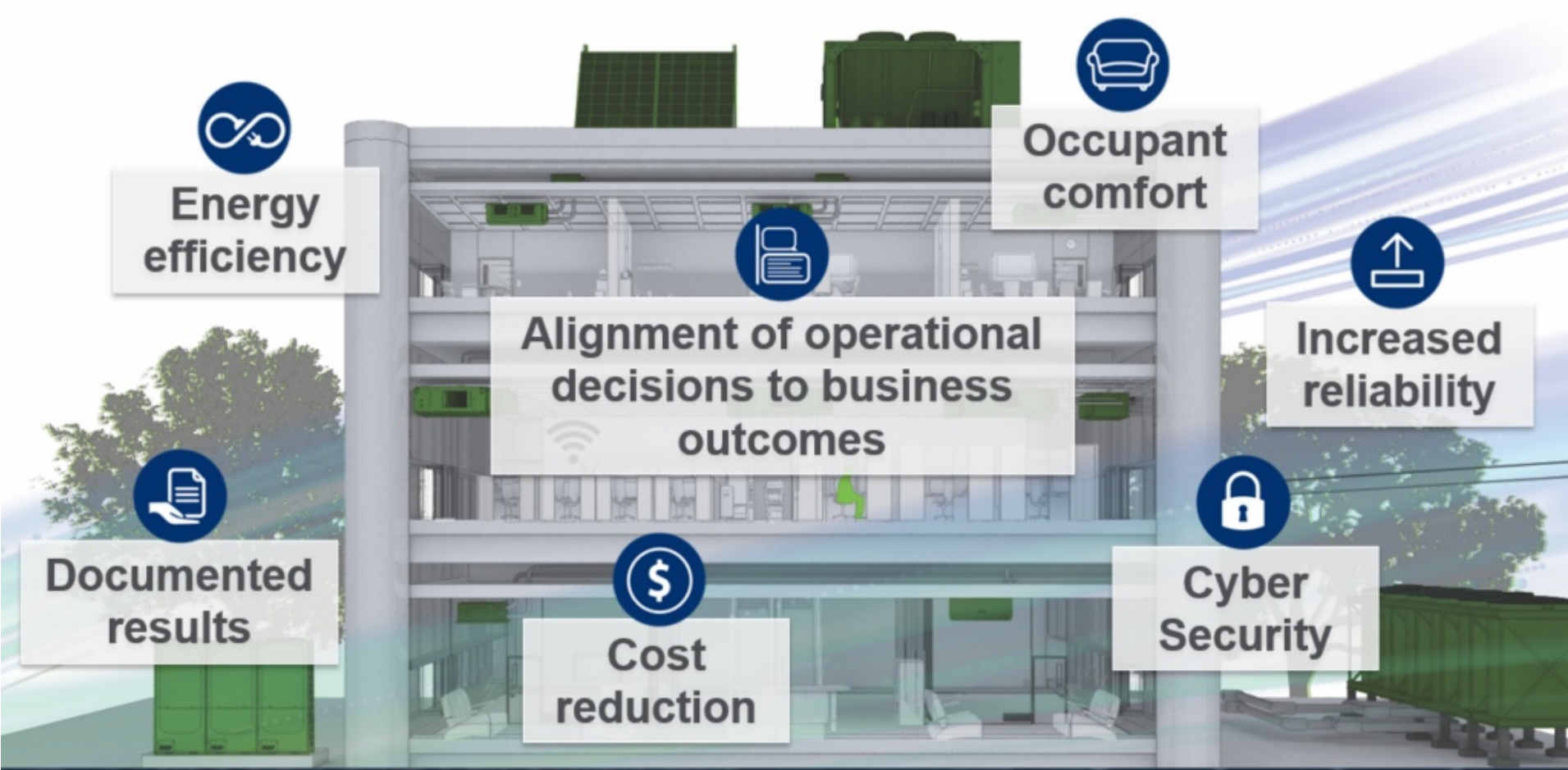


The Value of Data





What a Connected Building can deliver



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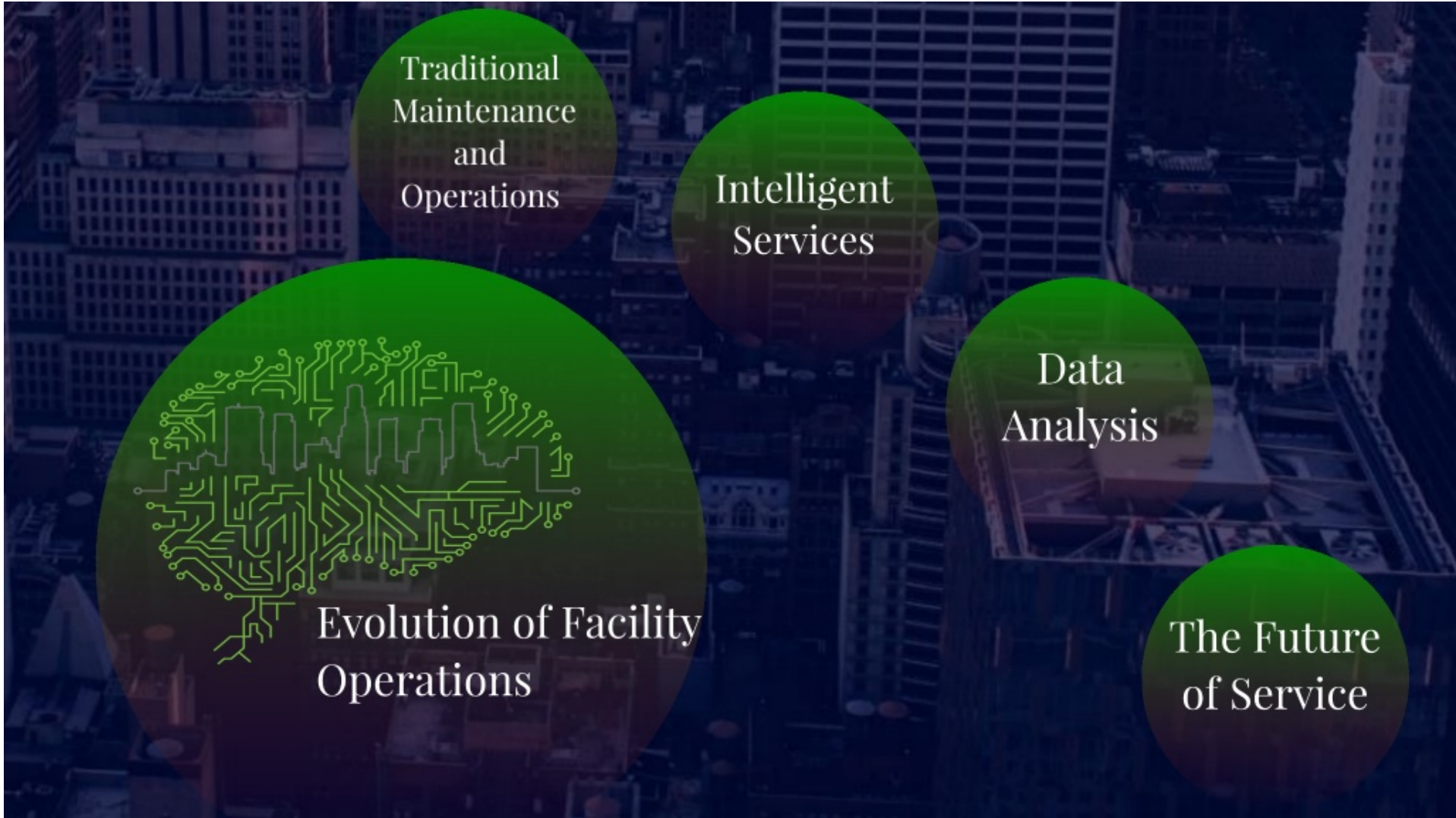
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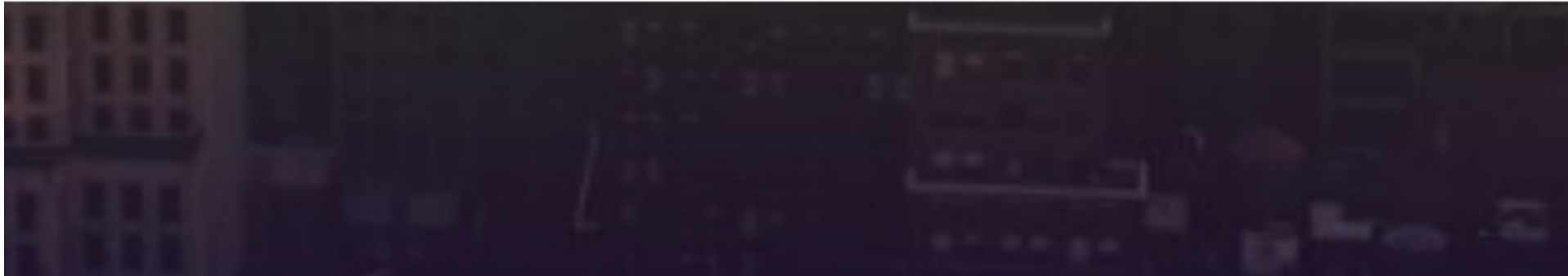


Changing the Approach to Building Management

Traditional Operation	Internet of Things Assisted
Scheduled	Continuous
Task Based	Customer Focused
Unit Based	System Based
Reactive	Proactive




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Intelligent
Services

What
is it?

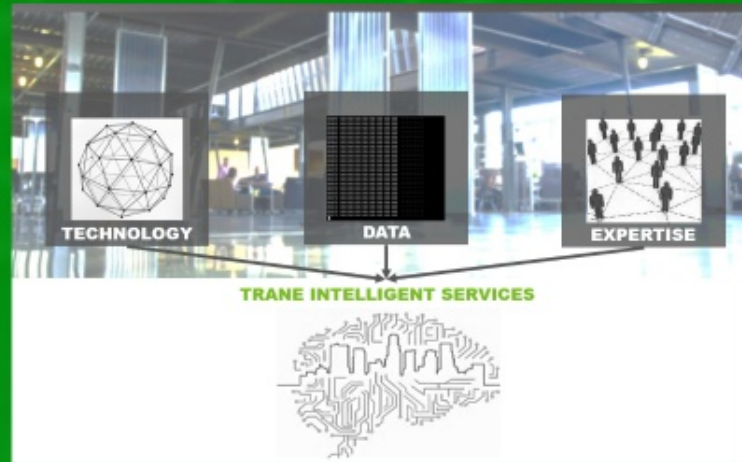


Intelligent Services is a *technology based service* that leads to *actionable* insights into your data.

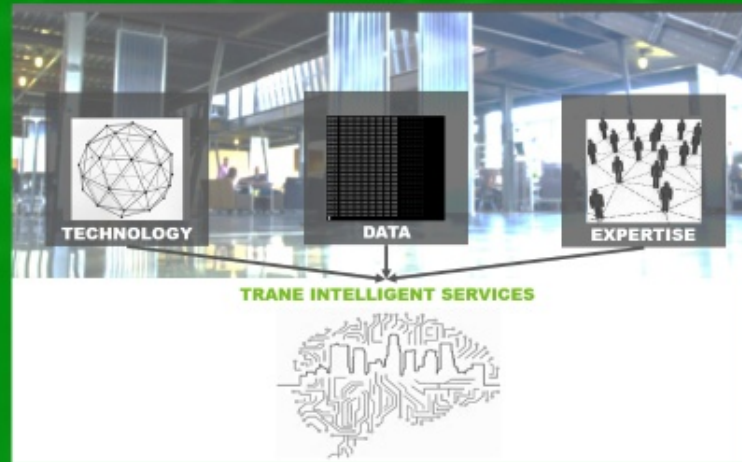
Technology
Based
Services

Actions

Technology Based Services

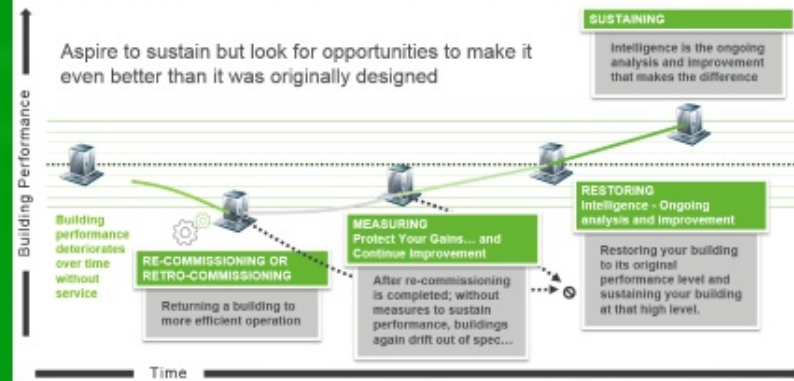


Technology Based Services

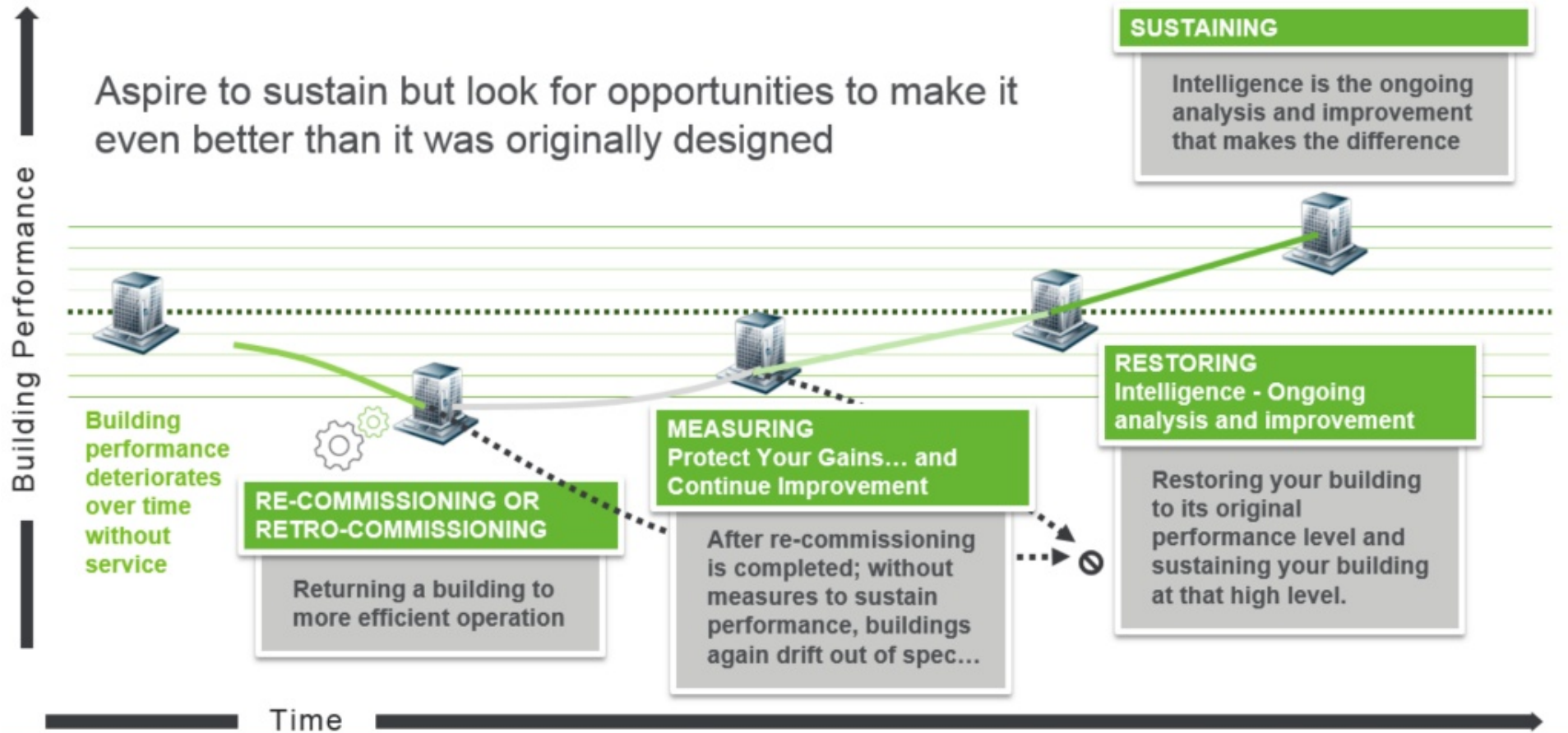


Actions

Every building can be transformed into a stronger asset

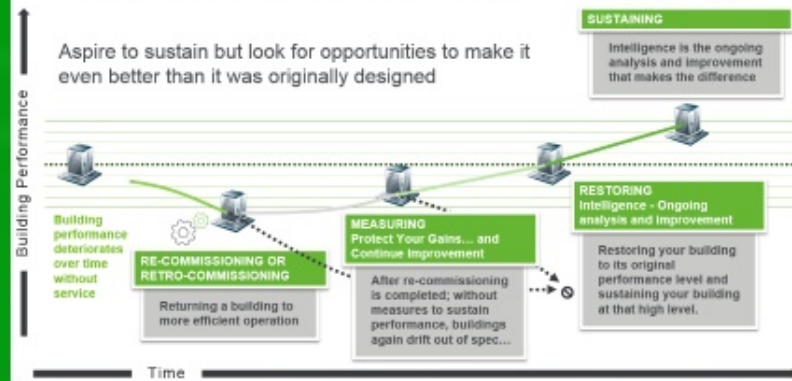


Every building can be transformed into a stronger asset



Actions

Every building can be transformed into a stronger asset



Data Analysis Examples

Increased
Reliability

Efficient &
Proactive
Management

Energy
Savings

Increased
Visibility

Increased Reliability

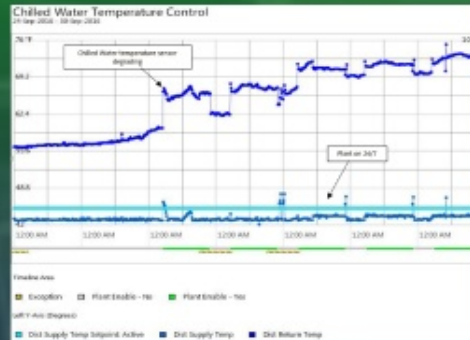
- Chillers were running after hours even when there was no one at the school
- Issue was found in air handler temperature setpoint
- Adjusting the setpoint saved in excess energy spend and stopped short cycling of the chiller

Issue Identification

Analytic Test	VAV-10-28	VAV-10-29	VAV-10-30	VAV-10-31	VAV-10-32
Cooling Setpoint Out of Range <71°F	0	0	0	0	0
Heating Setpoint Out of Range >73°F	0	0	0	0	0
Space Temp: Cold (Below Setpoint)	0	0	0	0	0
Space Temp: Warm (Above Setpoint)	0	2	6	25	4

Analytics will identify issues and their frequency, so you can more efficiently inspect the system by targeting the equipment with pre-identified problems.

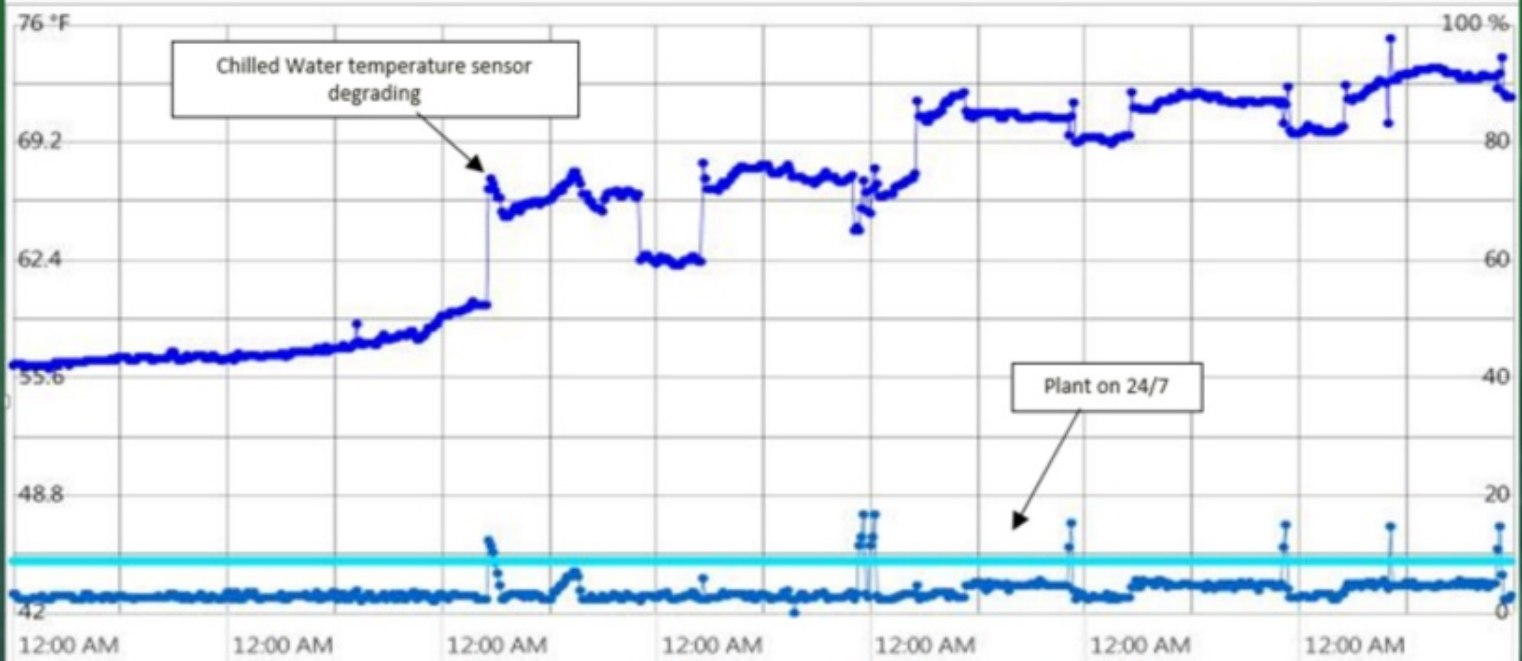
Cost Avoidance



A failed temperature sensor was causing the chillers to run 24/7. \$30,000 in energy spend could have been avoided with analytics.

Chilled Water Temperature Control

24-Sep-2016 - 30-Sep-2016



Timeline Area

Exception Plant Enable - No Plant Enable - Yes

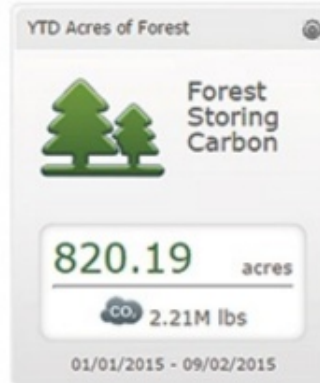
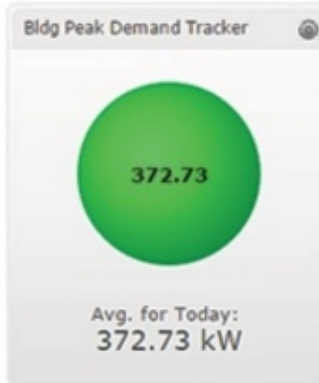
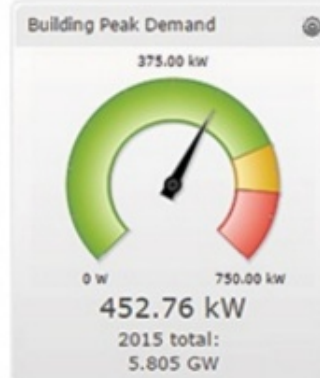
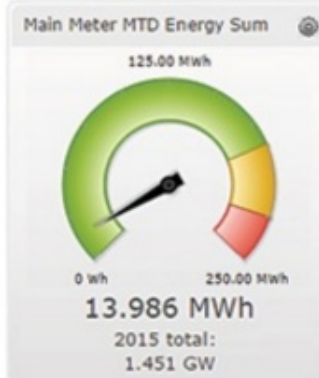
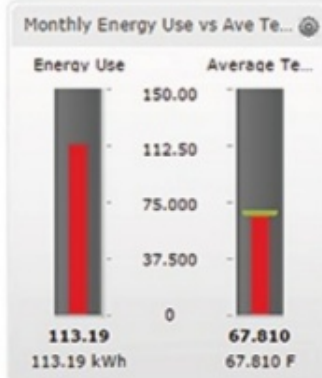
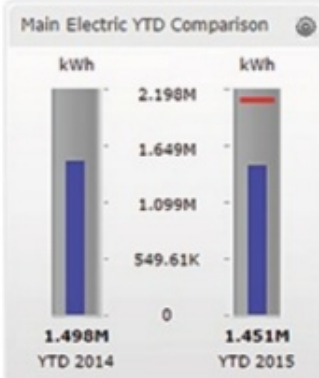
Left Y-Axis (Degrees)

Dist Supply Temp Setpoint: Active Dist Supply Temp Dist Return Temp

Real Time Dashboards



Trane White Bear Lake



The Future of Operations

Leverage existing infrastructure & IoT to respond to the challenges of managing your schools by

- Efficiently using your staff & budget
- Avoiding problems instead of reacting to them
- Reducing energy consumption and carbon footprint
- Re-investing savings to address deferred maintenance

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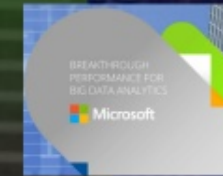
Market Landscape

- Market Maturity
- Competition
 - Systems Knowledge
 - Software Developers
- Implementation

Analytics

Summary

BAS / EMS



Summary



Utilizing existing data in your building to provide continuous commissioning that will help drive performance, improve IAQ and provide a better learning environment for your students

Data is the
great
differentiator.



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