

Market Outlook Construction Forum

Summary

as of December 4, 2020

Presenters

- Keith Garratt, Managing Director, AEI
- Fred Betz, Building Performance Consultant, AEI
- Andrew Jones, Project Manager, AEI
- Kevin Moses, Vice President, Big State Electric
- Richard Vermeulen, Lead Economist, Vermeulens
- Blair Tennant, Associate Principal, Vermeulens

Lessons from COVID, AEI

- Science of SARS-Cov-2
 - Pathogenic Micro Organism (0.1 microns), airborne dispersal is the primary method of transmission
 - Everyone is susceptible to the virus (unless vaccinated)
- Takeaways from COVID-19
 - Surface transmission is not as critical as once imagined
 - **HVAC does not spread COVID-19**, but airflow direction has an impact
 - Layered prevention methods should be utilized to reduce the overall likelihood of transmission
 - Any filters rated higher than MERV-13 provide diminishing returns
- Simple Solutions
 - Allocate specific areas for donning and doffing PPE
 - Use dedicated elevators when required
 - HVAC analysis that determines whether “contaminated air plumes” are forming within an office
 - Furniture partitions help to combat COVID plumes
 - More HVAC supply and return locations between people reduces cross-contamination
- Smart Building Solutions
 - Utilizing phone applications for entry instructions, wayfinding, etc.
 - Software that generates usable data based on office interactions to assist with cleaning and contact tracing

COVID-19 Impacts, Big State Electric

- Staff: 100% in the office, Furlough is down 50%
- Daily screening for crew members, jobsites continue to have strict COVID-19 screening policies (7-10% time loss)
- Market momentum is steady
- RFP trend: time to price has reduced
- Service opportunities for new installations of COVID-19 mitigation systems
- Material shortages: PVC, high/medium voltage systems, breakers, and busway system

Accelerators for Change – Health Networks Preview, Vermeulens

- Thoughts on establishing a framework for total benefit analysis in the built environment

Future Agenda

- DIRT: Modular and Furniture Solutions
- Bid/GMP: Market Feedback
- Healthcare Consolidation and Total Benefit



Since 1972



Design & Construction Market Outlook

- Keith Garratt – AEI
- Fred Betz – AEI
- Andrew Jones – AEI
- Kevin Moses – Big State
- Richard Vermeulen – Co-CEO
- Blair Tennant – Associate Principal

North America’s Construction Economist
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- Please **mute** mics except for those speaking
- Please keep **camera** function **off**
- Interim **questions** and comments via **chat**
- Thank You: slide deck, audio link
- “Situation Report” (Summary) Along with a Reminder
- Next session **Monthly – January 8th**

- Breaking the Chain – Lessons Learned from COVID -19
- Subcontractor Feedback - Electrical
- Subcontractor Feedback - Mechanical
- Total Benefit in The Built Environment – Health Networks



Breaking the Chain: Lessons Learned from COVID-19

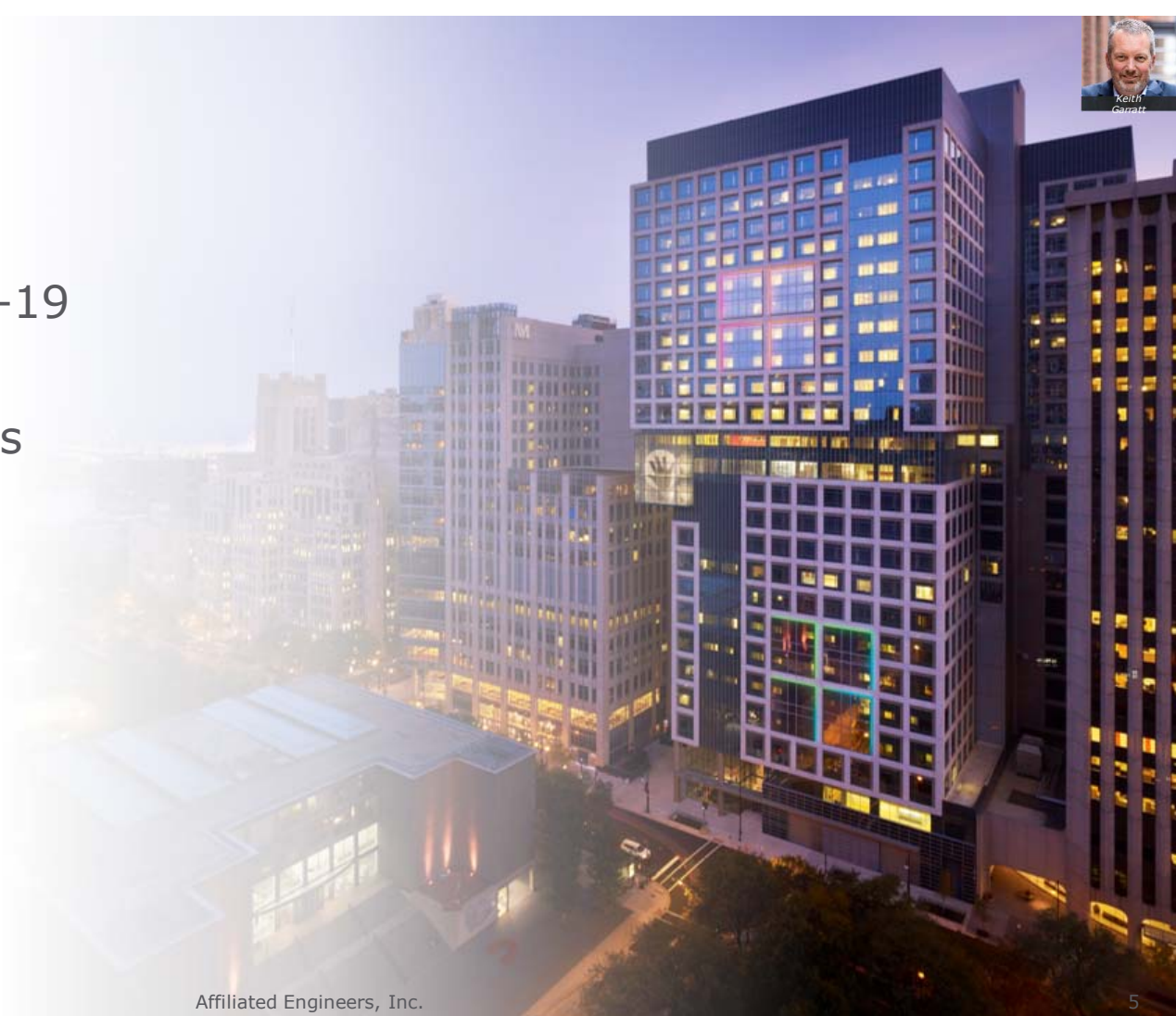
Vermuelen's Monthly Market Forum

December 4th, 2020



Agenda

- Science of SARS-Cov-2
- Takeaways from COVID-19
- Simple Solutions
- Smart Building Solutions



Affiliated Engineers, Inc.



Engineering a better way, from
mastering complexity to leveraging it.

19

offices

700+

employees

318

LEED® projects



Services

- Consulting & Leadership
- Planning
- Commissioning
- Mechanical
- Electrical
- Piping/Plumbing
- Fire Protection
- Building Performance Practice
- Instrumentation & Controls
- Process Engineering
- Technology Consulting & Design
- Security Consulting & Design
- Pivotal Lighting Design
- Cost Estimating
- Intelligent Buildings
- Geothermal Heating & Cooling

Markets

- Science & Technology
- Healthcare
- Energy & Utilities
- Commissioning
- Mission Critical
- Industrial Test
- Process Industries
- Higher Education
- Aerospace
- Aviation
- Federal Government
- Sports & Athletic Centers
- Cultural & Public
- Commercial/Office



Presenters



Andrew Jones
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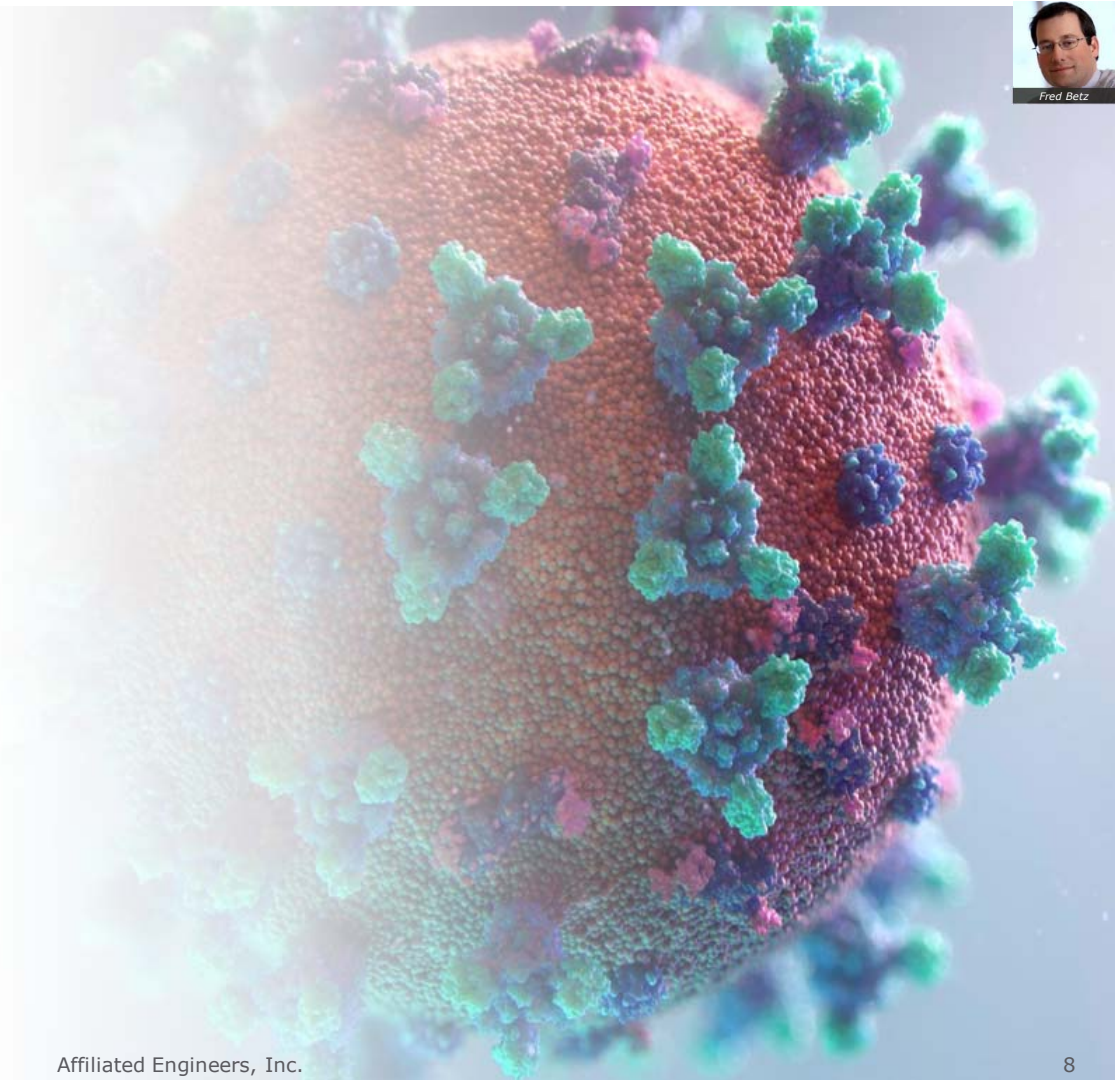
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Building Performance Consultant
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Taking a Step Back: Addressing COVID-19

- “Novel coronavirus”, new and unique.
- Previous remedies generated mixed results.
- Solve an undefined problem.
- Return the basics of infection prevention.



Breaking the Chain: Infection Prevention

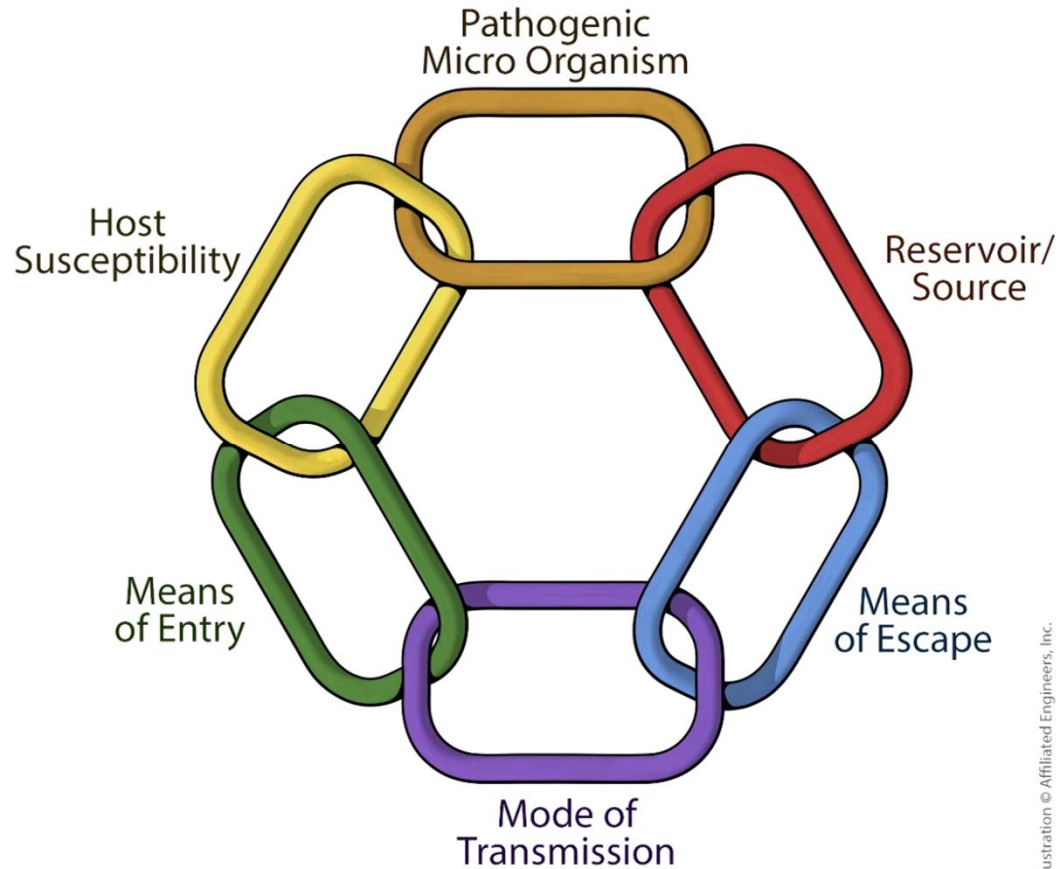
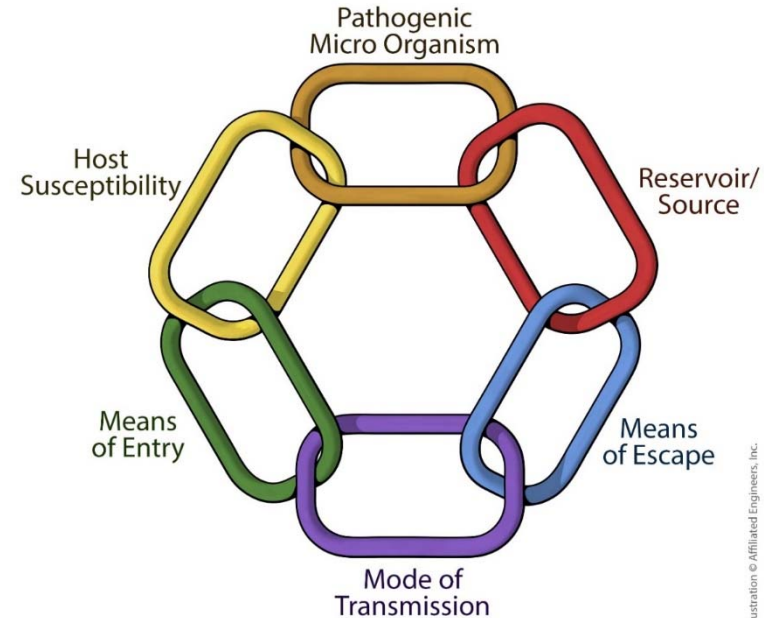


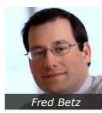
Illustration © Affiliated Engineers, Inc.

Transmitting SARS-CoV-2

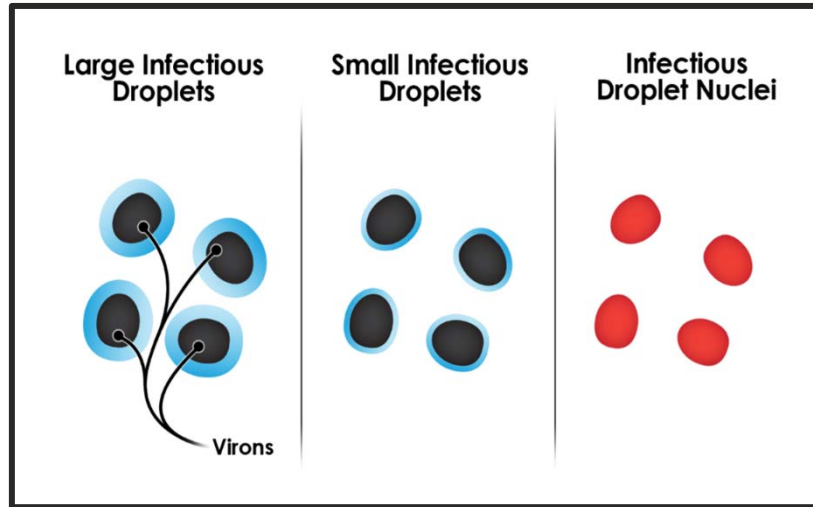
- Pathogenic Micro Organism
 - SARS-CoV-2, size = 0.1 microns
- Reservoir/source
 - The air, surfaces, respiratory tract
 - **Vaccine, surface/air cleaning**
- Means of Escape
 - Breathing, coughing, and sneezing
 - **Masks**
- Mode of Transmission
 - Direct contact, indirect contact, airborne dispersal
 - **Social distance, airflow management, surface cleaning**
- Means of Entry
 - Mouth and nose
 - **Wash hands, N95 Masks**
- Host Susceptibility
 - All except previous hosts within last 2-3 months
 - **Vaccine**



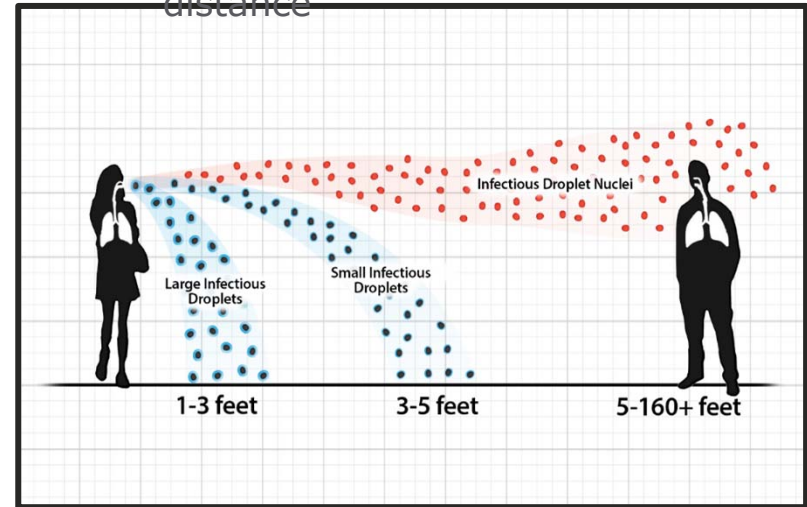
COVID-19 Size



Droplet evaporation process



Droplet transmission distance



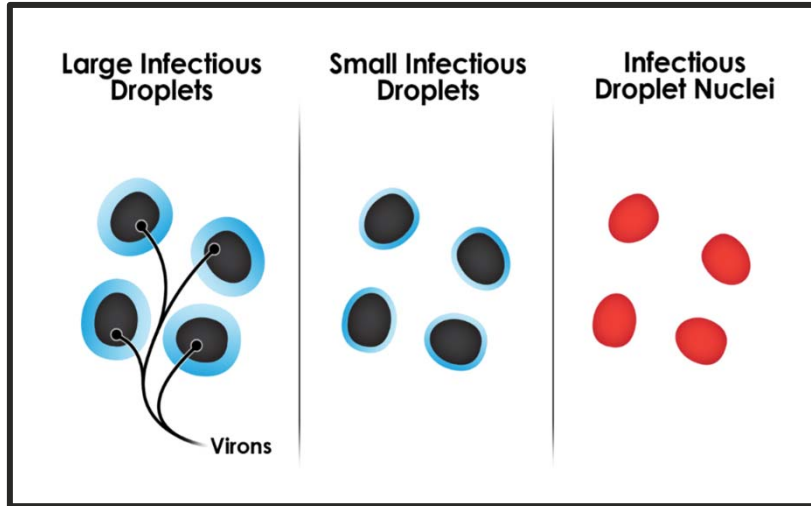
Distance ~15ft 150ft+

Time 1-5 sec ∞

COVID-19 Size



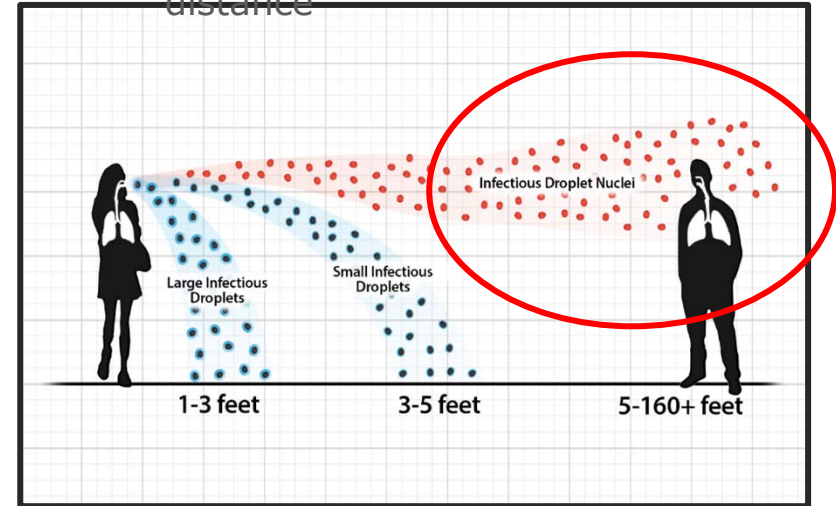
Droplet evaporation process



Distance ~15ft 150ft+

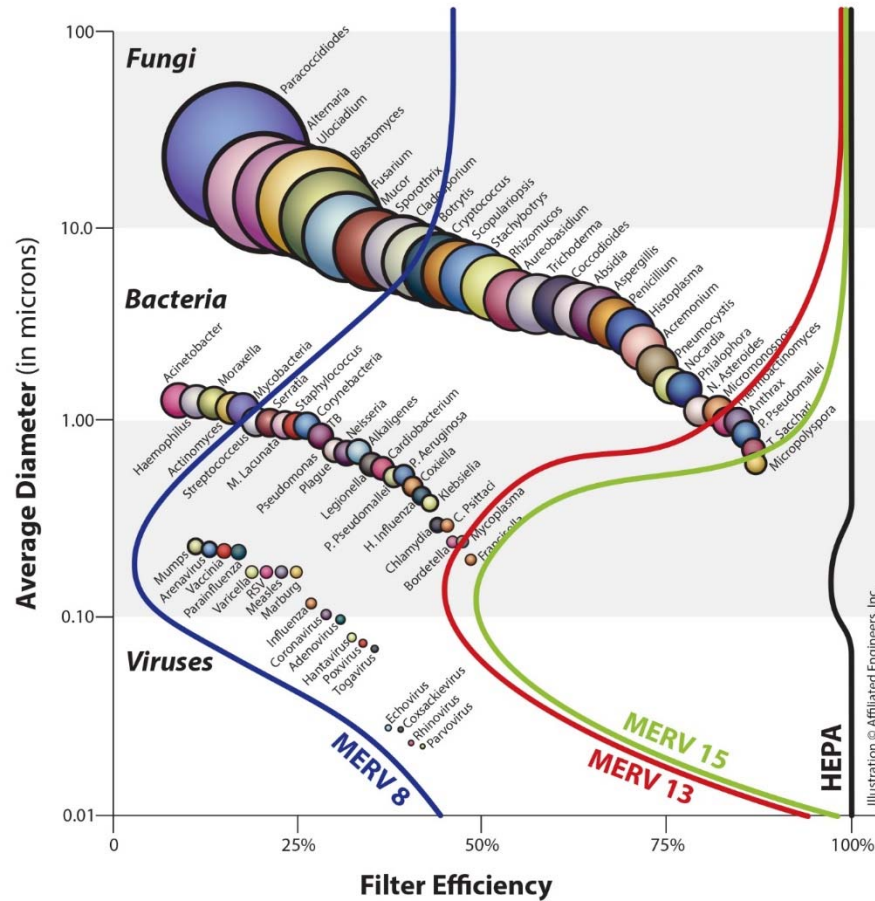
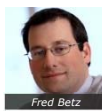
Time 1-5 sec ∞

Droplet transmission distance

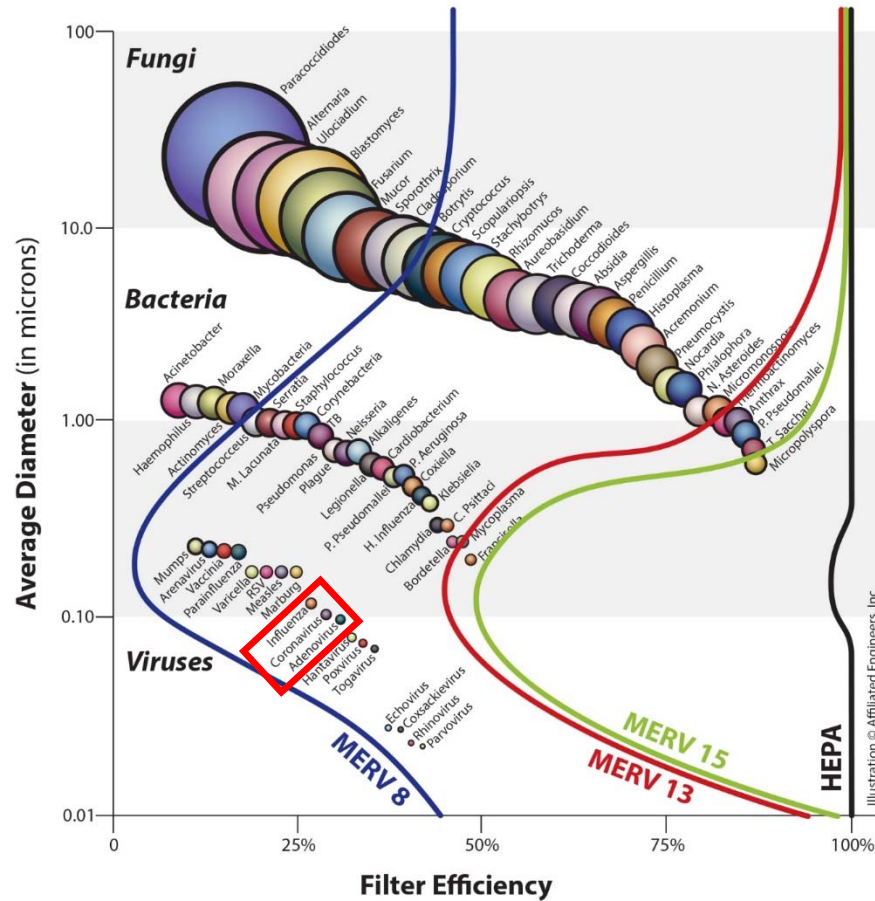
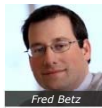


Reduce these infectious particles

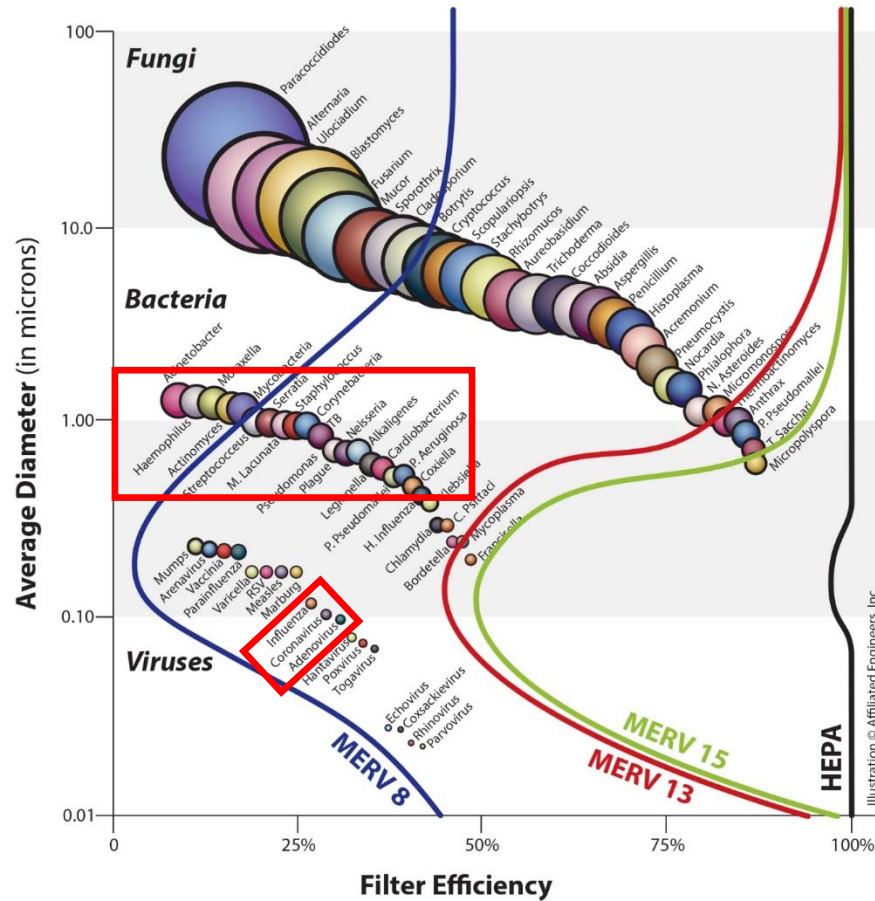
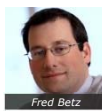
COVID-19 Size



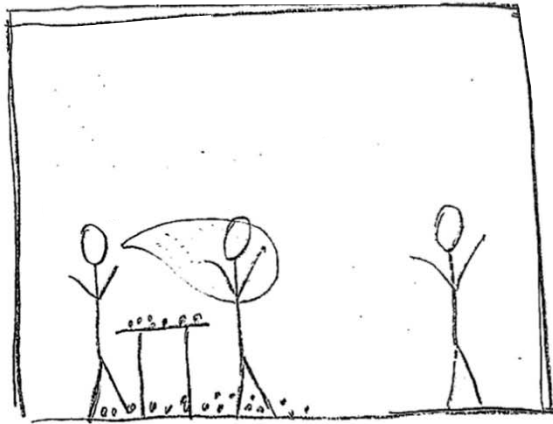
COVID-19 Size



COVID-19 Size

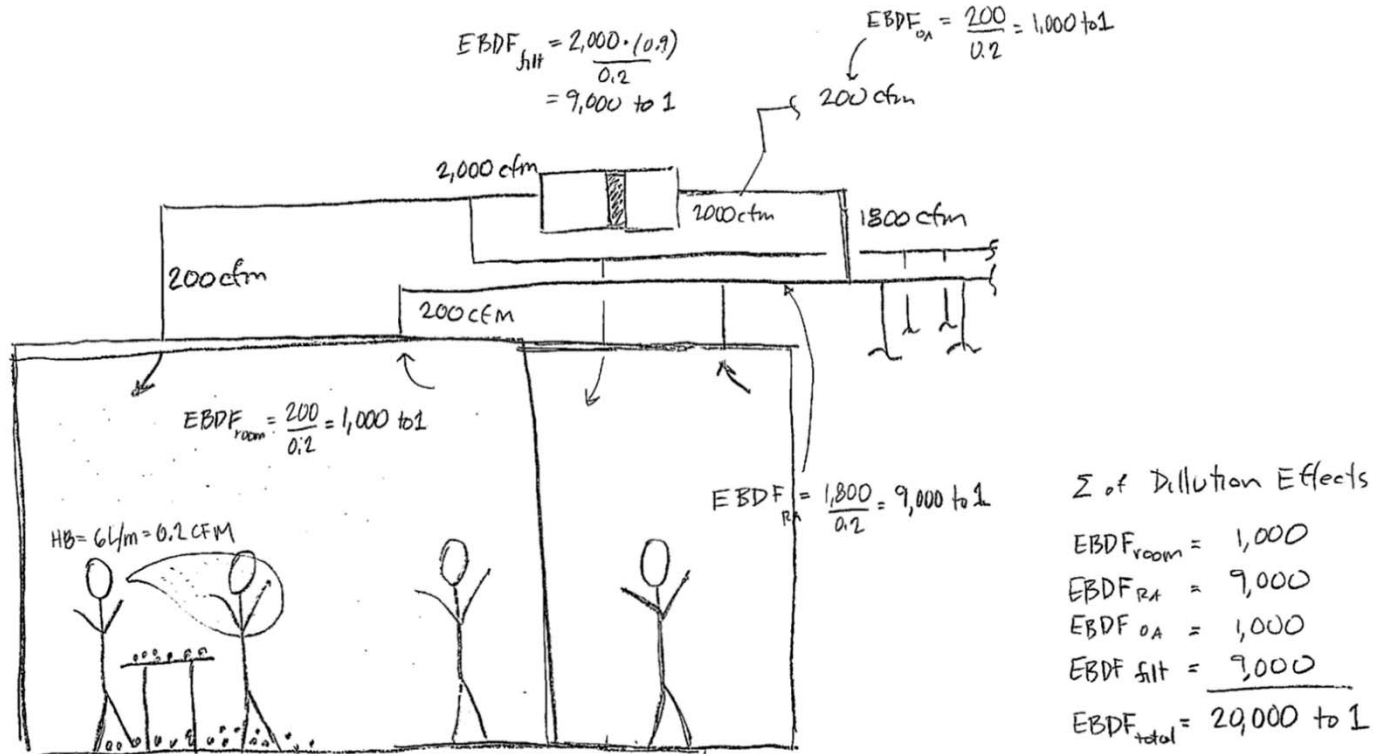


The COVID Cloud



"SARS-CoV-2 Cloud" - Travis English, Kaiser Permanente

Dilution – Focus Below the Ceiling



"SARS-CoV-2 Cloud" - Travis English, Kaiser Permanente



Takeaways From Earlier This Year

- What did we learn?

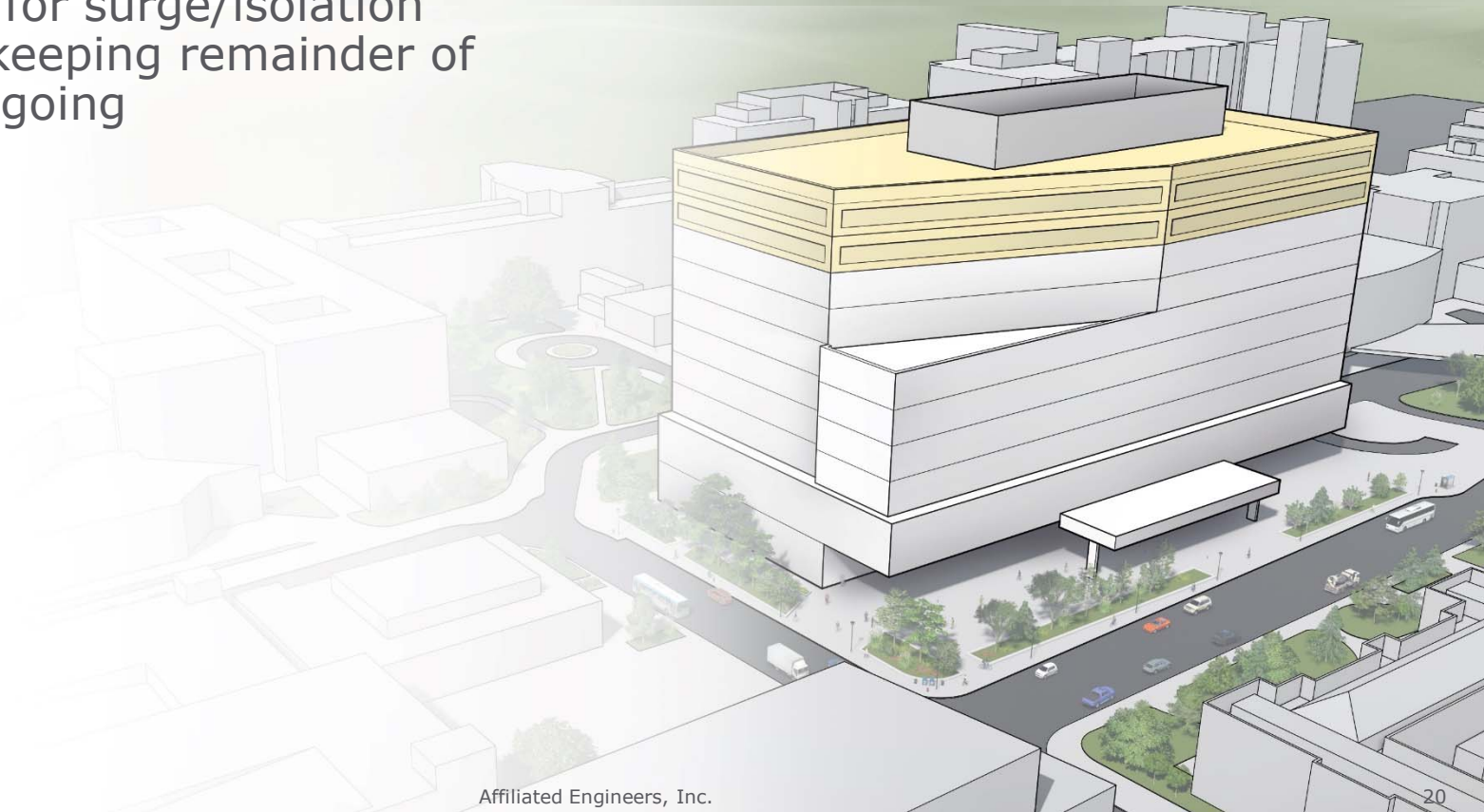
Takeaways From Earlier This Year

- What did we learn?
 - Treat like any transmissible disease – break the chain
 - Surface transmission not as large of an issue as originally thought
 - HVAC does not spread COVID-19, but airflow direction matters
 - Swiss Cheese – no single prevention measure is effective, but layered they reduce the overall likelihood of transmission
 - Need to keep healthcare services running – for general care and revenue



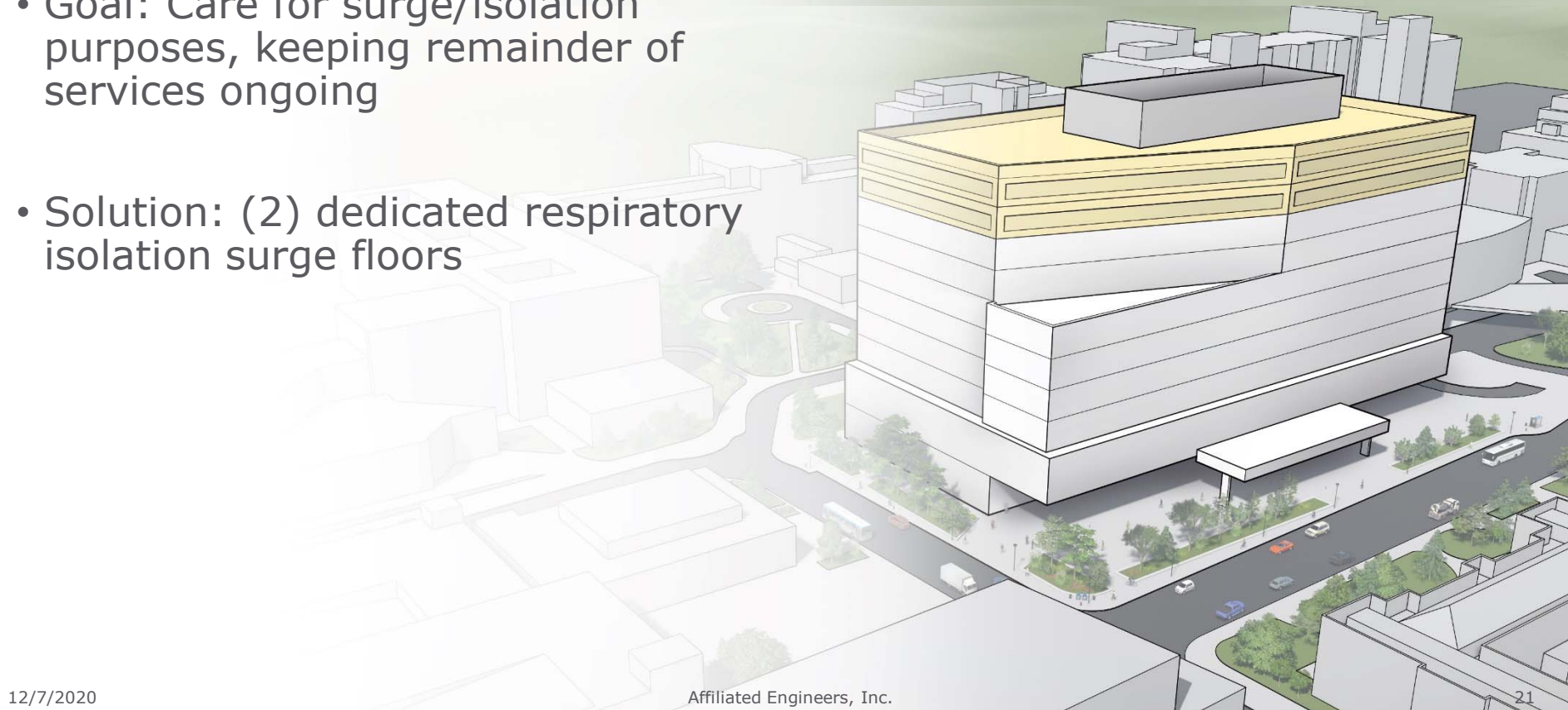
Building Adaptability

- Goal: Care for surge/isolation purposes, keeping remainder of services ongoing



Building Adaptability

- Goal: Care for surge/isolation purposes, keeping remainder of services ongoing
- Solution: (2) dedicated respiratory isolation surge floors



Building Adaptability

- Exercise in planning
- Vestibules, donning/doffing spaces
- Dedicated elevators – when needed
- Negative pressure isolation/exhaust
- Headwall electrical and medical gas growth

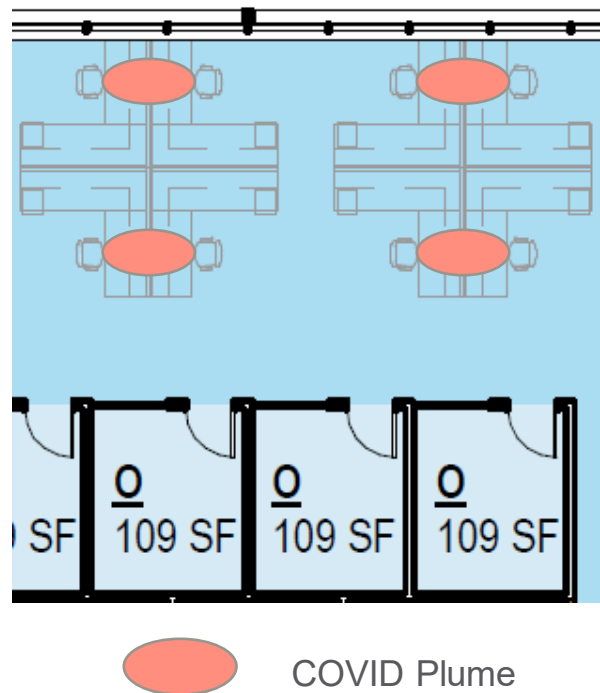


Human Behaviors



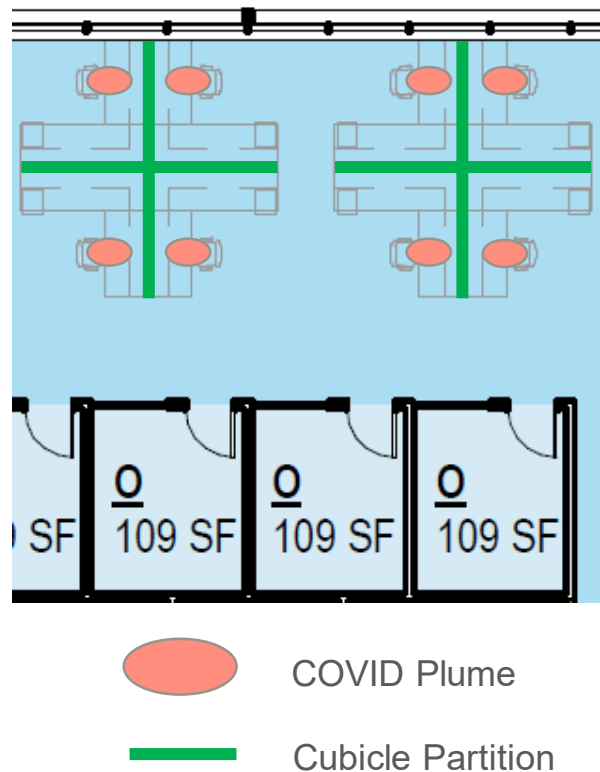
Office Spaces

- People exhaling towards each other is undesirable
- Private offices likely don't risk transmission
- HVAC systems can push COVID plumes towards people
 - Case Study: Restaurant –Guangzhou, China



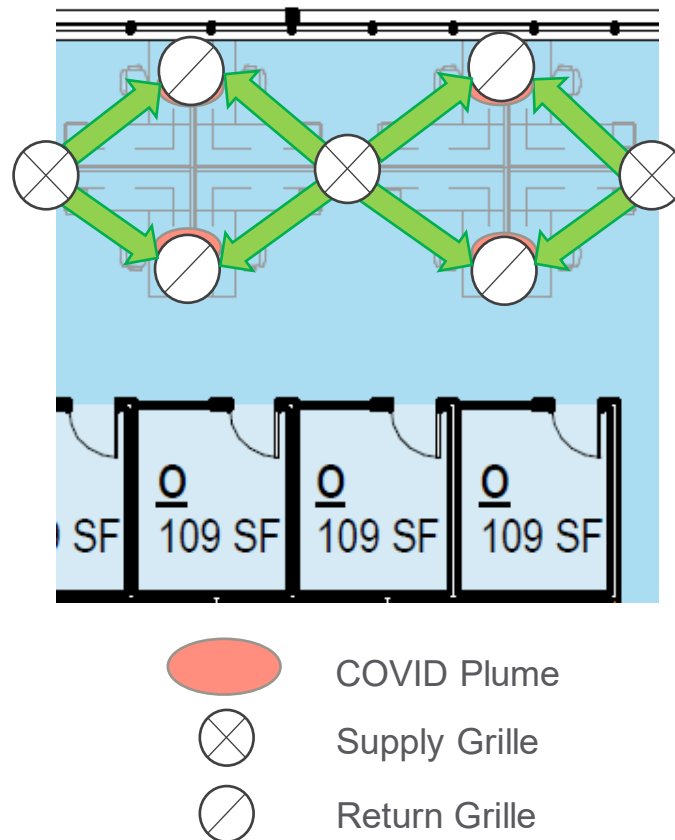
Office Spaces

- Furniture partitions can be used to block plume
- Careful to not make too high to create stagnant pockets where SARS-CoV-2 can build up



Office Spaces

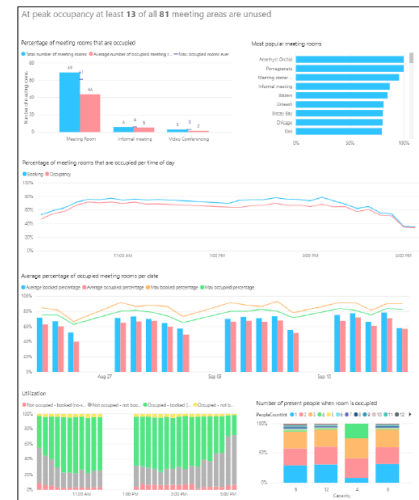
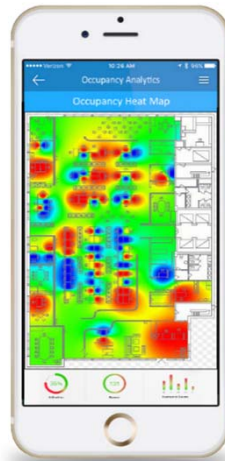
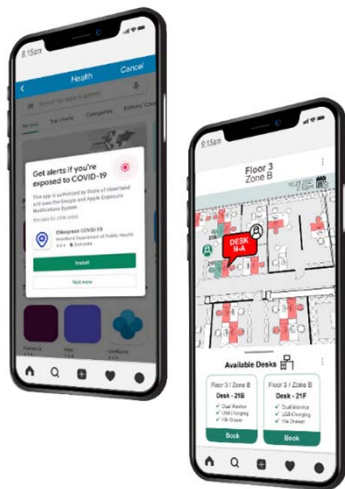
- More HVAC supply and return locations between people reduces cross contamination
- Total airflow stays the same – ASHRAE 62.1 still viable
- Ceiling coordination becomes more challenging



Occupant Experience Applications



Occupant Experience Applications



- Entry instructions
- Wayfinding
- Workstations appropriately spaced apart

- Generates usable data
- Right time cleaning / sanitization

- Contact tracing
- Space utilization
- Wells-Riley Equation

Fault Detection

DIAGNOSTIC DATE FILTER

All ▼

Start Date
5.1.202

End Date
6.5.202



AIR HANDLERS

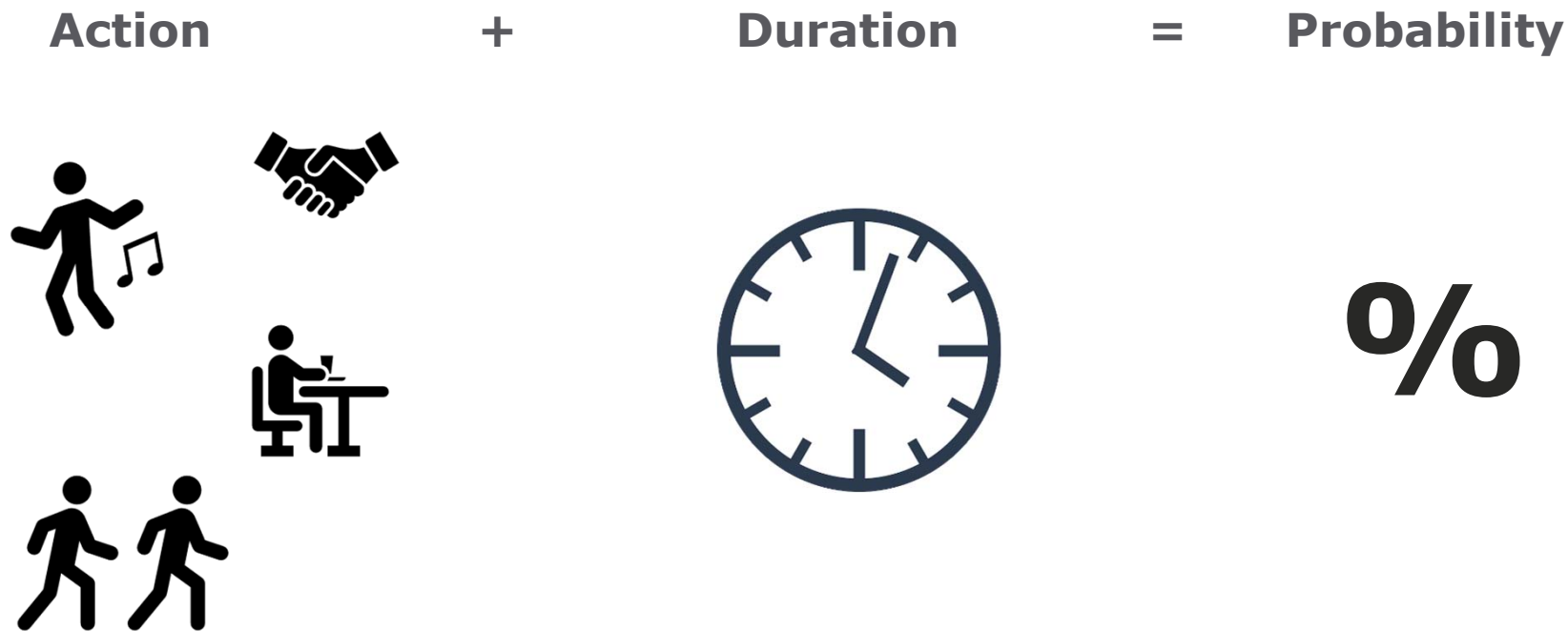
Equipment Name	# Days in Fault
Bldg 3 AHU-2	
Return Air Flow Higher Than Setpoint	28
Stuck Cooling Coil Valve	16
Bldg 4 AHU-1	
Fan Left In Manual Override	30
AHU-3	
Supply Static Pressure Smaller Than Setpoint	28
Fan Status Data Mismatch	1
Bldg 4 AHU-2	
Supply Static Pressure Smaller Than Setpoint	26
Fan Speed Feedback Higher Than Command	2
AHU-4	
Supply Static Pressure Larger Than Setpoint	27
AHU-6	
Fan Status Data Mismatch	17
Supply Static Pressure Smaller Than Setpoint	3
Bldg 2 AHU-3	
Economizer Should Be Off	11
Bldg 2 AHU-1	
Supply Static Pressure Smaller Than Setpoint	6
AHU-1	
Fan Status Data Mismatch	4
Fan Speed Short Cycling	1
Bldg 1 AHU-3	
Fan Status Data Mismatch	4

ZONES

Equipment Name	# Days in Fault
VAV 1-6	
Stuck Zone Supply Damper	28
Bldg 2 VAV-3	
Supply Air Flow Lower Than Setpoint	15
VAV 1-4	
Supply Air Flow Lower Than Setpoint	11
Bldg 1 VAV-3	
Supply Air Flow Lower Than Setpoint	8
Bldg 4 VAV-1	
Supply Air Flow Lower Than Setpoint	4
Slow Room Air Temp Response to Conditioning	1
Bldg 1 VAV-2	
Slow Room Air Temp Response to Conditioning	4
Bldg 4 VAV-2	
Supply Air Flow Lower Than Setpoint	4

Merging Systems and Real Time Data

Probability of airborne infections governed by Wells-Riley equation.



Breaking the Chain

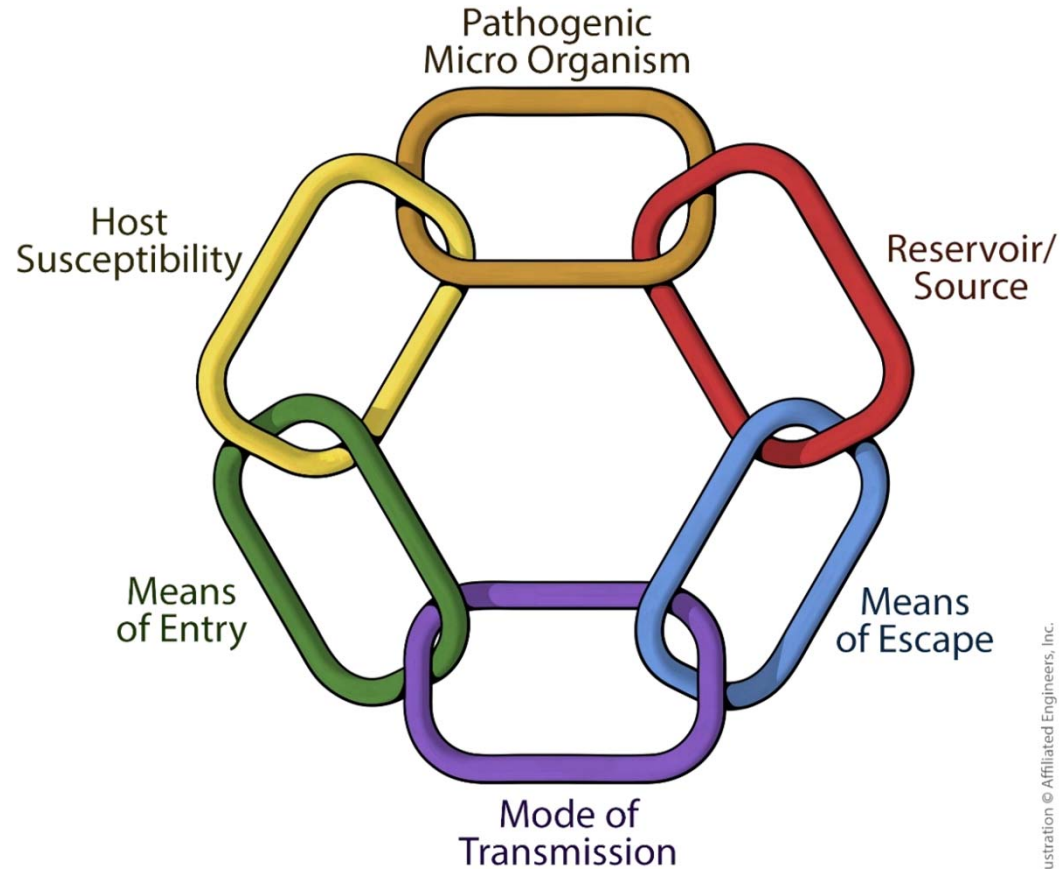


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Questions?

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BIG STATE ELECTRIC, LTD
COVID -19 IMPACTS
December 4, 2020





Current Work Plans in Place

- Staff
 - Still @100% in the Office
 - COVID is taking its toll little by little (7 in pre-fab shop; 20-30 in field)
 - Furlough is down 50%, but still an impact
 - 15% in quarantine due to exposure
 - BSE requires employee to test negative 2 times. Come on back.
 - Some jobsites require 14 day quarantine. Difficulty in planning around
- Daily screening for Crew Members - 3 simple questions with Signature per day
 - Jobsites continue to have strict COVID-19 screening policies
 - 7-10% lost time on projects



Effect on Current/Future Work

- September Bids + \$75M
- October +/- \$25M
- November +/- \$90M (Mostly individual projects over \$5M)
- December +/- \$70M Projected
- January looks skinny (Not sure what is coming)

- When we see RFP's, we are seeing a trend that the time to price seems expedited.

- 2020 Austin Sales up 73%

- With AIA billings down in April, we anticipate October / November Lull in the Private Market. We saw a lull in October and it jumped back up

- Market momentum is steady Crews seem to be more comfortable working on jobsites.

- Distribution; Mission Critical; Healthcare; Manufacturing

- Service opportunities for new installations of COVID-19 mitigating systems



Effect on Cost

- Material Shortages
 - PVC 8 weeks out!!!! Mostly due to hurricanes
 - High / Medium Voltage systems (Switchgear; Pad-mt Transformers, Sub-stations 30 weeks)
 - Can be an issue with Utility energizations (CPS Energy in SA)
 - Residential breakers
 - Busway systems
- Stored Materials
 - Get stuff in town and stored. Never know what will happen.
 - Copper is up and going up / Consider more stable Aluminum solutions
 - Sched 40 and Sched 80 PVC is through the roof.
- Daily screening for Crew Members
 - After NECA Survey, National Average supports a lost time of 45 Minutes / day = \$20,250.00 per day
 - Change orders with added fees for COVID-19 impacts
- Keeping our core working during complete shutdown?
 - Qualified manpower shortages
 - We have plenty of work and backlog. Looking for manpower to fulfil needs
- Potential for factory backlog to increase costs, due to high demand
 - Remains the case



- Carbon Steel fittings and flanges are flat
- Forged Steel fittings are flat
- Stainless Steel is moving higher
- Carbon Steel pipe is moving higher
- Aluminum, brass and copper are moving higher – new item since 11/5 update
- Imported Metals market is soft
- Domestic Metals with slight increases published for January 2021

- The upticks were in the 1 to 3 percent range.

- Hangers, valves, some sizes of pipe have increasing lead times



***Relative to the overall Texas market I would say project's overall margins are rising slightly due to the robust market. Everywhere but Houston – still very flat there.

***Automatic premium time is necessary in bids to draw qualified skilled labor to the robust markets in Texas, including the Tesla plant in Austin that will affect all of North and Central Texas.

A Better Built Environment through Measured Value

Richard Vermeulen, Chief Estimator | Lead Economist
Blair Tennant, Director | Business Development

HEALTHY PLANET

Year 2020
36 BMT

C02 Emissions in Billion Metric Tons

Year 2050
10 BMT



RENEWABLES

Wind Power
Solar Thermal
Solar Photovoltaic
Hydro/Geothermal
Biofuels



EFFICIENCY

Industry
Buildings
Transportation



ECONOMY

Fuel Switching
Carbon Capture
Resource Conservation
Digital Communication



BUILT ENVIRONMENT

Green Infrastructure
Access Ability
Building Right Size
Macro Mobility
Land Diversity

HEALTHY PEOPLE

Year 2050
9.5 Billion

World Population

Year 2100
7.5 Billion



COMMUNITY

Family
Social Groups
Communication
Education
Human Rights



FOOD

Plant Based Diets
Organic Practices
Local Sources



WORK

Team Practice
Health Networks
Full Employment
Safety



BUILT ENVIRONMENT

Blue Infrastructure
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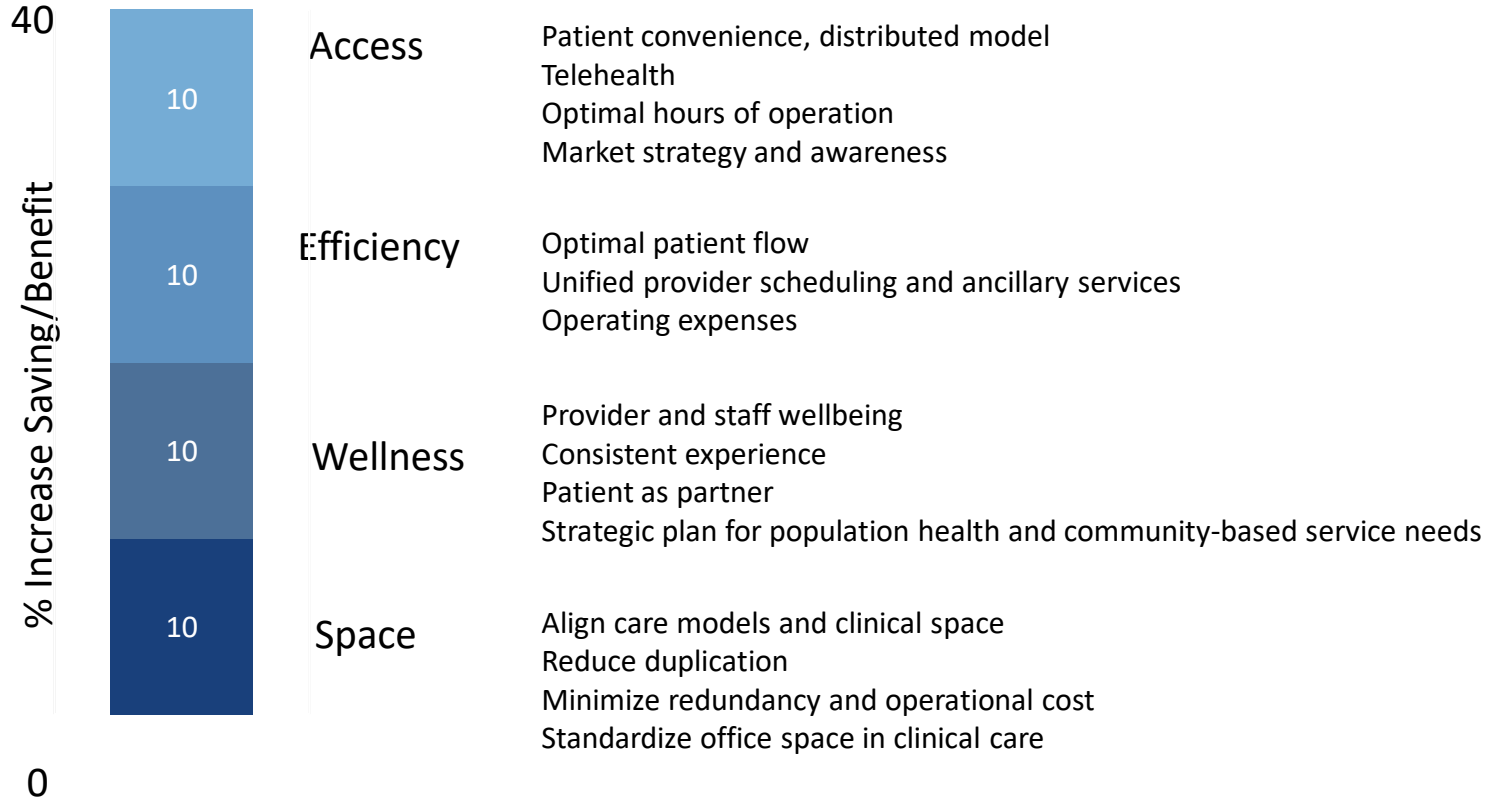
Ambulatory Re-Optimization Plan

Vision – improve response and conserve resources through integrated and distributed models

Mission - consolidate footprint, implement and expand telehealth, identify impact and benefits of virtual care

Outcome - significant benefits for access to care, improved patient experience, staff and provider wellbeing, and reduced operational expenses to the health system

Total Benefit – Ambulatory (health outcomes excluded)



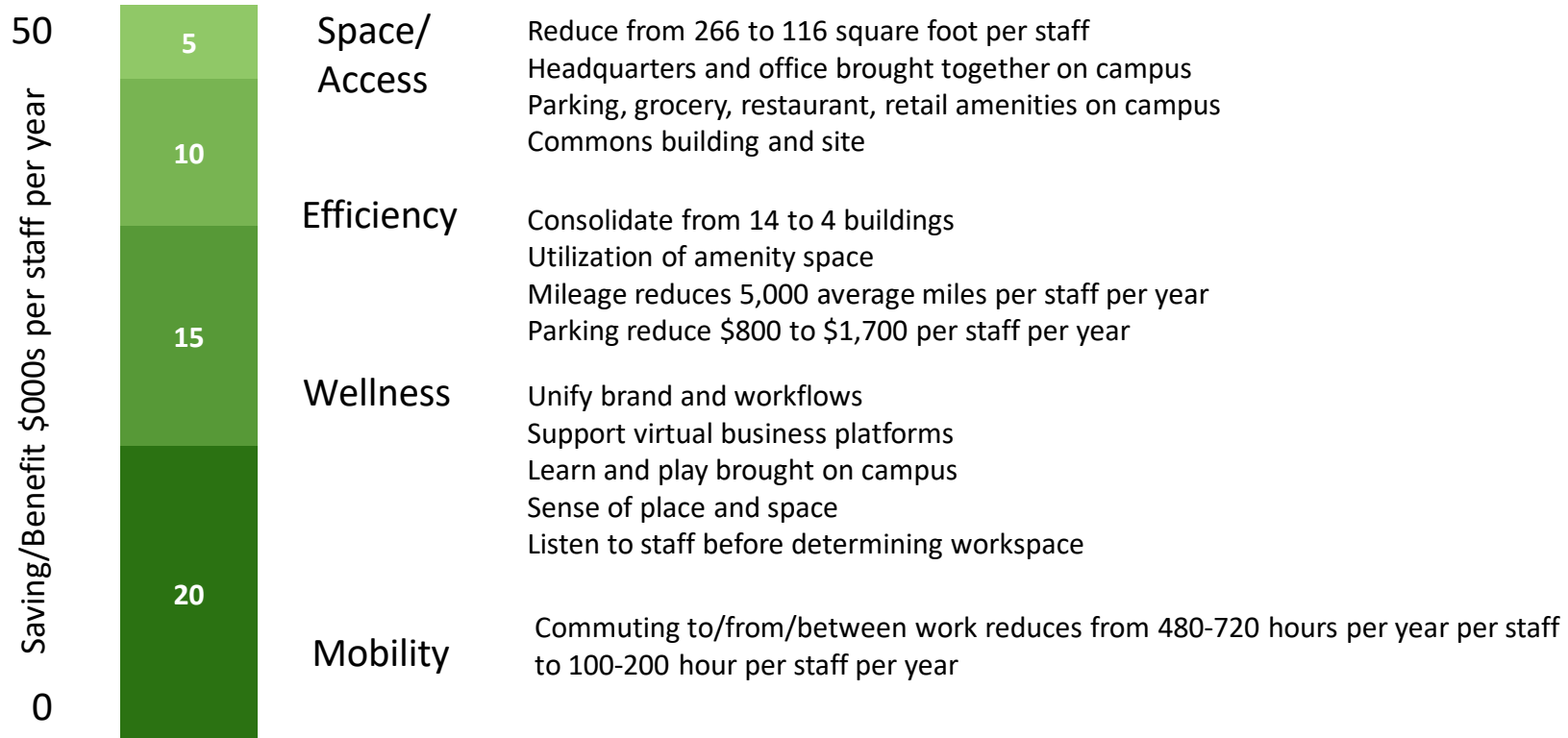
Administrative Re-Optimization Plan

Vision – improve work environment and conserve resources through hybrid virtual and real spaces

Mission - reorganize and consolidate footprint, implement and facilitate work from home, working analysis of this change

Outcome – model future administrative space for health systems

Total Benefit – Administrative Office



Total Benefit – Health Networks



Health Care comprises 18% of the North American economy
A 50% improvement in the sector is easily achieved through

Health Outcomes

Access
Communication
Diversity
Blue and Green Infrastructure
Education
Mobility

HEALTHY PLANET

Year 2020
36 BMT

CO2 Emissions in Billion Metric Tons

Year 2050
10 BMT

SUPPLY

RENEWABLES

Wind Power
Solar Thermal
Solar Photovoltaic
Hydro/Geothermal
Biofuels

DEMAND

EFFICIENCY

Industry
Buildings
Transportation

POLICY

ECONOMY

Fuel Switching
Carbon Capture
Resource Conservation
Digital Communication

BUILD

BUILT ENVIRONMENT

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HEALTHY PEOPLE

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BELONG

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BEHAVE

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Safety

BUILD

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