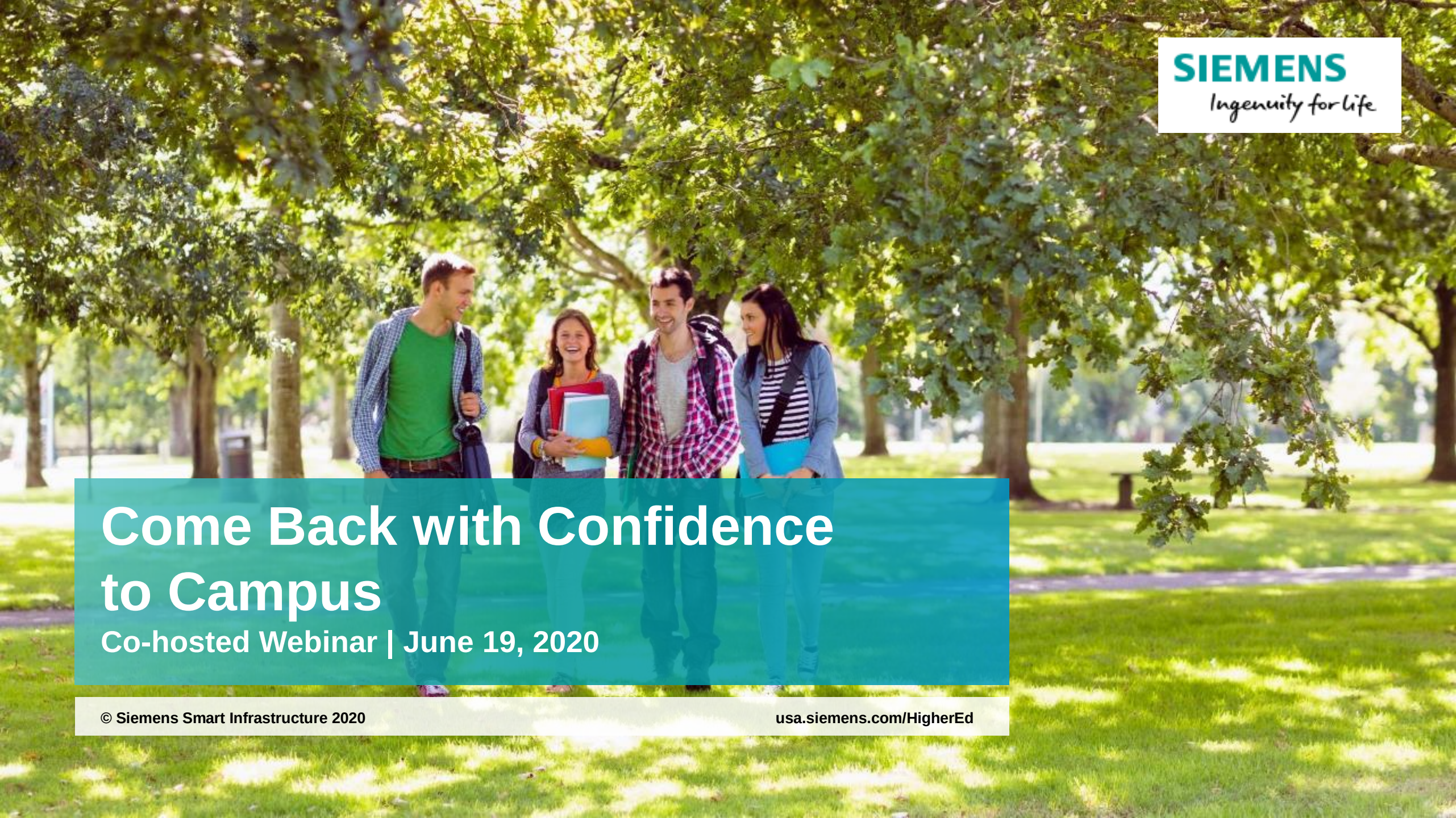

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Come Back with Confidence to Campus

Co-hosted Webinar | June 19, 2020

Welcome

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MICHIGAN COLLEGES ALLIANCE

Robert Bartlett, Ph. D.
President

COUNCIL of INDEPENDENT NEBRASKA COLLEGES Foundation

Treva D. Haugaard, MSW, MPA
Executive Director

Siemens – Your thought partner

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Nicole Gazzeny
Director of Strategic Partnerships
Siemens Smart Infrastructure
Michigan

Fred James
Director of Higher Education
Siemens Smart Infrastructure
National

Carolyn D. Rooker, MSW, MPA
Director of Strategic Partnerships
Siemens Smart Infrastructure
Nebraska

Siemens at a Glance

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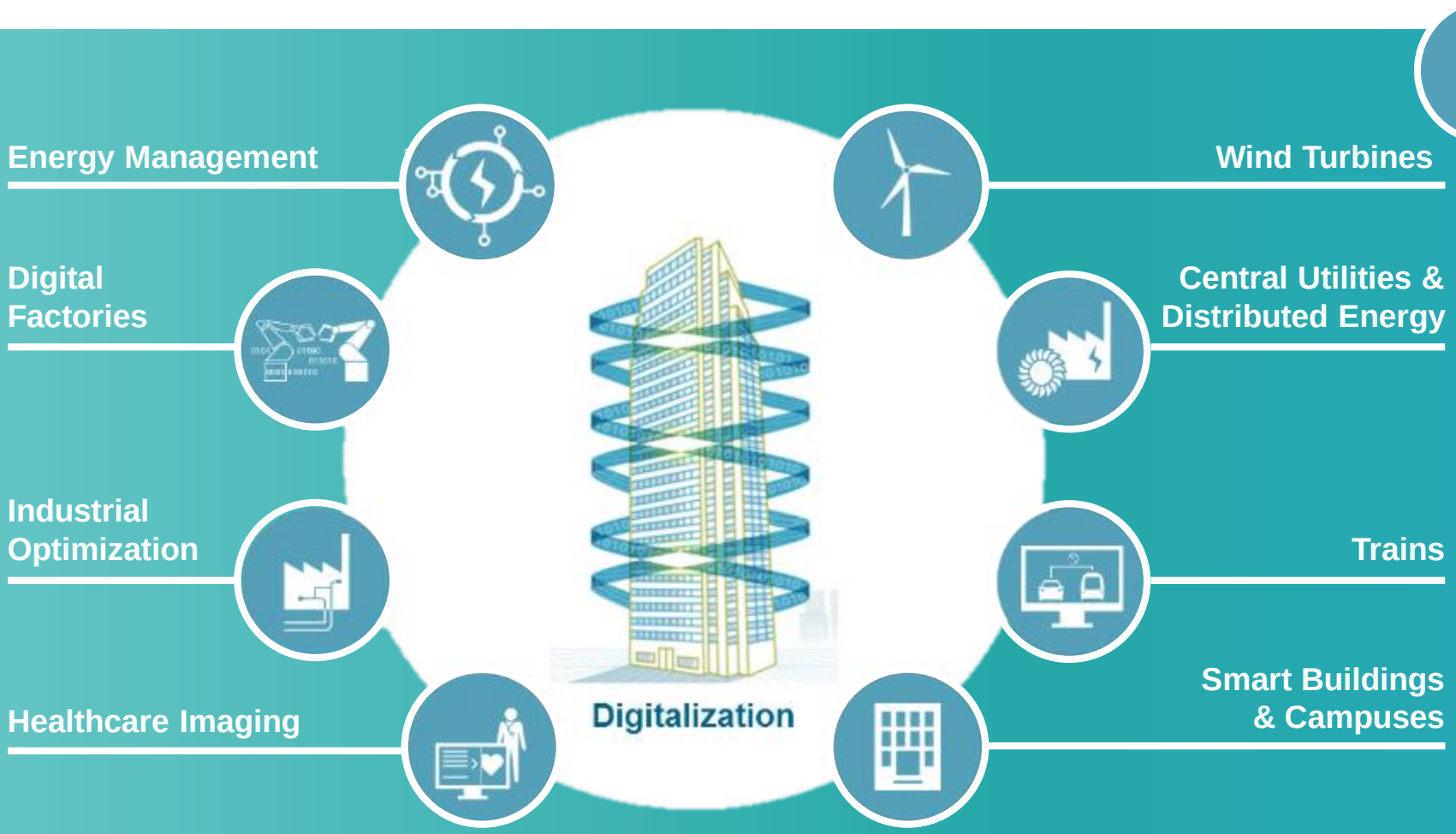

Smart Buildings and Campuses

Leverage data, innovation and technology to provide learning environments that are:

- Comfortable
- Safe and Secure
- Resilient
- Aesthetically appealing
- Energy efficient
- Automated
- Data-Driven
- Sustainable
- Easy to operate and maintain

Supporting Private & Faith-based Colleges and Universities Nationally

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MIDWEST

Adrian College
Concordia University
Madonna University
Northwestern University
University of Evansville

SOUTH

Columbia International University
Duke University
Florida Institute of Technology
Southern Methodist University
Xavier University

NORTHEAST

Columbia University
Eastern Mennonite University
George Washington University
New York University
Princeton University

Siemens supports more than 800 higher education customers in the U.S. & Canada

Trends and Challenges in Private Higher Education

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- Reduce Capital and Operating Expenses
- Enhance Space and Asset Efficiency
- Increase Reliability and Staff Productivity
- Optimize Health, Safety and Security
- Secure Enrollment

A new campus: rules, requirements, and innovation

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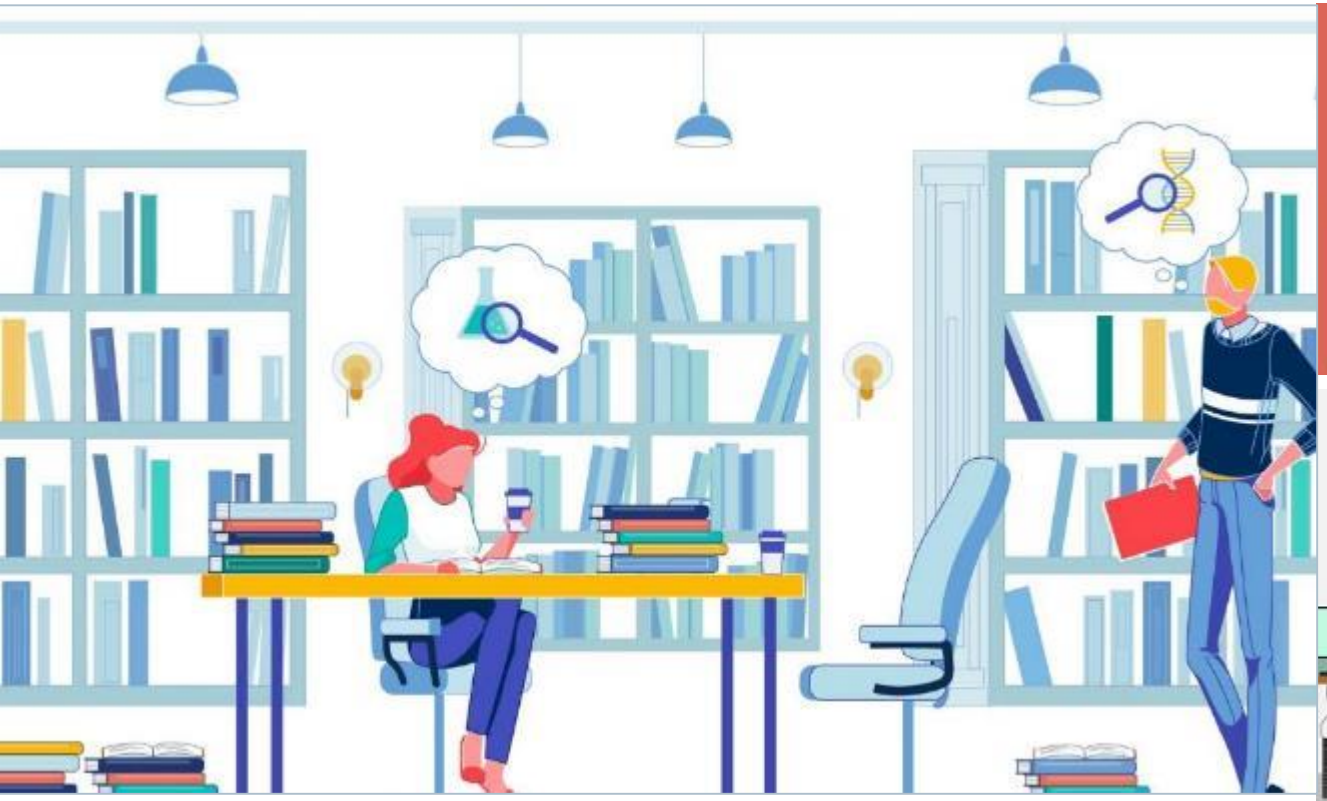

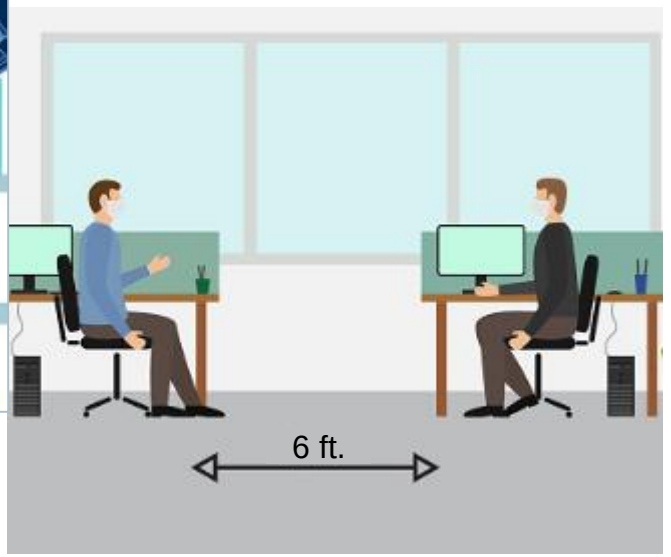

Campuses will look different when we return

You have questions –
for now and for the future of education

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How can we help reduce the spread of airborne and surface contaminants?

Can we do anything about air quality?

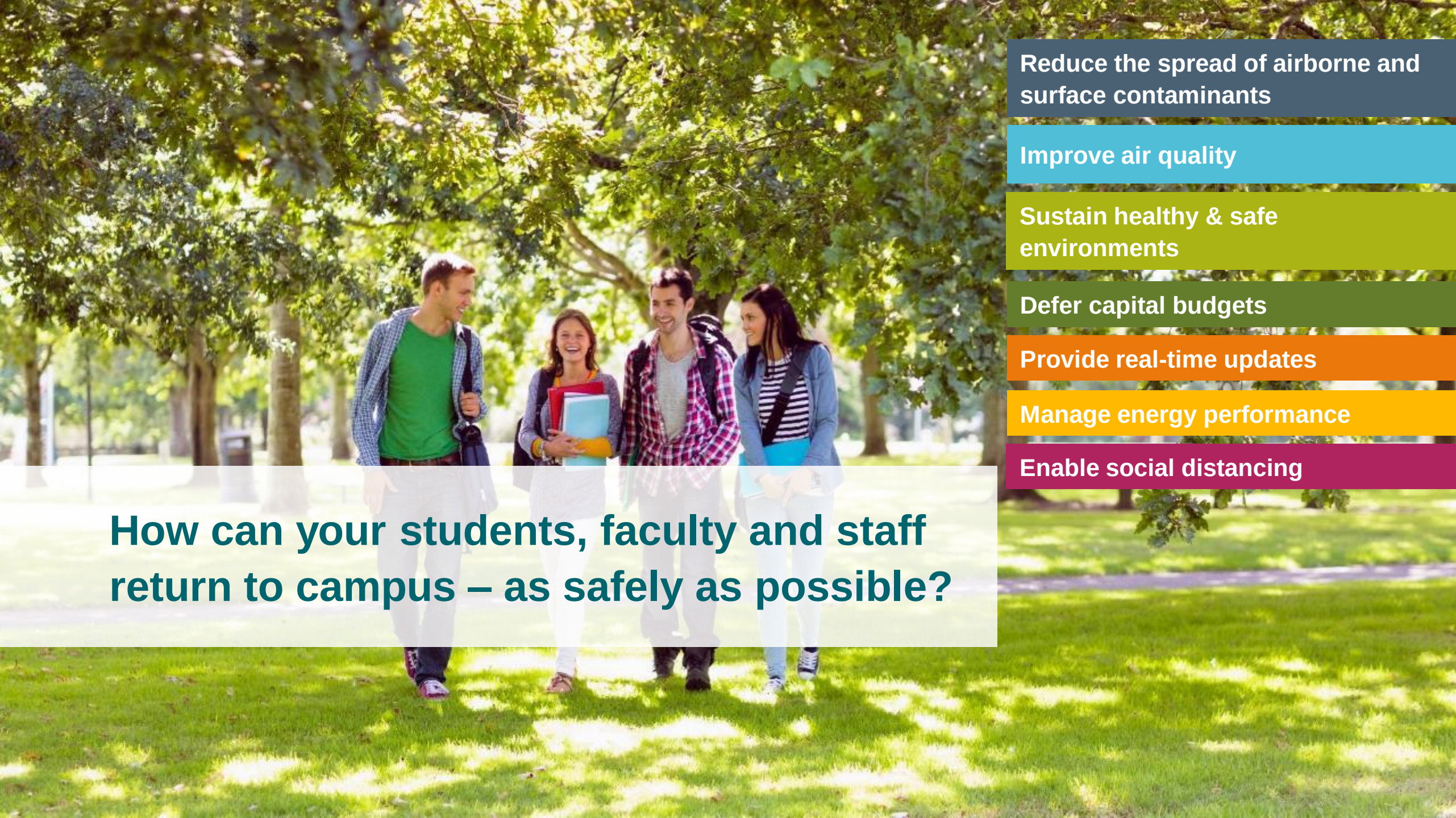
Energy performance is still a priority – how do we manage that?

How can we support social distancing?

What's the best way to keep people informed and up-to-date?

How can we sustain healthy and safe environments?

What about budgets?



How can your students, faculty and staff return to campus – as safely as possible?

- Reduce the spread of airborne and surface contaminants
- Improve air quality
- Sustain healthy & safe environments
- Defer capital budgets
- Provide real-time updates
- Manage energy performance
- Enable social distancing

Come back with confidence to safe, healthy higher education environments

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Improve air quality with new HVAC maintenance strategies and advanced filtration

Clean the air and surfaces with ozone-free ionization technology that kills mold, bacteria and viruses and removes VOCs

Spot clean high contact areas with installed or portable UV technologies

Combine technology and HVAC maintenance strategies to reduce the spread of viruses

Create a targeted sanitation and surface disinfection strategy with equipment and IoT sensors

Contact tracing for individuals who tested positive

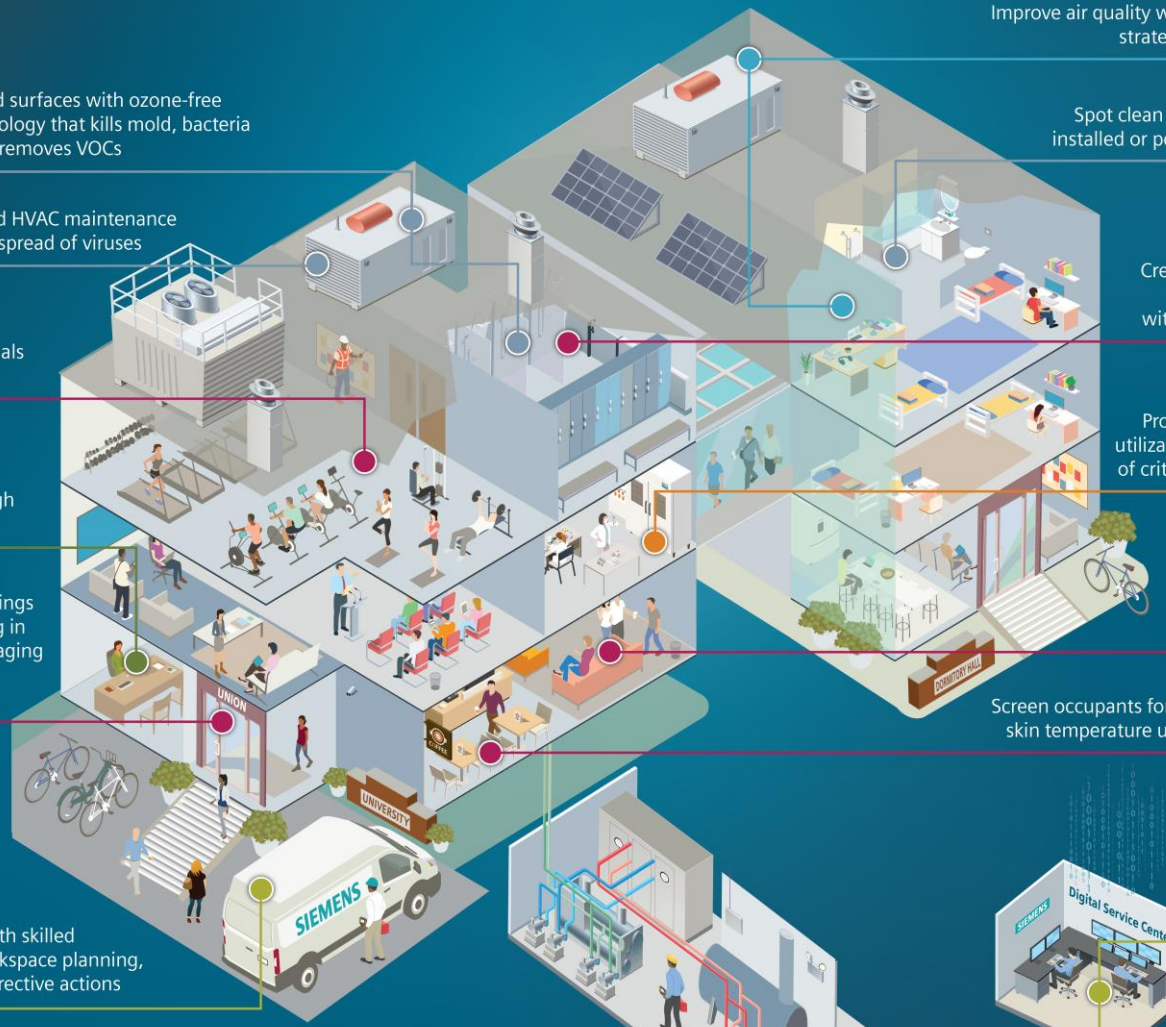
Provide real-time updates on space utilization and emergency notification of critical events or COVID-19 updates

Defer capital budgets to operating budgets through financing options

Control occupancy in buildings by counting people coming in and out of a building leveraging video analytics or access control readers

Monitor occupancy for density and safe distancing leveraging equipment and IoT sensors and analytics

Screen occupants for evidence of elevated skin temperature using thermal cameras



Utilize 24/7 monitoring, remote response and resolution, and maintenance to help onsite teams

Leverage advanced analytics and fault detection to identify issues early and service equipment based on need

Utilize on-site service, with skilled technicians and safe workspace planning, for maintenance and corrective actions

Manage energy performance by off-setting new HVAC guidelines with energy efficiency strategies and IoT technology

- Reduce the spread of airborne and surface contaminants
- Improve air quality
- Sustain healthy & safe environments
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- Manage energy performance
- Enable social distancing

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Speakers & Topics

Martha Senf
National Director
Building Level IoT
Siemens Smart Infrastructure

Topics include:

Enabling social distancing

- How to implement
- What technologies can assist

David Santo
National Director
Mechanical Services
Siemens Smart Infrastructure

Topics include:

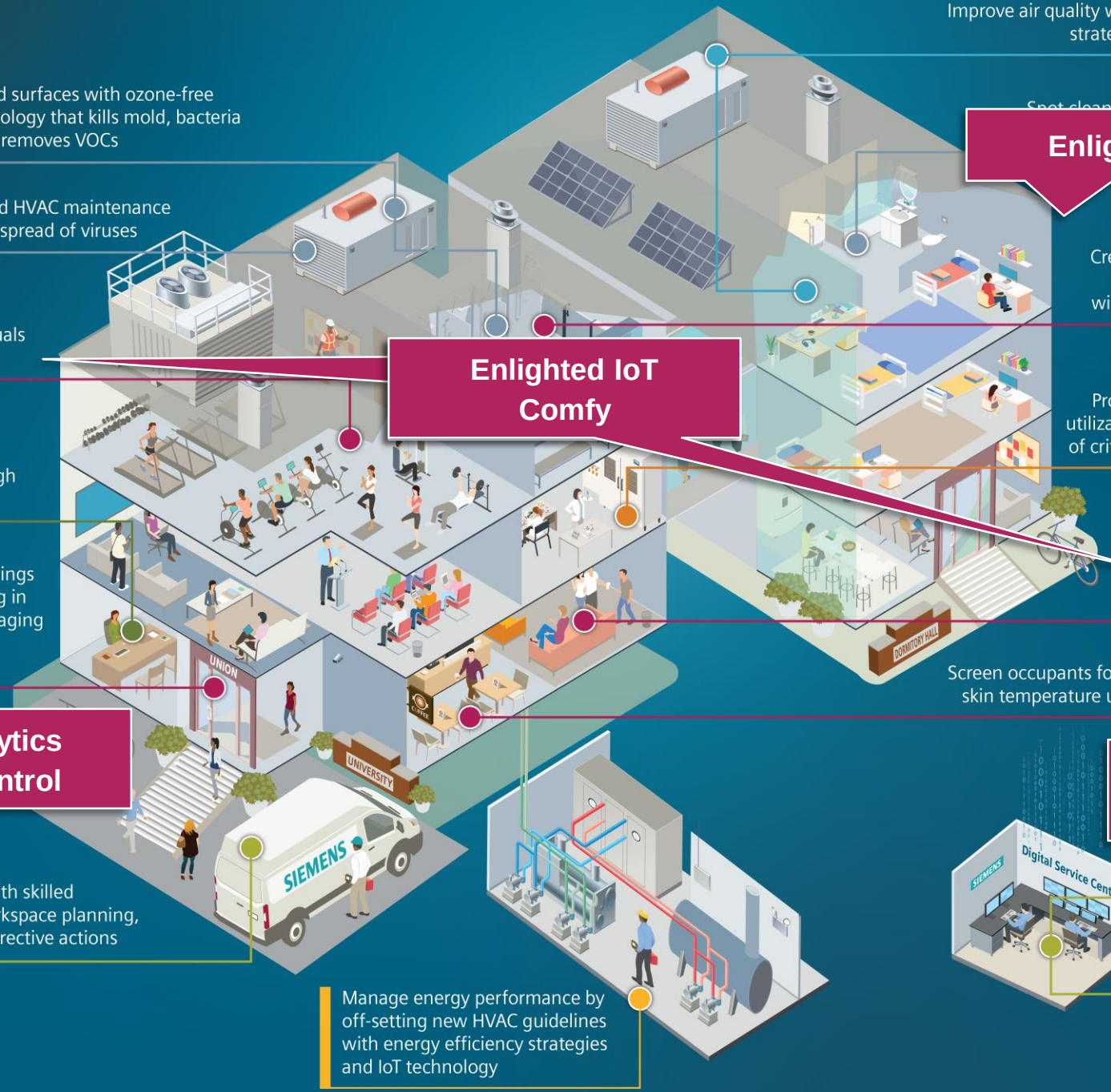
Reducing the spread of airborne and surface contaminants

- How to implement
- What technologies can assist

Improving air quality

- What strategies and services can support

Implementing physical distancing



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Enlighted IoT

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Enlighted IoT Comfy

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Video analytics
Access control

FDA-cleared thermal cameras

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Enable physical distancing

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How do we accomplish this?	
Screen occupants for evidence of elevated skin temperature (EST)	Security Offerings **FDA-Cleared Thermal Cameras**
Control occupancy in building by counting people coming in and out	Security Offerings **Video Analytics** and **Access Control**
Enable contact tracing for individuals who tested positive	**Enlighted Building IoT**
Create a targeted sanitization and surface disinfection strategy	IoT Solutions and Platforms **Enlighted** and **Comfy**
Monitor office occupancy for density and safe distancing	IoT Solutions and Platforms **Enlighted** and **Comfy**

Security offerings that enable physical distancing

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FDA Cleared Thermal Cameras

Campuses should measure the students' and faculty's temperature and assess symptoms prior to starting their day. Ideally, temperature checks should happen before the individual enters the campus at large.* Positioning thermal cameras at building entrances allows facility managers to implement the CDC's recommendation.

People Counting

Video Analytics: Within the video management system, apply analytics that enable people counting and support safe distancing.

Access Controls: Install access control readers for "read in / read out" capabilities to manage occupancy.

*Source: Centers for Disease Control and Prevention

Enlighted Building IoT
How it works

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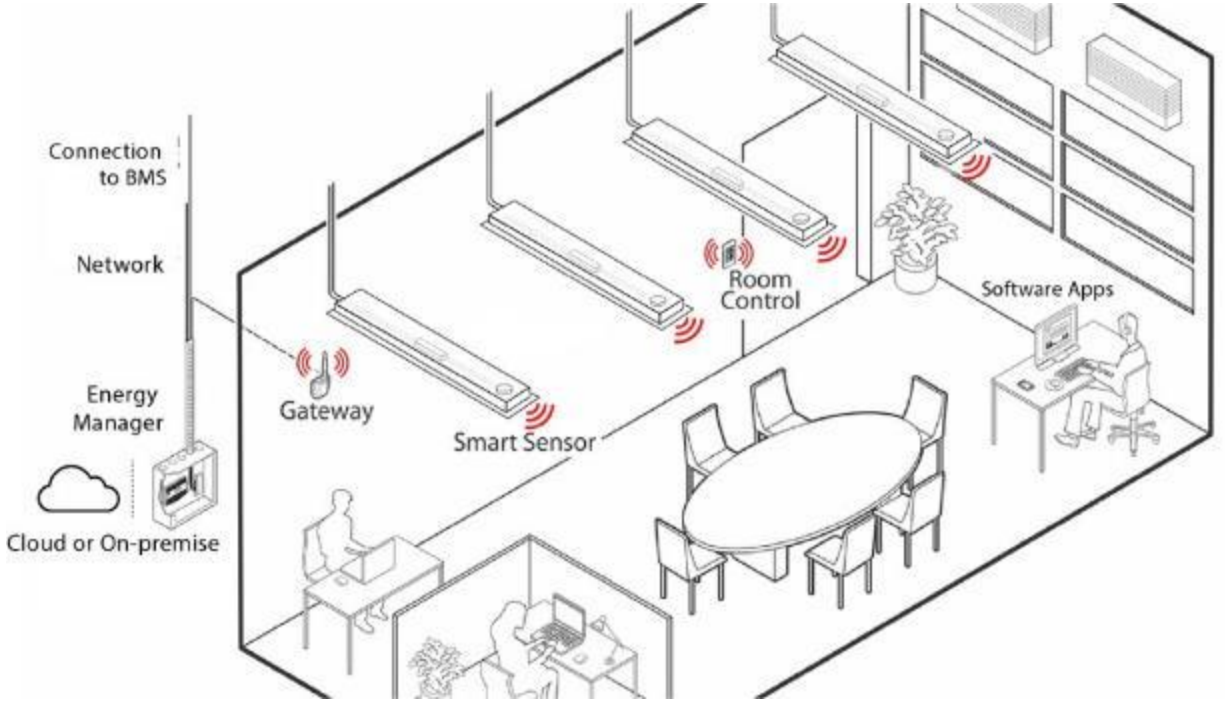

Enlighted Building IoT

Who came into contact with whom?

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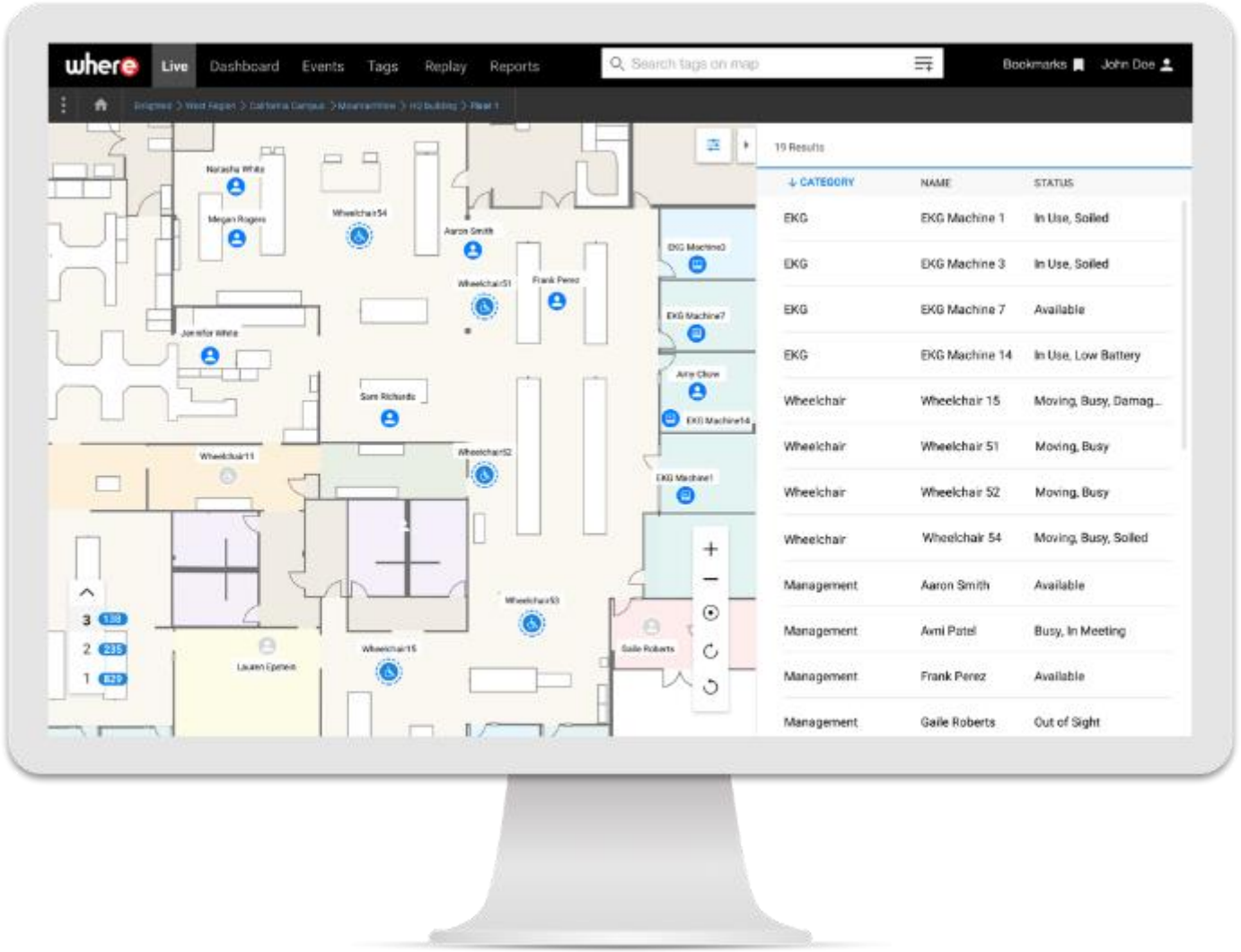
Identify interactions with people who tested positive for COVID-19 and avoid the need to quarantine entire teams. Focus sanitization efforts accordingly.

Enlighted Building IoT helps make sure people who may be contagious stay home.



Data Reporting that Allows Privacy

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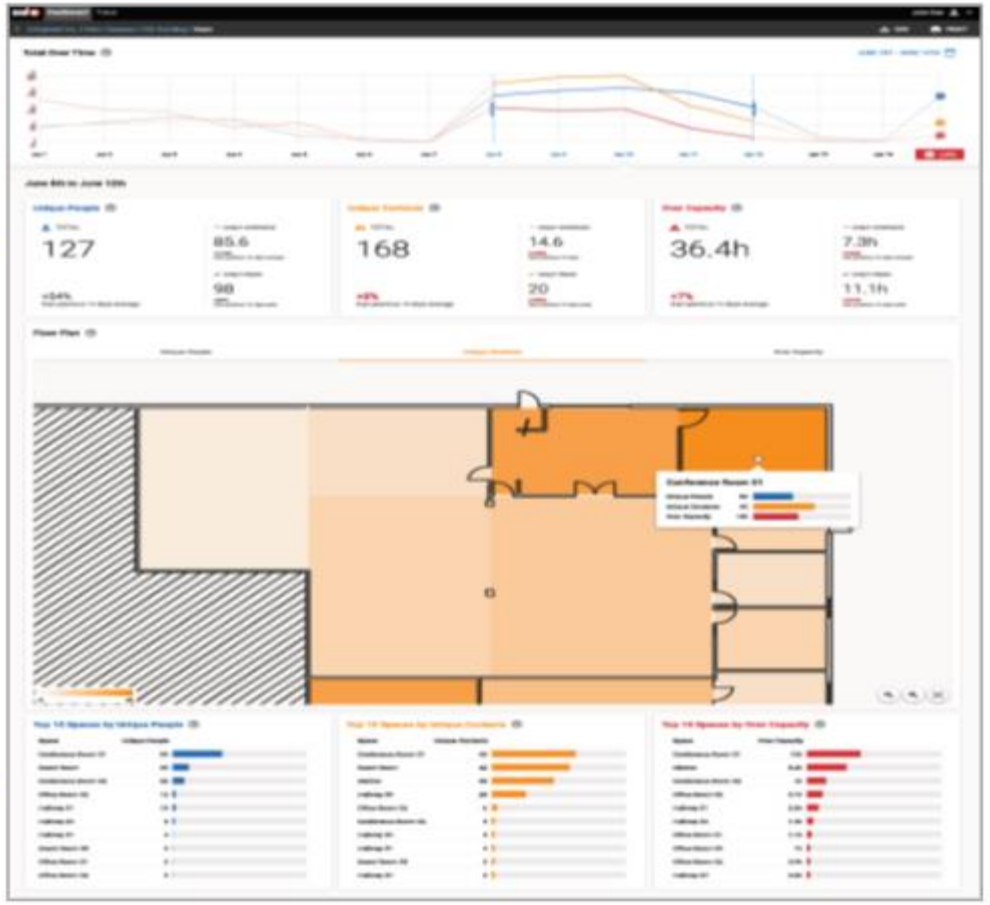

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6e5b69af007a501422acd20ad7c7408e	ID-89993	2019-12-02T17:36:24+00:00	2019-12-02T17:41:25+00:00	near	medium
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6e5b69af007a501422acd20ad7c7408e	ID-89993	2019-12-03T00:55:01+00:00	2019-12-03T01:00:01+00:00	near	medium
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6e5b69af007a501422acd20ad7c7408e	ID-89993	2019-12-07T17:50:57+00:00	2019-12-07T18:01:23+00:00	close	extreme

Understand Density Patterns

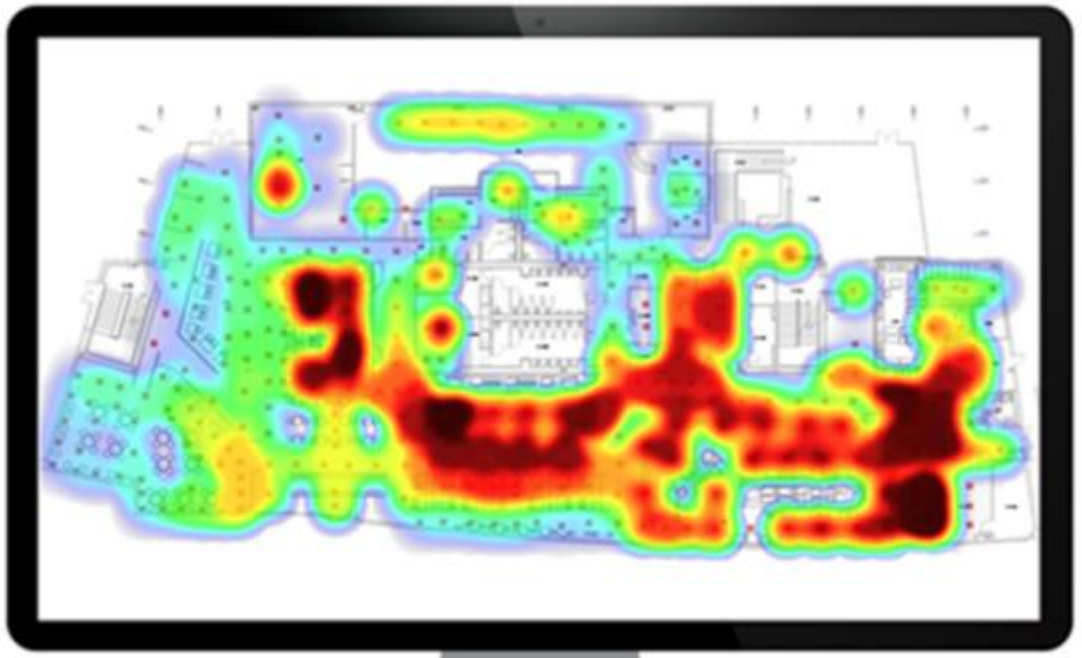
Identify areas that are the most densely populated

Focus efforts on space reconfiguration and seat elimination to reduce density

Validate if changes were effective

Direct janitorial services

Identify traffic routes that need monitoring



SPACE Application: Density Heatmaps

Manage Physical Distancing

Create a healthy environment for students and faculty

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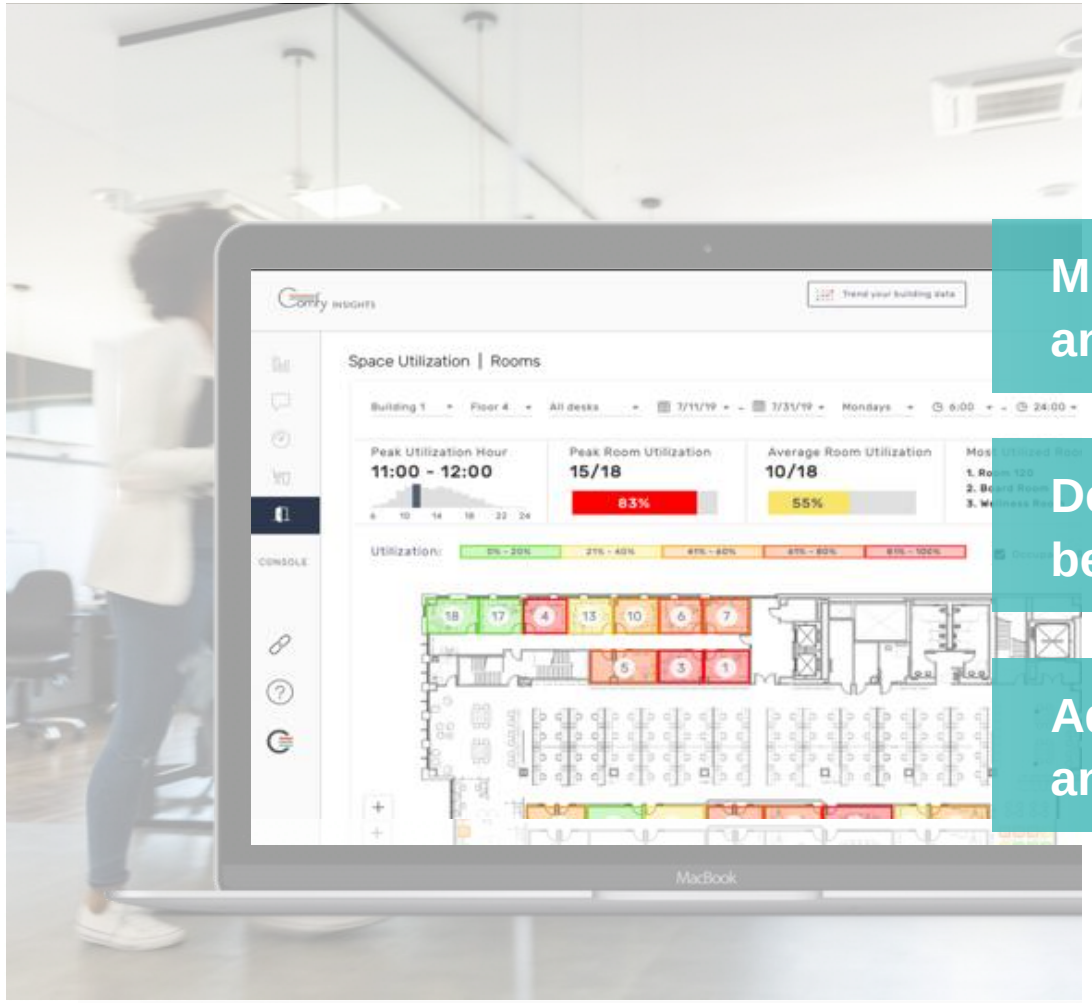

Monitor classroom and office occupancy for density and safe distancing

Determine whether specific floors or rooms should be opened / closed based on traffic and occupancy

Adjust cleaning schedules based on use of space and amenities

Manage Large Study and Work Spaces

Strategies to navigate physical distancing

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- **Configurable desk booking**
- **Help locate amenities to prevent overcrowding**
- **Search for where colleagues are studying in the building**
- **Allow sanitization between desk and conference room bookings**

Creating healthy and safe environments

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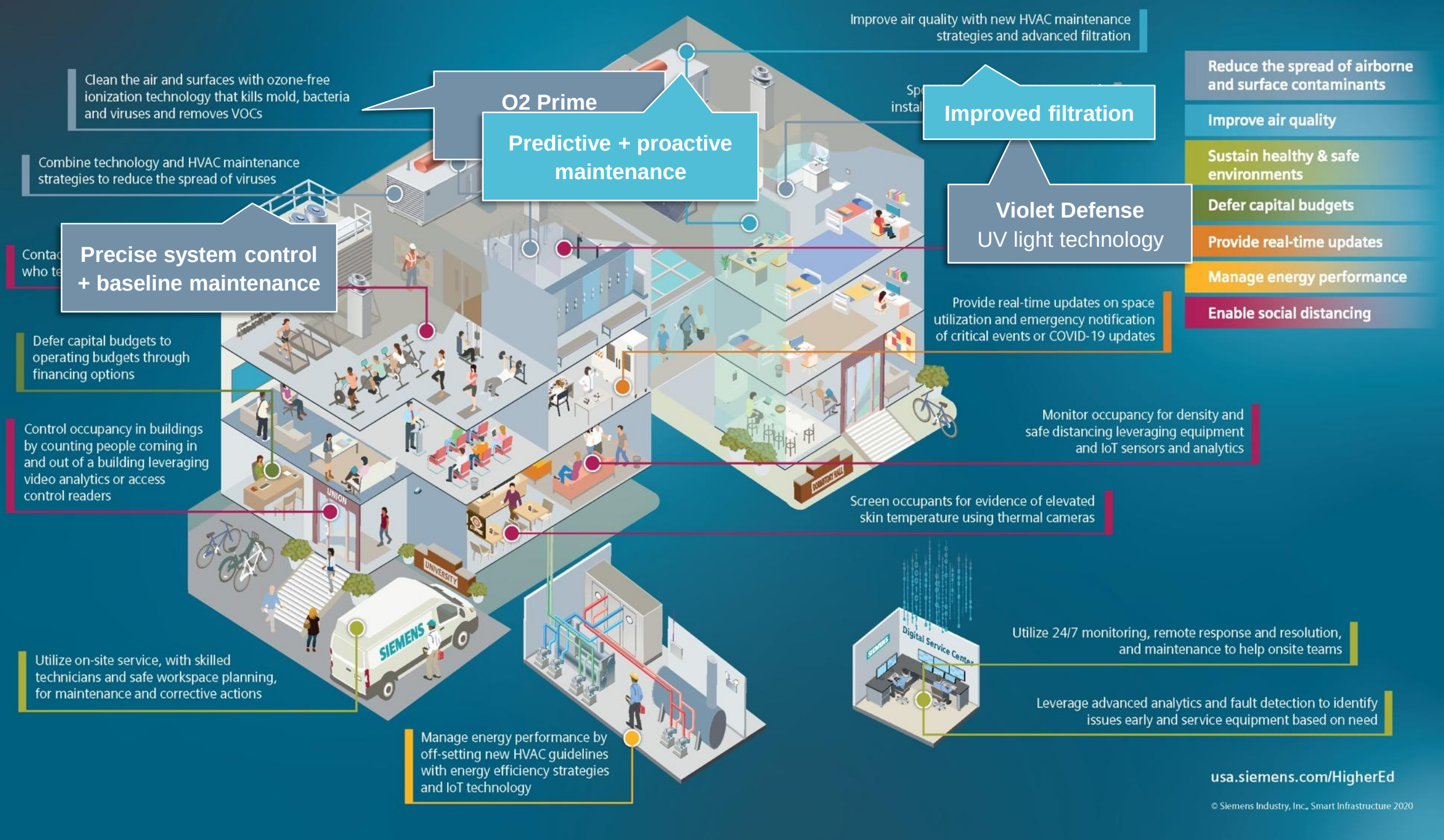
Reduce the spread of airborne and surface contaminants

Improve air quality within your buildings


Improve air quality with new HVAC maintenance strategies and advanced filtration
Clean the air and surfaces with ozone-free ionization technology that kills mold, bacteria and viruses and removes VOCs
O2 Prime
Predictive + proactive maintenance
Improved filtration
Violet Defense
UV light technology
Reduce the spread of airborne and surface contaminants
Improve air quality
Sustain healthy & safe environments
Defer capital budgets
Provide real-time updates
Manage energy performance
Enable social distancing
Combine technology and HVAC maintenance strategies to reduce the spread of viruses
Precise system control + baseline maintenance
Provide real-time updates on space utilization and emergency notification of critical events or COVID-19 updates
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Air IQ Program

Creating healthy and safe environments

What are contaminants?

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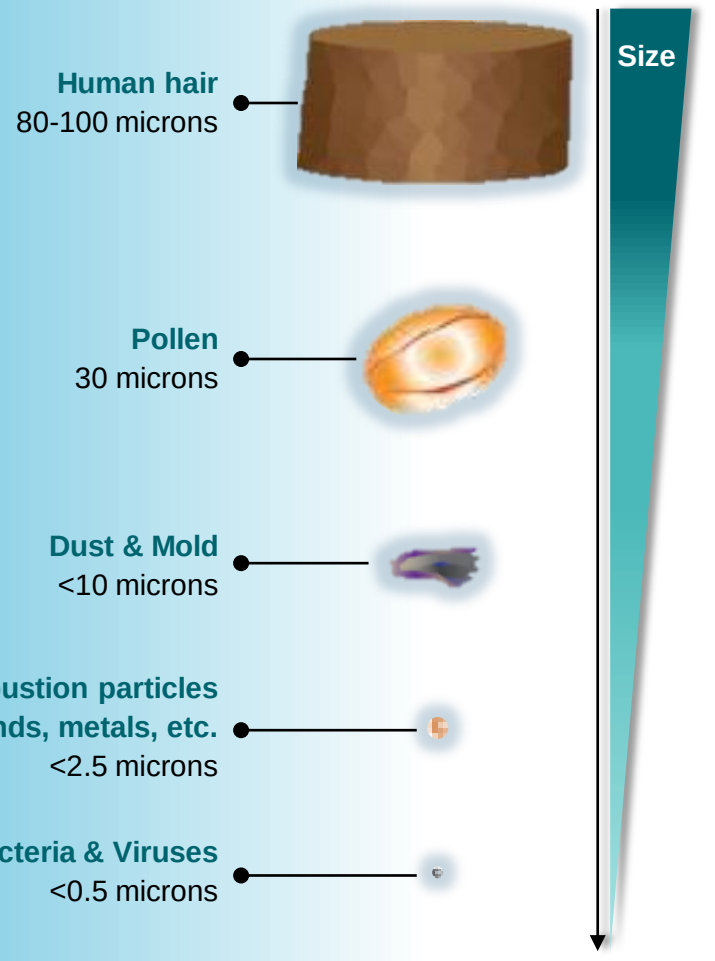
Indoor Airborne Contaminants classified in three primary categories:

- **Particulate** — Dust, Lint, Hair, Dirt, Soot
- **Biological** — Bacteria, Viruses, Molds, Pollen
- **Gaseous** — VOCs, Chemical Vapors, Cleaning Solvent Off Gases, CO_2



The Dangers Of Airborne Particles

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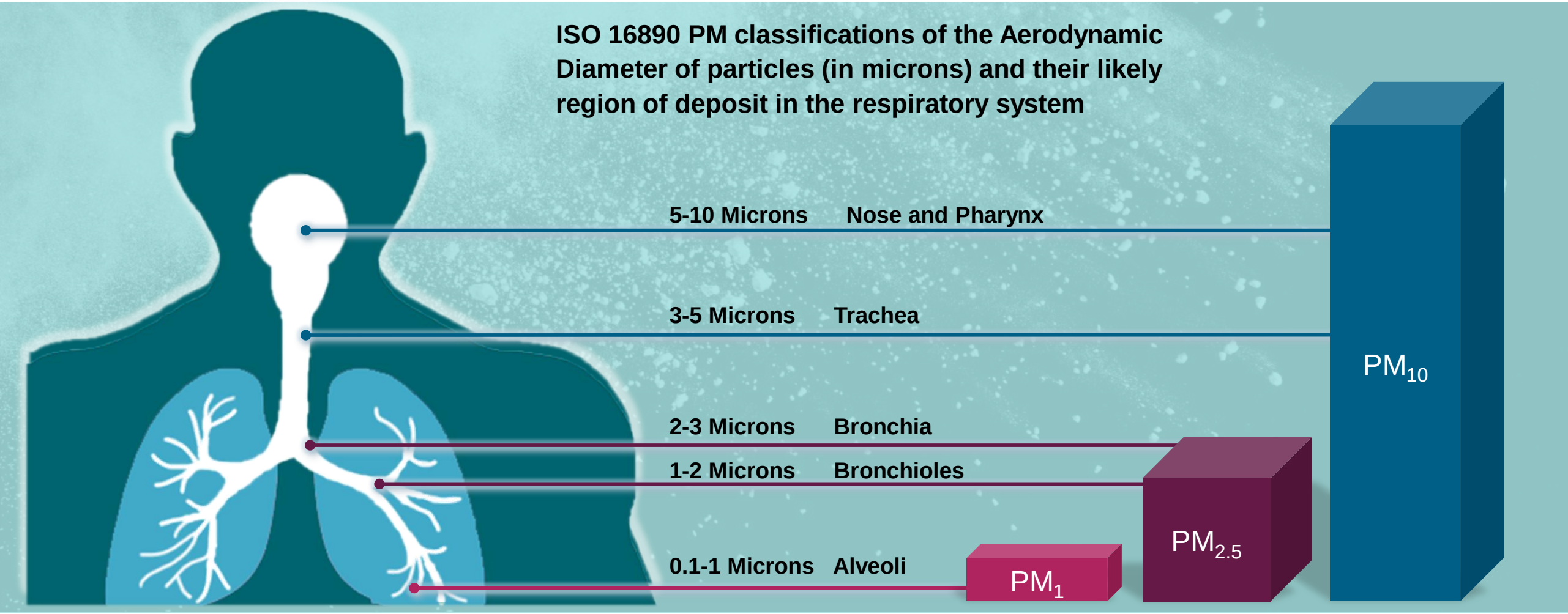

How Does This Affect You?

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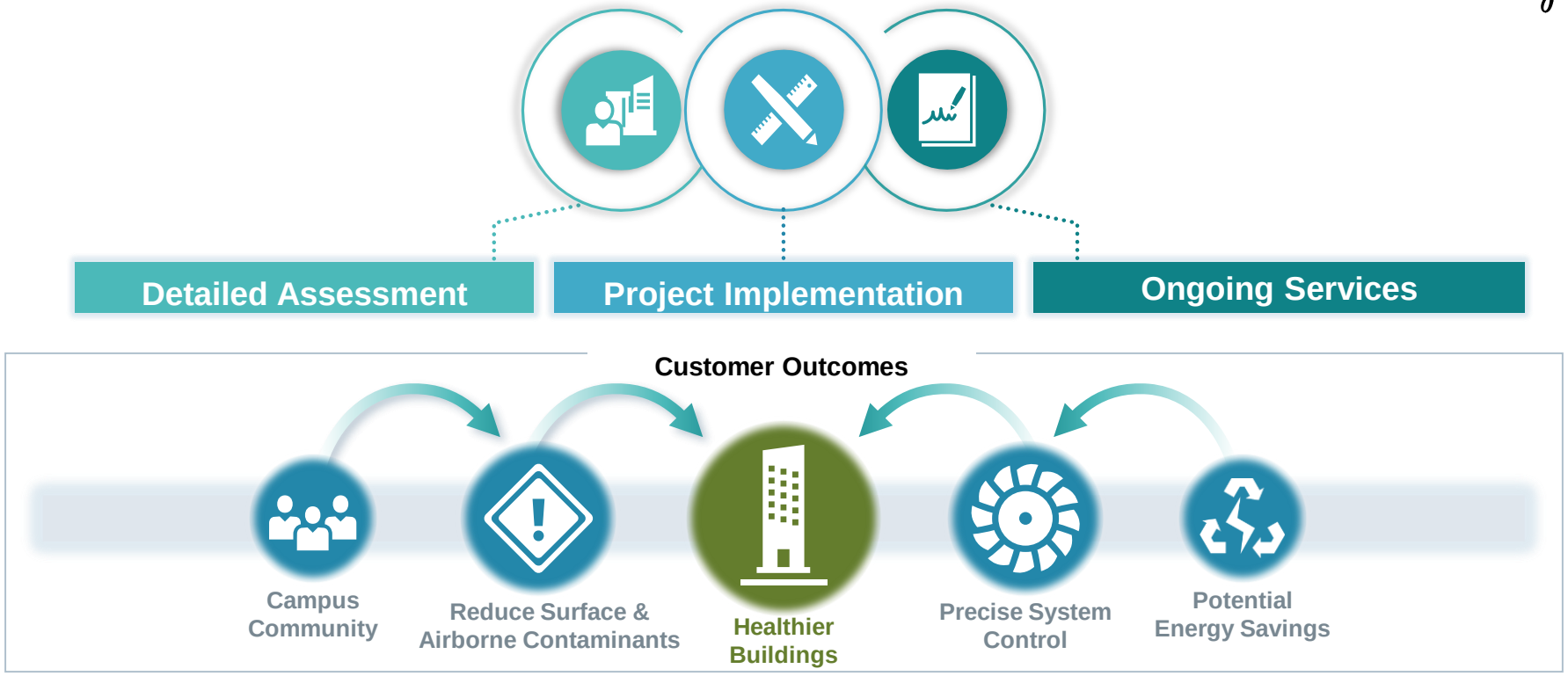
Facility Manager Challenges

- Balancing risks – cost of solution vs. no action
- Some guidance can not be implemented with existing infrastructure
- Many conflicting recommendation, no consensus yet
- Conflicting information and guidance
- Uncertainty about what to do
- Multiple overlapping technologies; which ones work?
- Some guidance will increase energy and operating costs

Recommendations

- More frequent cleaning schedules
- Fog based disinfectants
- New cleaning products
- Increased ventilation – air changes
- Purge air from the building daily
- Temperature and Humidity control
- Air Treatment with Ionization
- UV decontamination
- Advanced Filtration

Air IQ Program Process



Air IQ Program Elements - Overview

Scientifically Proven Technologies

Needle Point Bipolar Ionization - O2 Prime

- Millions of +/- Ions treat air
- Reduces fine particles
- UL Certified ozone free
- Works continuously

Xenon Pulsed Ultraviolet Light-Violet Defense

- UV- A,B,C, and violet blue light
- Less time and energy required than other UV systems
- Lower cost in energy and bulbs

Air Scrubber – enVerid (HLR®)

- Side stream air scrubber reduces VOCs
- Gaseous contaminants are captured and rejected from building

Improved Filtration

- Reduce fine particles in air
- Change filters to prevent bypass
- ASHRAE recommend MERV 13 and up

Precise System Control

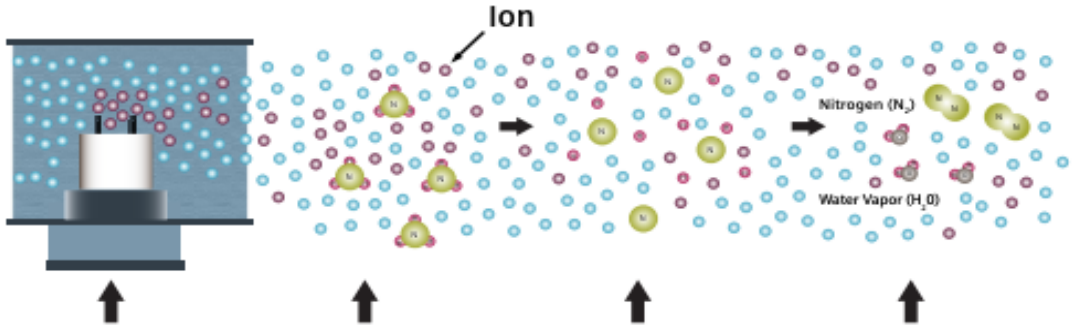
- Remote system analytics
- Identify systems performance issues
- Dynamic VAV Optimization (DVO) option
- Mitigate viral spread

HVAC BAS Maintenance & Cleaning

- Maintain HVAC systems at peak performance
- Assurance that treatment technology has maximum uptime
- Deliver proper temp, RH, and building pressure

Air IQ Program Element – Ionization
How it Works

VOC Effects



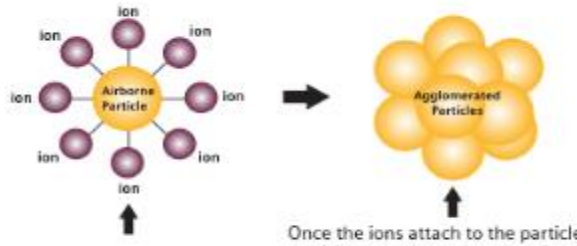
Ions created in forced air stream.

Ammonia (NH_3) Molecule.

Free floating positive and negative ions produced by the unit breaks down gasses.

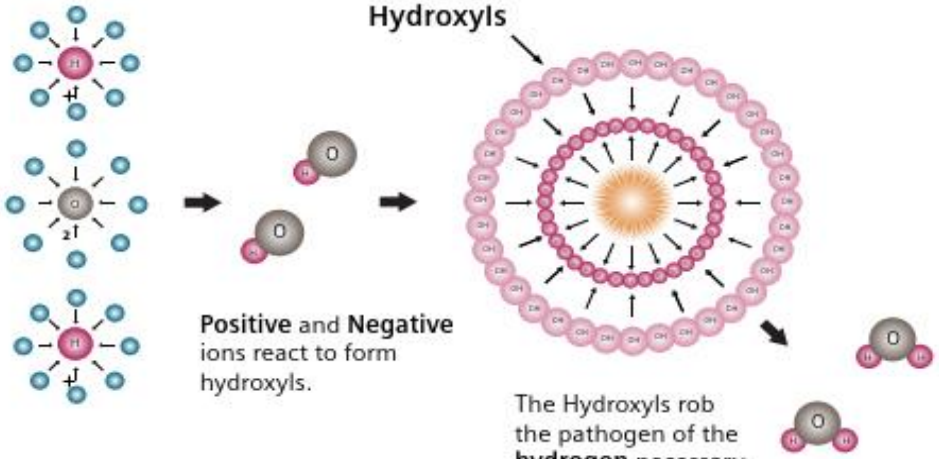
The gases regroup to form safe and desirable gases already prevalent in our atmosphere.

Airborne Particle Effects



Once the ions attach to the particle, the particle grows larger by attracting nearby particles of the opposite polarity, thereby increasing the filtration effectiveness.

Bacteria and Pathogen Effects



Positive and **Negative** ions react to form hydroxyls.

The Hydroxyls rob the pathogen of the **hydrogen** necessary for them to survive, making them inactive.

Creating water vapor (H_2O) in the process.

Air IQ Program Element – Ultraviolet Treatment
How it Works

Pulsed Xenon Ultraviolet Light

- Shorter exposure duration to be effective compared to other UV solutions
- Lower cost of operation in energy and bulbs
- Applied in an air handler, room light fixtures or via a mobile unit
- Pulsed Xenon lamp in direct contact with UV transmissive polymer lenses – no fogging, cracking or discoloration
- Built in motion sensors to avoid exposure to people for safe operation

Air IQ Program Element – Filtration
How it Works

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Filtration and MERV Ratings

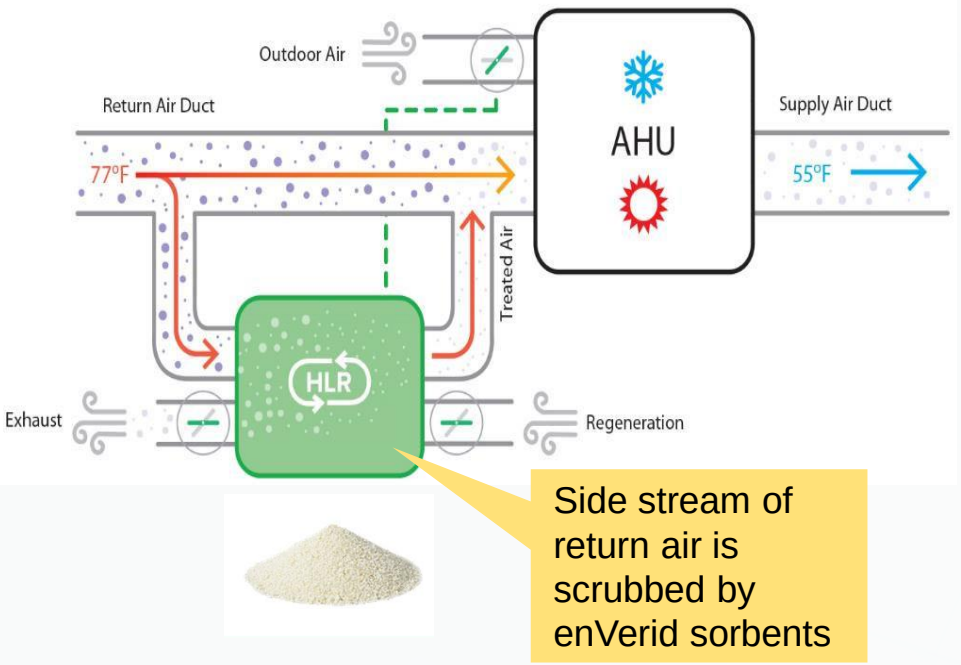
Standard 52.2 Minimum Efficiency Reporting Value (MERV)	Composite Average Particle Size Efficiency, % in Size Range, µm		
	Range 1 (0.3-1.0)	Range 2 (1.0-3.0)	Range 3 (3.0-10.0)
1	n/a	n/a	E3 < 20
2	n/a	n/a	E3 < 20
3	n/a	n/a	E3 < 20
4	n/a	n/a	E3 < 20
5	n/a	n/a	20 ≤ E3
6	n/a	n/a	35 ≤ E3
7	n/a	n/a	50 ≤ E3
8	n/a	$20 \le E_2$	70 ≤ E3
9	n/a	$35 \le E_2$	75 ≤ E3
10	n/a	$50 \le E_2$	80 ≤ E3
11	$20 \le E_1$	$65 \le E_2$	85 ≤ E3
12	$35 \le E_1$	$80 \le E_2$	90 ≤ E3
13	$50 \le E_1$	$85 \le E_2$	90 ≤ E3
14	$75 \le E_1$	$90 \le E_2$	95 ≤ E3
15	$85 \le E_1$	$90 \le E_2$	95 ≤ E3
16	$95 \le E_1$	$95 \le E_2$	95 ≤ E3

Air Filtration

- Poorly installed filters are ineffective give the fine particles we are trying to capture at the Air Handler
- As filters get overloaded pressure creates pathways for particles to bypass filtration
- ASHRAE Recommends MERV 13 or better
  - < 50% effective 0.3 to 1.0 µm
  - < 85% effective 1.0 to 3.0 µm
  - < 90% effective 3 to 10 µm

Air IQ Program Element – Advanced Filtration / Air Scrubber
How it Works

Advanced filtration to capture molecular contaminants and cleaning the inside air and exhausts contaminants from the building



Air Scrubber – enVerid

- Side stream air scrubber reduces CO2, VOCs, and other harmful gases
- Contaminants are captured in filtration cartridge and are rejected via building exhaust during cleaning cycles
- Designed to minimize the need for outside air dilution per ASHRAE 62.1 IAQP
- The Scrubber operates in two modes:
  - Absorption during the day for contaminant removal.
  - Regeneration at night, a cycle that heats the filter media and passes contaminants out with exhaust air.

Air IQ KPIs

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Temperature
Maintaining temperature within 2 degrees of setpoint

Differential Pressure
Maintain desired pressures within building envelope

Fine Particulate
Monitoring to identify performance of ionization, filtration, and the condition of the indoor environment

Humidity
Maintain humidity within thresholds for occupant comfort, and mitigation of mold and pathogens.

Ionization
Measure ionization to insure it meets or exceeds minimum thresholds.

UV Cleaning Cycles
Confirm that system is completing set UV cleaning cycles.

Air IQ Program Reporting

Outcomes-Based Performance Reporting

- Updates on KPIs
- Recommendations based on goals
- Regular quality checks
- Facility Focused
- Executive Leadership Focused
- Occupant and Team Focused
- VOC’s
- Precise System Control
- Indoor Air Monitoring
- Building Advice Energy Modeling

Air IQ Program = Healthy Buildings

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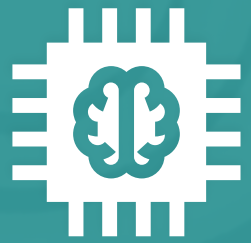
Advanced Technology



Advanced technology uses existing HVAC systems to clean and treat indoor air-reducing airborne contaminants

+

Ongoing Service & Monitoring

Leverage digital information to remotely monitor and maintain systems to high industry standards

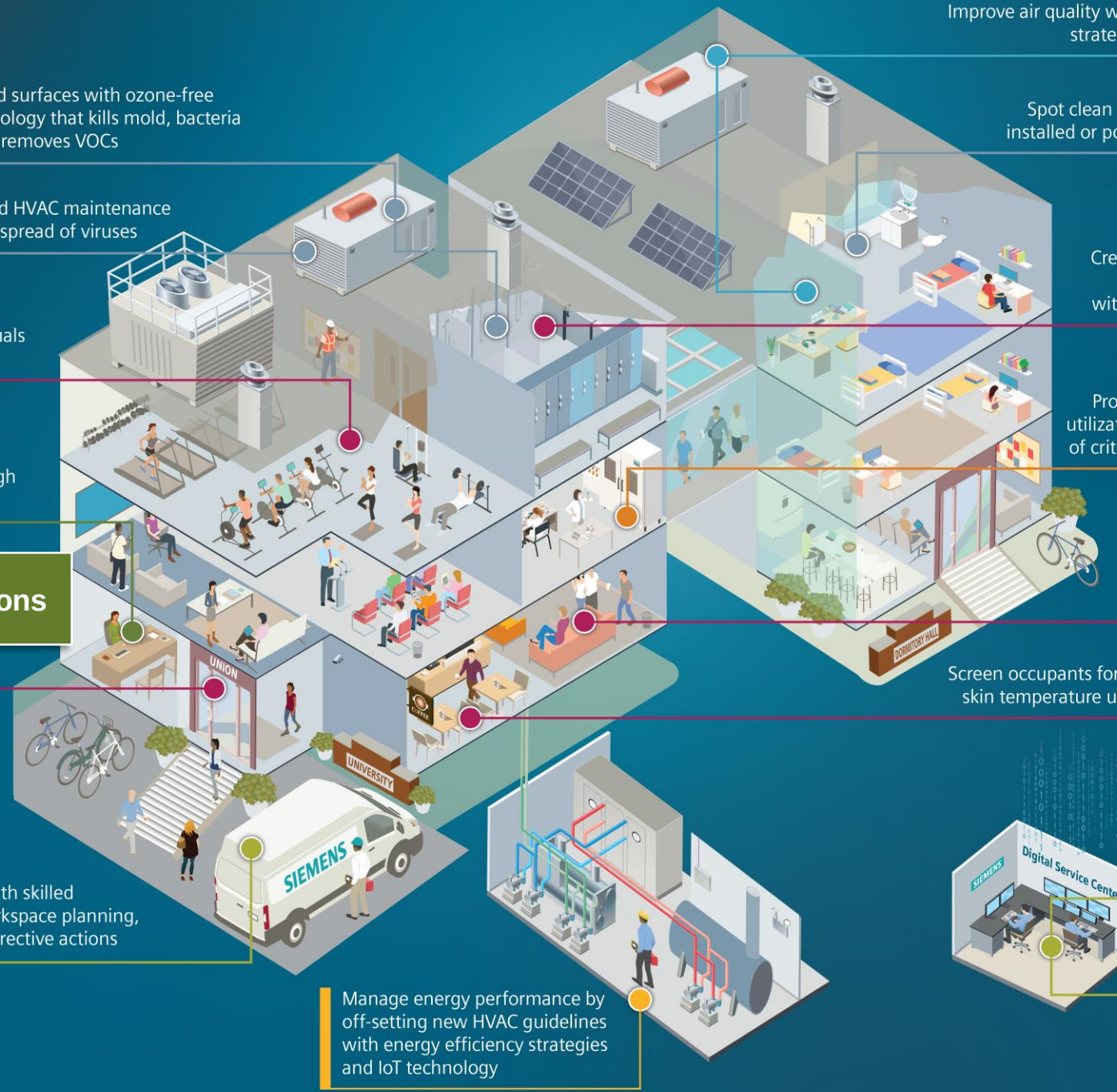
=

Healthy Buildings

Building becomes an active contributor to the success of the business and the bottom line

Creating financial options

Defer capital budgets through financing options



Improve air quality with new HVAC maintenance strategies and advanced filtration

Clean the air and surfaces with ozone-free ionization technology that kills mold, bacteria and viruses and removes VOCs

Spot clean high contact areas with installed or portable UV technologies

Combine technology and HVAC maintenance strategies to reduce the spread of viruses

Create a targeted sanitation and surface disinfection strategy with equipment and IoT sensors

Contact tracing for individuals who tested positive

Provide real-time updates on space utilization and emergency notification of critical events or COVID-19 updates

Defer capital budgets to operating budgets through financing options

Financial options

Monitor occupancy for density and safe distancing leveraging equipment and IoT sensors and analytics

control readers

Screen occupants for evidence of elevated skin temperature using thermal cameras

Utilize on-site service, with skilled technicians and safe workspace planning, for maintenance and corrective actions

Utilize 24/7 monitoring, remote response and resolution, and maintenance to help onsite teams

Leverage advanced analytics and fault detection to identify issues early and service equipment based on need

Manage energy performance by off-setting new HVAC guidelines with energy efficiency strategies and IoT technology

- Reduce the spread of airborne and surface contaminants
- Improve air quality
- Sustain healthy & safe environments
- Defer capital budgets
- Provide real-time updates
- Manage energy performance
- Enable social distancing

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Alternative Contracting and Financing

Alternative vehicles enable:

- Preserve limited capital for campus core mission
- Secure financing at current low market rates
- Shift financial and operational risks to third party partner(s)
- Outsource services to address labor and skills shortages
- Capture tax benefits on clean energy investments

Energy Savings Performance Contract (ESPC)	Energy Efficiency Service Agreement (EESA)	*"As a Service"* Contracts ("X"aaS)	Solar Power Purchase Agreement (PPA)	Design Build Own Operate Maintain (DBOOM)

How can Siemens help you *Come Back With Confidence?*

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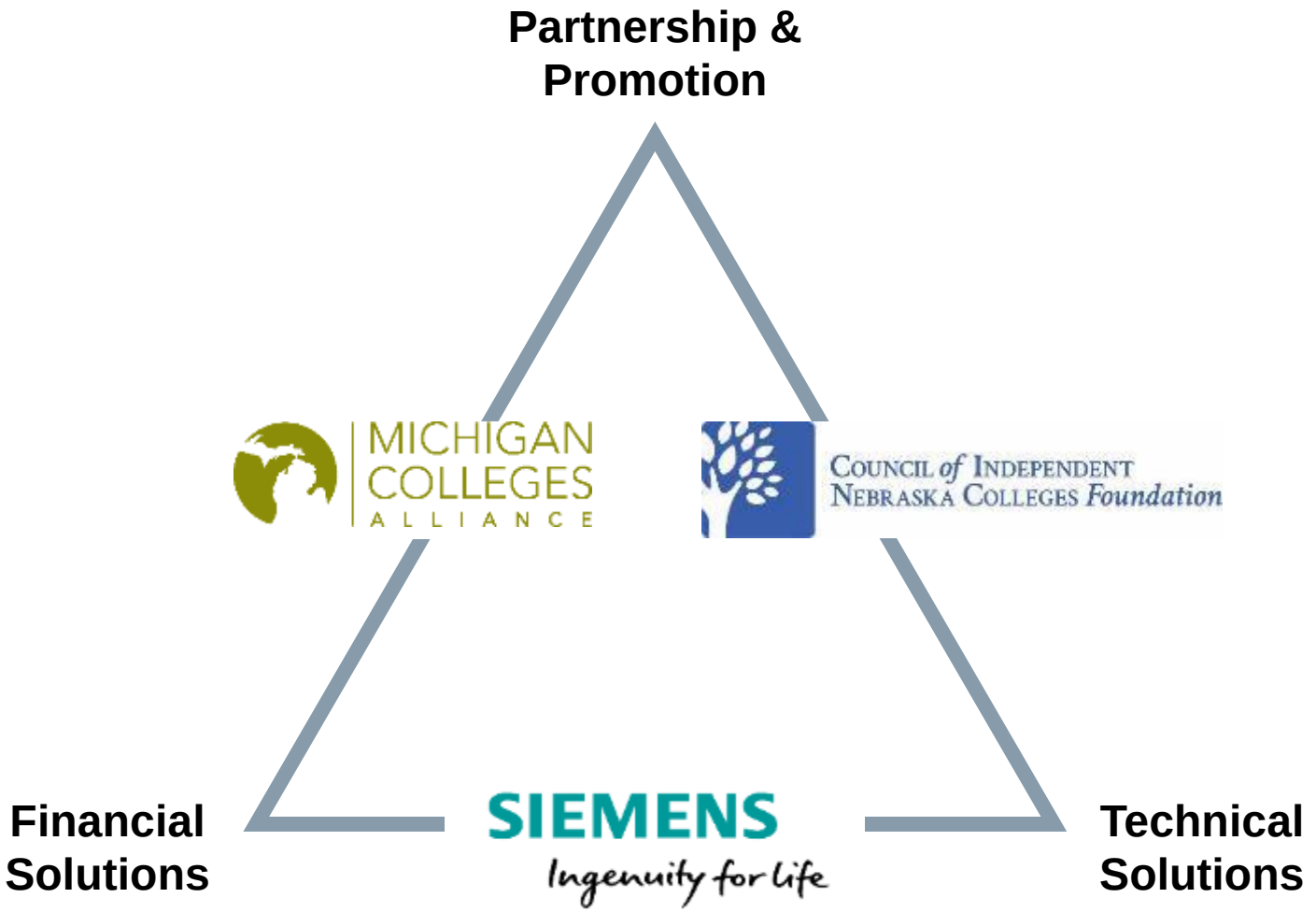

Finding a path forward
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Questions?

Come back with confidence to safe, healthy higher education environments

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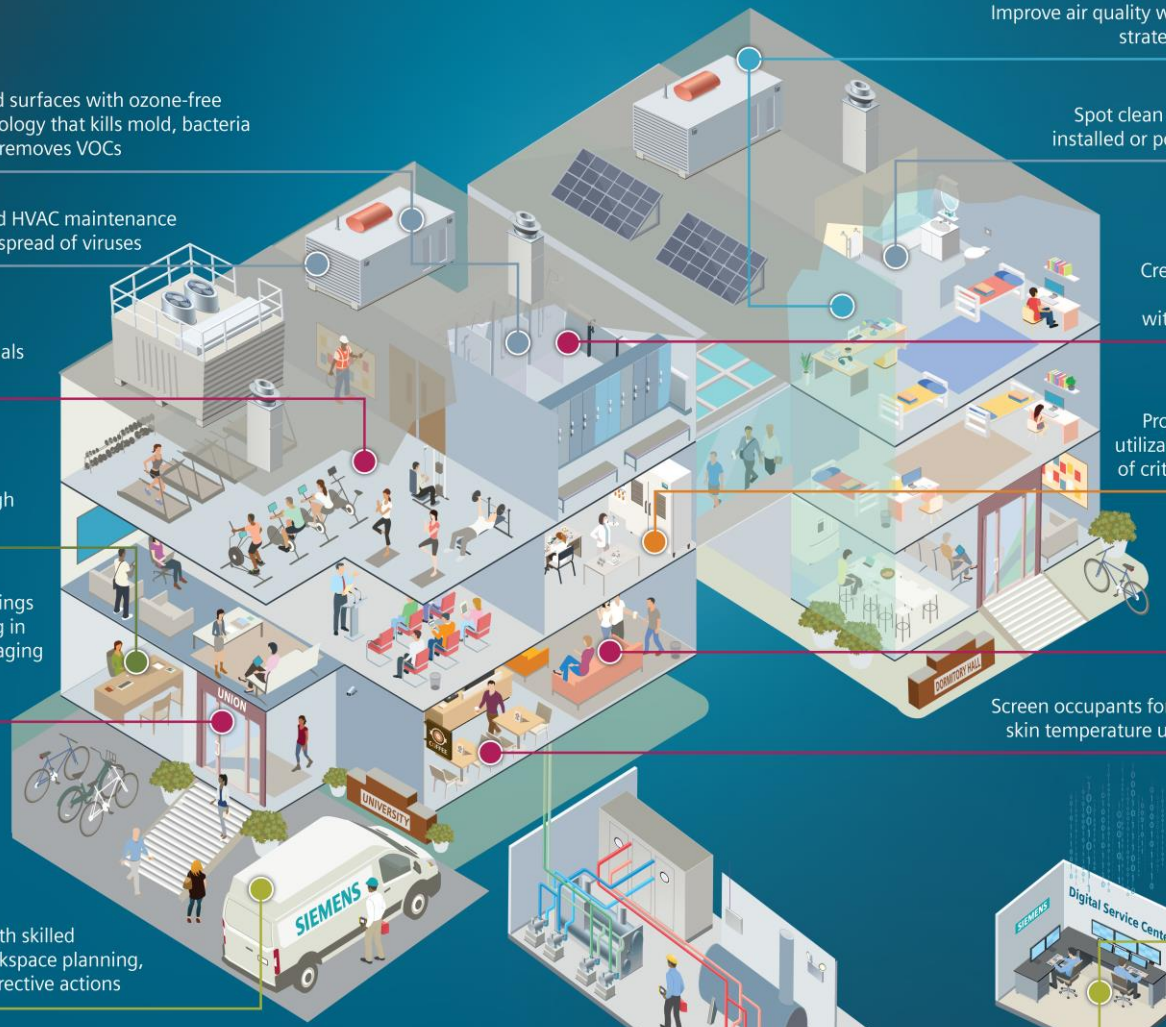
Defer capital budgets to operating budgets through financing options

Control occupancy in buildings by counting people coming in and out of a building leveraging video analytics or access control readers

Monitor occupancy for density and safe distancing leveraging equipment and IoT sensors and analytics

Screen occupants for evidence of elevated skin temperature using thermal cameras



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Thank You & Next Steps

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Executive Director

Thank you!