

 **rzero** |  
**Eli Harris**  
Co-Founder



# The average American spends 90% of their time indoors



**“In some workplaces, close physical contact is difficult to avoid, which makes viral transmission risk higher. This may be a good time to think about improving air quality in buildings.”**

Source: McKinsey & Company

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**↑ 2-5X**  
**indoors**

Pollutants are often 2 to 5 times higher indoors than outdoors.

Source: Environmental Protection Agency (EPA)

Impact of indoor air quality  
Why is a lack of it an issue



# Existing building systems promote thermal comfort, reduce odor, and improve air quality between rooms.

They don't solve in-room risk well.

HVAC systems replace the total volume of air in a room with fresh outdoor air over time, called Air Changes per Hour (ACH).

Yet, air circulation in a central system isn't designed to safeguard from person-to-person transmission.

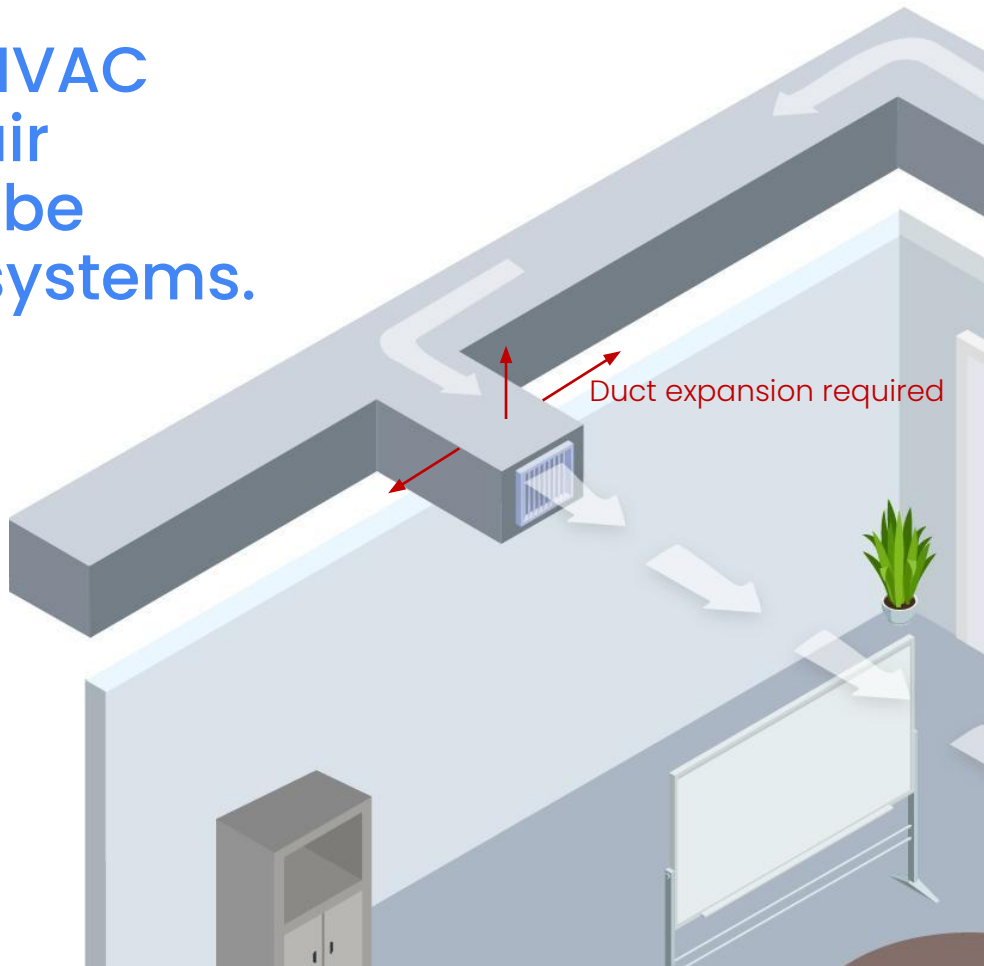




## Reducing risk with the HVAC system requires rapid air turnover, which cannot be achieved by standard systems.

Air Handling Units (AHU) are typically sized to achieve 2-4 ACH for a given space. Increasing the power of the HVAC system by more than an incremental amount requires a new fan, heating system, and cooling system. More importantly, this would require **entirely new ductwork**.

In most cases, a building is built to accommodate a certain duct size. **Installing larger ducts often requires remodeling the ceiling, easily pushing the cost above \$100 per sq ft** and necessitating vacating the building for months.





# The most effective way to safeguard your indoor spaces is to rapidly decontaminate air within the room.

Intelligent, connected, in-room UV-C is the gold standard for protecting occupied spaces

**Effective:** 99.9% effective\* and there are no known microorganisms that can survive it.

**Safe:** Certain wavelengths, such as 222nm Far UV-C light, do less cellular damage than 10 minutes in the sun.

**Intelligent:** UV-C devices can be IoT-connected, which means they run autonomously and can provide data insights.

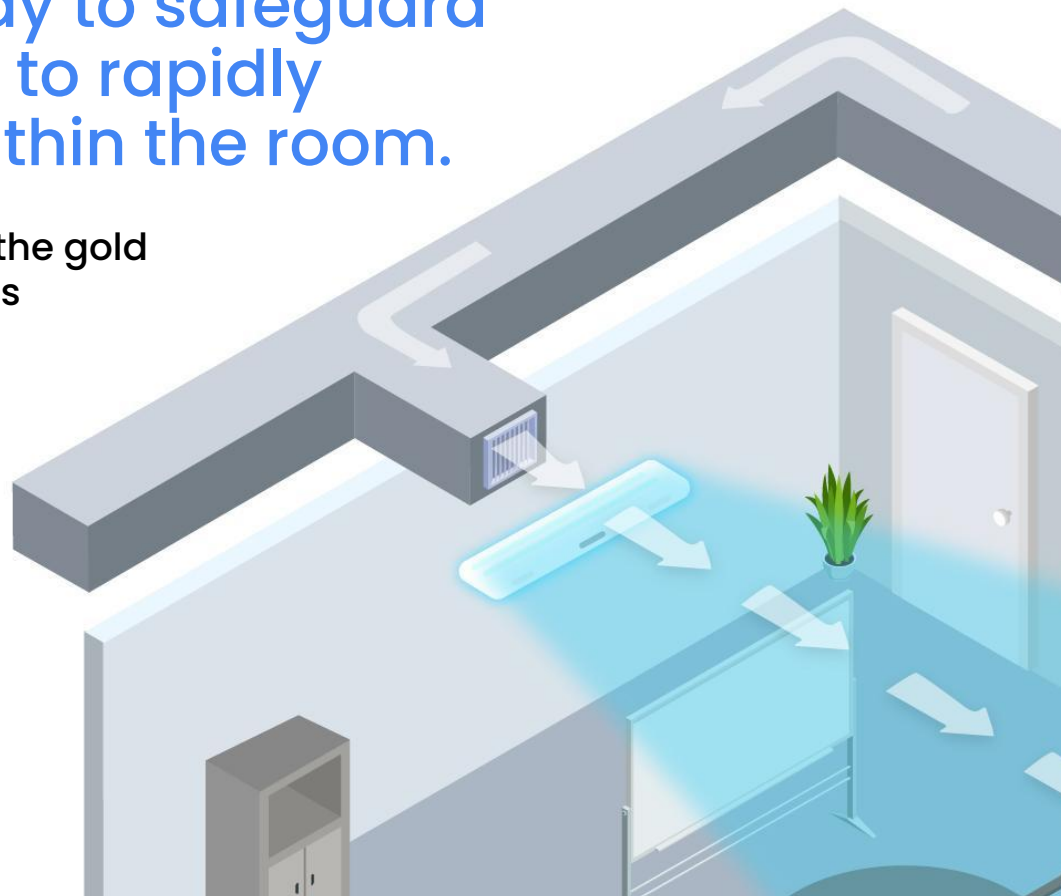


World Health Organization



Source: Dr. Edward Nardell | Harvard School of Public Health

*\*Third-party testing of SARS-CoV-2, feline calicivirus, MRSA, and E. Coli on hard, non-porous surface in seven minutes, samples taken at eight feet.*



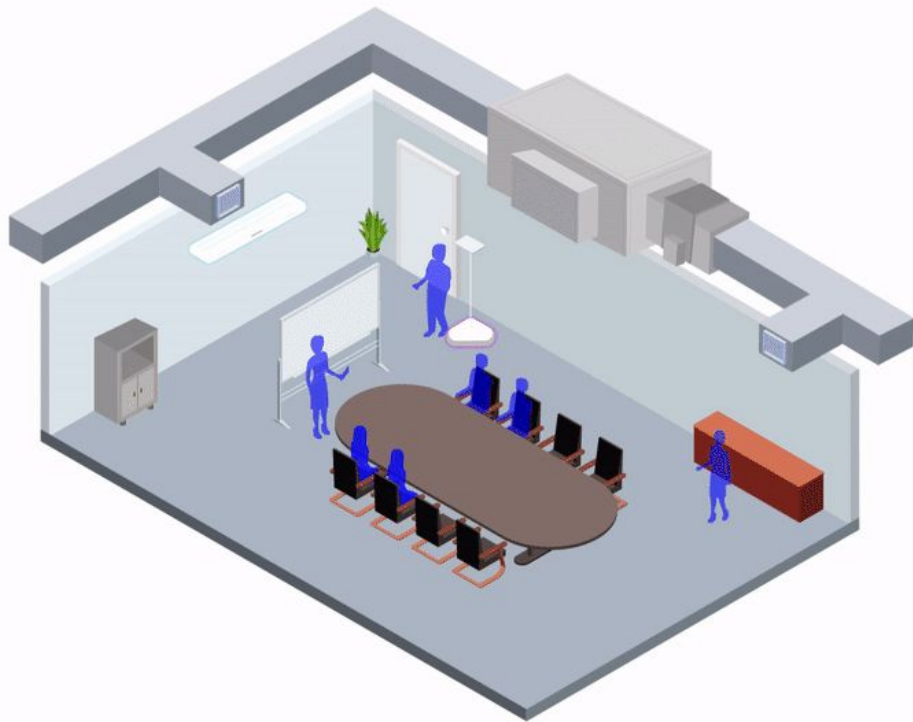


## R-Zero promotes Healthy Buildings by decontaminating air & surfaces

HVAC systems promote thermal comfort, protect against odor, and improve indoor air quality.

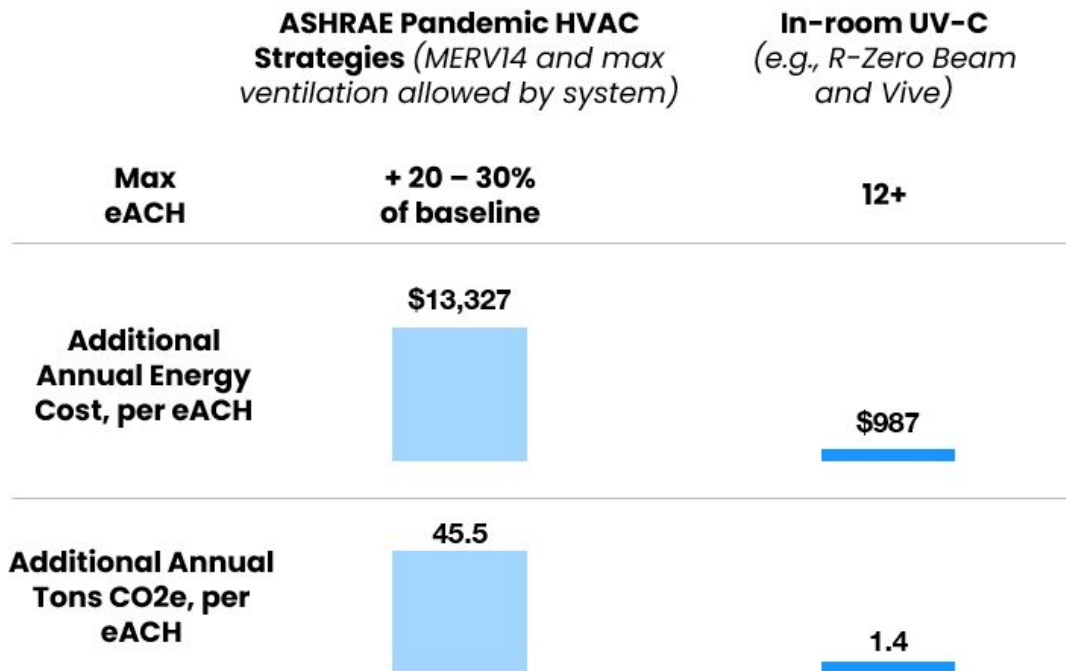
While they have traditionally been used to improve air changes per hour, air circulation does little to safeguard from microbes being actively shed in a crowded space.

**Equivalent Air Changes per Hour:** is the equivalent air changes generated by UVC, as defined by an equivalent clean air delivery rate (eCADR) as measured by inactivation of viruses and bacteria





# In-room UV-C solutions can achieve greater levels of biosafety more efficiently and sustainably than HVAC



R-Zero in-room UV-C delivers **eACH at <8% the cost** and **<4% carbon footprint** compared to HVAC










1. For 100,000 sq. ft. 5 story commercial office building with central plant HVAC.  
2. Derived from simulations across 6 major climatically different cities.







# R-Zero can provide measurable and material reduction of in-room exposure

Efficacy & Solution	In-Room	Air	Surface	IoT Connected
 rzero				
HVAC UPGRADE (MERV 13 + Increased ACH)				
CHEMICALS				
BIPOLAR IONIZATION				





Awareness and peace  
of mind that your indoor  
spaces are protected

Custom solutions that bring you  
**awareness and peace** of mind that  
your indoor spaces are protected





# BEAM

## Upper Room UVGI



Upper-Room UVGI Device

The world's first LED-powered upper-room UVGI device and shines a concentrated beam of UV-C light across the top of a room, safely inactivating microorganisms in the air above occupants.

Air

YES ☒

Surface

☐ NO

Occupied Spaces

YES ☒





# VIVE Far-UVC

The first autonomous Far-UVC overhead fixture that is safe for active air and surface disinfection in occupied spaces where people gather.

- Air ☒ YES
- Surface ☒ YES
- Occupied Spaces ☒ YES





## ARC UV-C Tower

The most powerful UV-C disinfection device on the market and destroys over 99.99%\* of microorganisms floor-to-ceiling in rooms up to 3,500 ft<sup>2</sup>, and is up to 53% more effective than manual cleaning.

Air

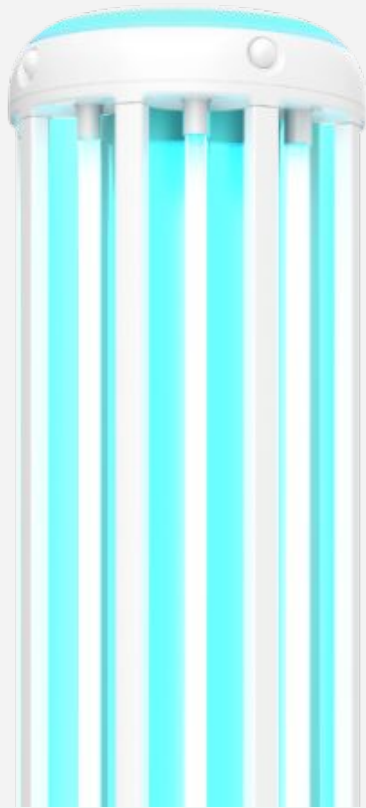
YES

Surface

YES

Occupied Spaces

NO





## R-Zero Sensors

Intelligent, real-time monitoring of occupancy and space utilization amplifies ability to solve healthy buildings challenges. It also enables continued optimization of the platform.



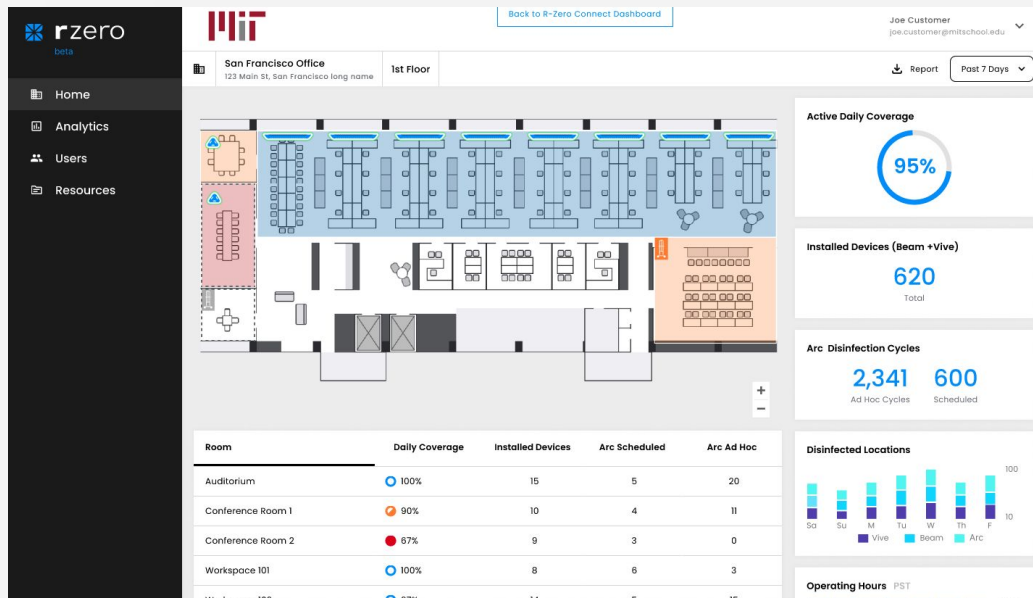


# BLUEPRINT Software

Visualize the risk of indoor health issues inside your space. Intuitive location hierarchy, device tracking & activity monitoring for easy management across organization's real estate portfolio.

## Key Features:

- **Monitor:** Usage and activity across spaces
- **Compliance:** Trends and audit of disinfection activities and occupancy
- **Insights:** Notifications from events of interest





# Custom Solutions. Predictable Outcomes.

With the basic physical characteristics of any space, we conduct risk assessments based on epidemiology, physics, and machine learning.



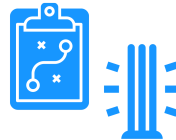
## 1 Risk Assessment

First, we perform a comprehensive site evaluation, quantify the likelihood of encountering harmful microorganisms, and develop a tailored profile that predicts microorganism load.



## 2 Design Custom Solution

After creating your risk profile, we run a series of simulations designed to match your unique risk assessment to the most optimal solution.



## 3 White Glove Installation

Once a solution is defined, we determine the type and number of R-Zero products required to achieve the best results for your space.





# High Exposure Spaces

## Classroom

- Medium to large shared space occupied for long hours
- High degree of interaction between people for extended duration of time around common spaces
- High risk of microbe exposure through air, medium risk of microbe exposure through surfaces

Typical Exposure Risk

**+ 40%**

Goal ACH

**≥12**

R-Zero Exposure Impact

**Under 14%**

R-Zero additional eACH

**10+**

Product Recommendation

 **rzero | beam**

 **rzero | vive**

Other Spaces Include:

Large Classroom

Medium Classroom

Small Classroom





# Medium Exposure Spaces

## Cafeteria

- Enclosed space meant for face-to-face interactions
- Occupants typically not wearing masks for an extended duration of time
- Medium risk of air microbial exposure, medium risk of surface microbial exposure

Typical Exposure Risk

**20–40%**

Goal ACH

**≥9**

R-Zero Exposure Impact

**Under 10%**

R-Zero additional eACH

**10+**

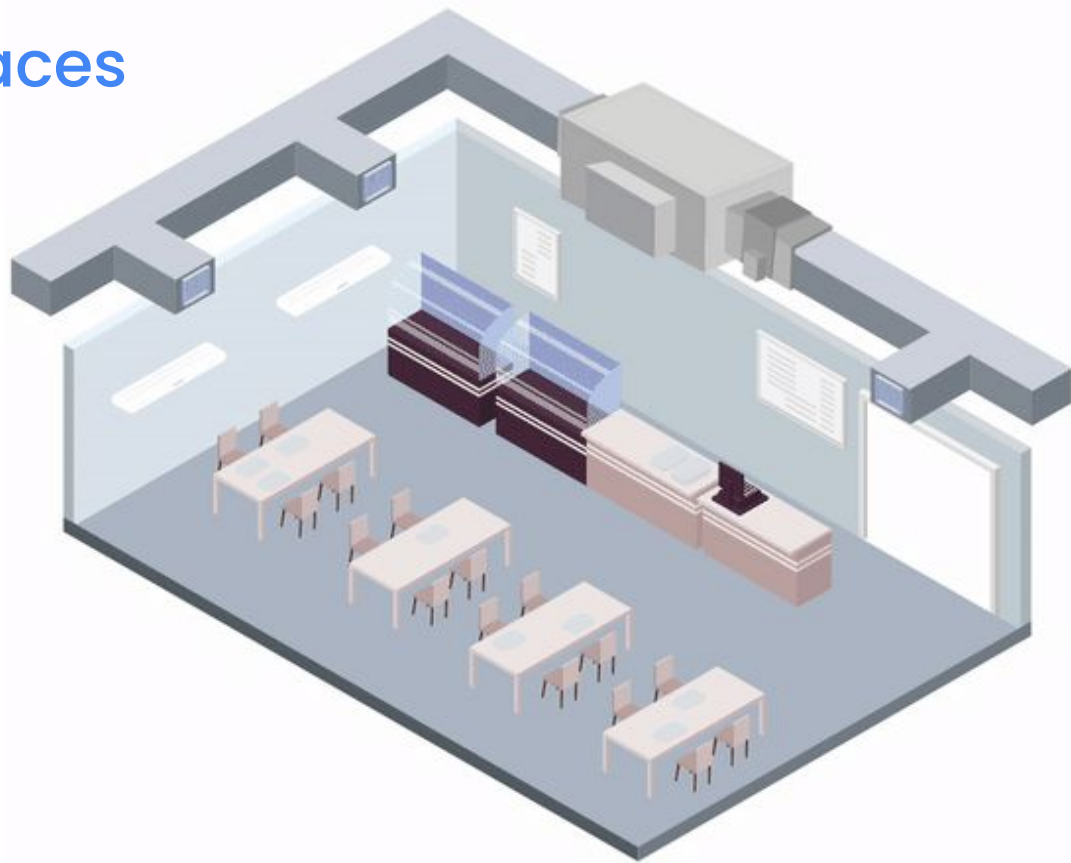
Product Recommendation

 **rzero | beam**

 **rzero | vive**

Other Spaces Include:

Private Bathrooms  
Break Rooms / Lounges  
Food Prep Areas





## Lower Exposure Spaces

### Large Bathroom 5+ Stalls

- Large, shared space with lower turnover of occupants
- Lower risk of air and surface microbial exposure
- Lower occupancy with large rooms reduce in-room risk

Typical Exposure Risk

**(-) 20%**

Goal ACH

**≥6**

R-Zero Exposure Impact

**Under 6%**

R-Zero additional eACH

**10+**

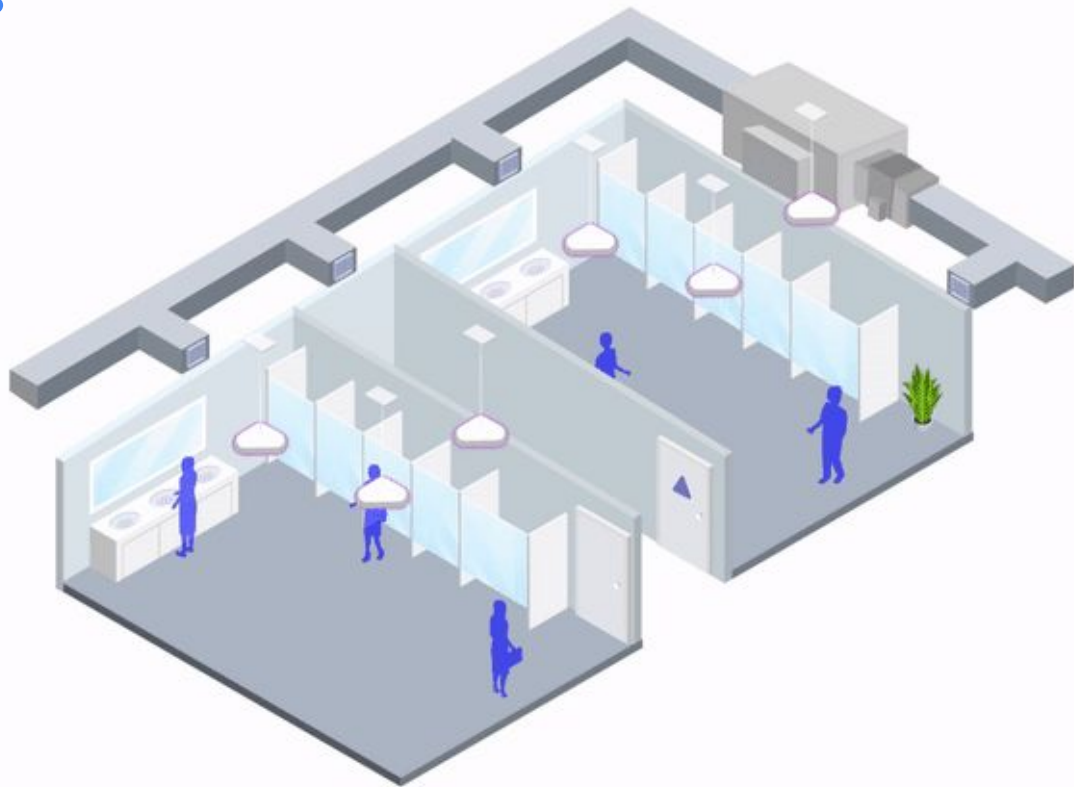
Product Recommendation

 **rzero | beam**

 **rzero | vive**

Other Spaces Include:

Standard Bathrooms 2-4 stalls  
Conference Room 7-10 PAX  
Lobby / Reception  
Gym  
Locker Rooms





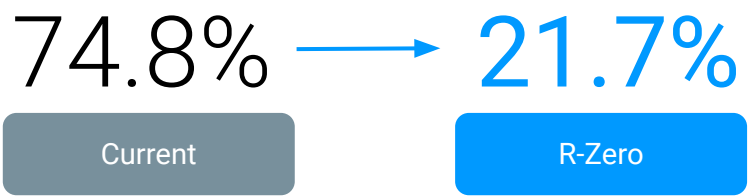
# Risk Reduction Sample

This sample is based on 3 indicative occupied spaces.  
Our deliverable includes:

- Quantification of baseline risk for communicable disease exposure
- R-Zero product placement strategy to mitigate exposure risk
- Calculation of expected risk reduction from solution implementation

Detailed audit is required before accessing your school's risk..

## Sample Exposure Risk



Location	Products	Risk Reduction
Standard Classroom	Vive - Far UV (3)	2.7x
Large Classroom	Beam - UR UVGI (2)	4.6x
Cafeteria Large	Beam - UR UVGI(4) Vive - Far UV(2)	4.5x
Cafeteria Small	Beam - UR UVGI (2) Vive - Far UV (1)	2.9x
Library	Beam - UR UVGI (1)	4.7x

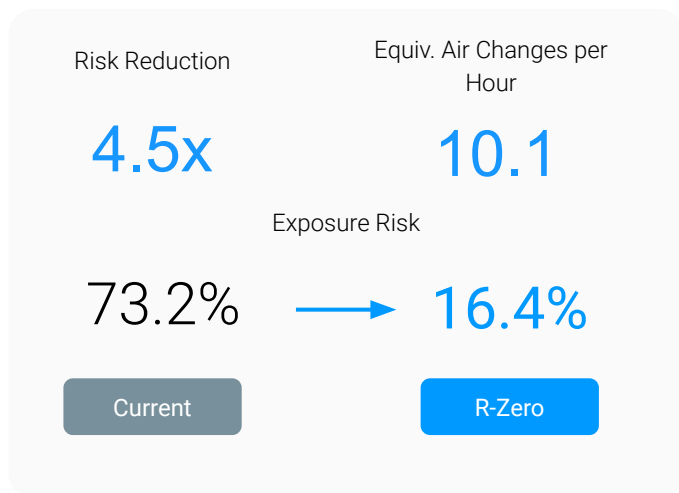


# Sample – Large Cafeteria

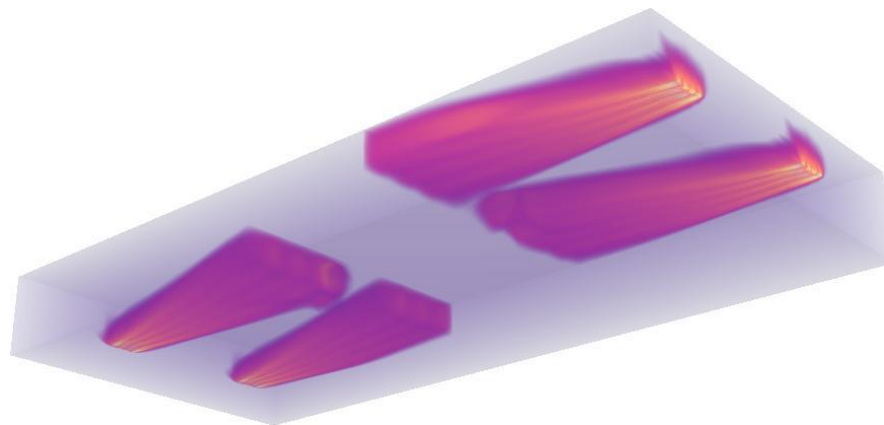
## OVERVIEW

Product	Quantity	Room Size (Sq. Ft)	Occupancy	Mounting	Modeling Behaviors
Beam - UR UVGI Vive - Far UV	4 2	8643	310 permanent occupants for 1 hour	Wall, Ceiling	Talking without masks

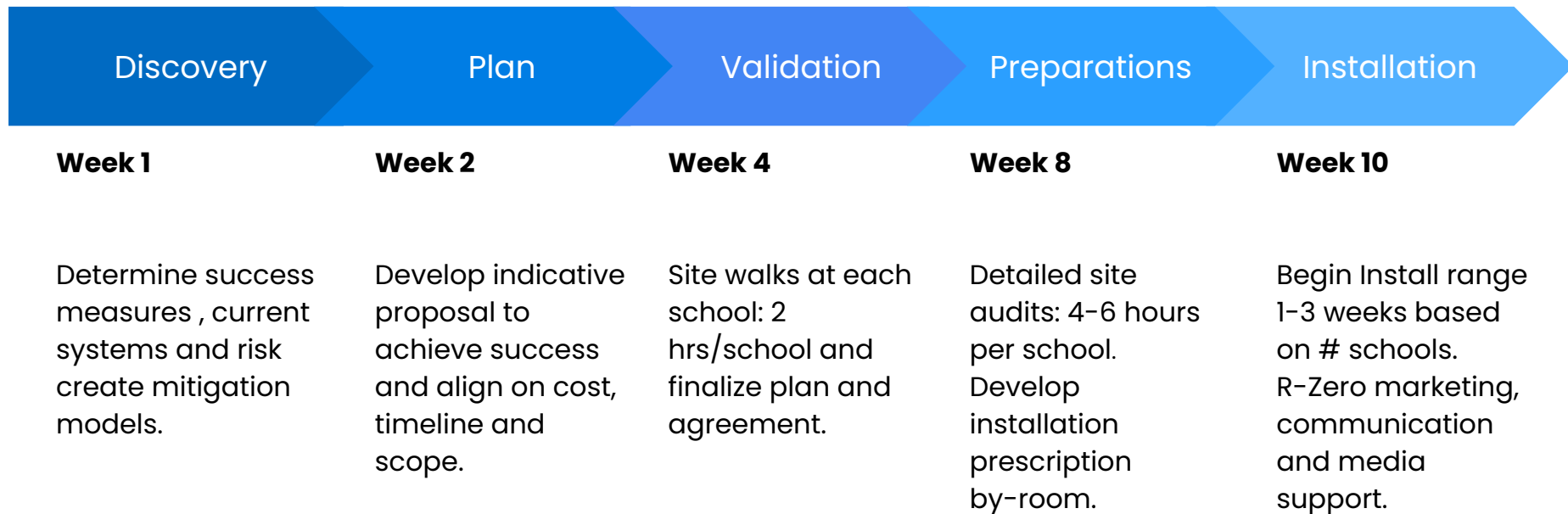
## EFFICACY



## VISUALIZATION



# Sample Install Collaboration Timeline





## | Trusted Solutions at Scale

“ To make our staff feel comfortable returning to work, in order for parents to feel comfortable sending their children to school, we decided to pursue the R-Zero units. Instead of using chemicals to disinfect the classroom, we bring the Arc units in to disinfect. ”

- DAMIAN WILTZ

*Director of Facilities and Maintenance, Fort Bend ISD*



World Health  
Organization



AREOLabs





# Healthy Buildings for All

16M

SqFt Protected

750+

Locations Protected

## HEALTHCARE\*



California Department of  
State Hospitals



## CORPORATIONS\*



## MANUFACTURING\*



## SPORTS + ENTERTAINMENT\*



## EDUCATION\*



## ASSOCIATION PARTNERSHIPS\*



\*These are a small selection of our current partnerships.





# Driven by Science. Backed by Institutions.

Tested and Certified by  
Independent Labs



Backed by Top  
Venture, Impact,  
Healthcare Investors



## In the Press

[Businesswire | Mayo Clinic and R-Zero Partnership to Accelerate Healthy Building Innovation](#)

[Forbes | This startup booked \\$5 million in 3 Months - Despite the Pandemic](#)

[CNBC | Companies are betting on new tech to make reopening the office safe](#)



# THANK YOU



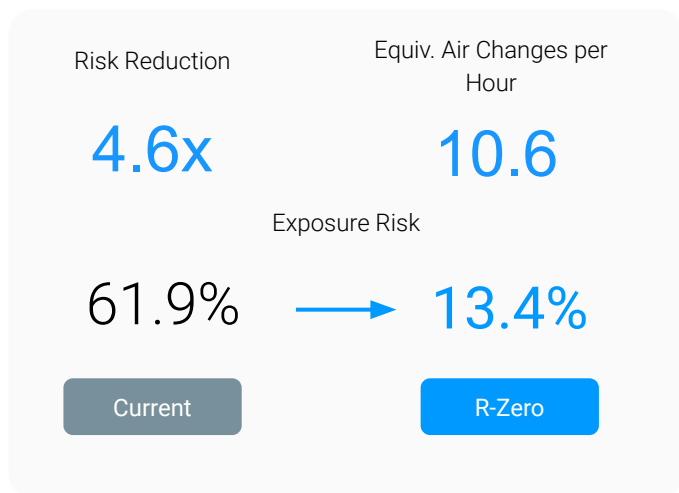
# APPENDIX

# Sample – Large Classroom

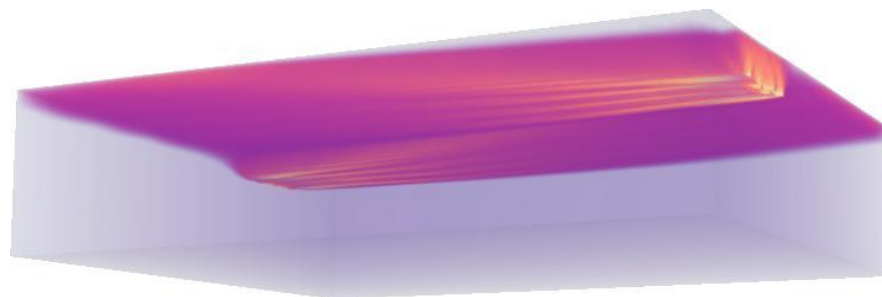
## OVERVIEW

Product	Quantity	Room Size (Sq. Ft)	Occupancy	Mounting	Modeling Behaviors
Beam - UR UVGI	2	1251	20 permanent occupants for 3 hours	Wall	Sitting without masks

## EFFICACY



## VISUALIZATION



# Sample – Library

## OVERVIEW

Product	Quantity	Room Size (Sq. Ft)	Occupancy	Mounting	Modeling Behaviors
Beam - UR UVGI	1	1948	30 permanent occupants for 1 hour	Wall	Talking without masks

## EFFICACY

Risk Reduction

4.7x

Equiv. Air Changes per Hour

8.2

Exposure Risk

45.4%

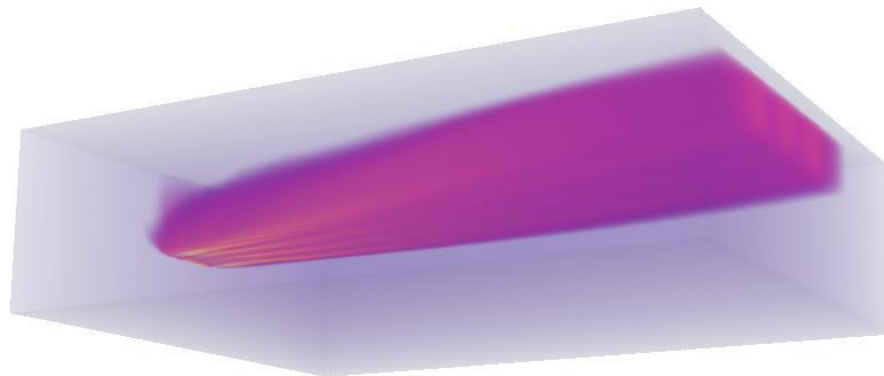


9.6%

Current

R-Zero




## VISUALIZATION





# Disinfection Modeling

R-Zero [models your space](#) to maximize device efficacy. Through a combination of room dimensions, occupancy, baseline ACH, and activity type, we can predict microbial load with Machine Learning.

<b>Baseline Airborne Risk:</b> (+) 40%		<b>Typical High Risk Spaces</b> <ul style="list-style-type: none"><li>• Large Classroom 900+ sf</li><li>• Medium Classroom 600-900 sf</li><li>• Small Classroom &lt;600 sf</li></ul>
<b>Baseline Airborne Risk:</b> 40% - 20%		<b>Typical Medium Risk Spaces</b> <ul style="list-style-type: none"><li>• Large Cafeterias &gt;4000 sf</li><li>• Small Cafeterias &lt;4000 sf</li><li>• Private Bathrooms 1 stall</li><li>• Break Rooms / Lounges</li><li>• Food Prep Area</li></ul>
<b>Baseline Airborne Risk:</b> (-) 20%		<b>Typical Low Risk Spaces</b> <ul style="list-style-type: none"><li>• Large Bathrooms 5+ Stalls</li><li>• Standard Bathrooms 2-4 Stalls</li><li>• Small Conference Rooms 7-10 PAX</li><li>• Lobby / Reception</li><li>• Gymnasium</li><li>• Locker Rooms</li><li>• Auditoriums</li><li>• Libraries</li></ul>

## ACH/eACH prescriptions:

### High Risk Spaces:

$ACH + eACH \geq 12$

### Medium Risk Spaces:

$ACH + eACH \geq 9$

### Low Risk Spaces:

$ACH + eACH \geq 6$

[CDC](#) / [ANSI/ASHRAE Standard 62.1-2019](#) recommends a minimum of 6 to 12 Air Changes per Hour (ACH) for healthy indoor air.