

# Trane: Improve Air Quality and Efficiency

## VDR 1

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Andreu Santeiro

# Team Introductions



Jake Hamilton  
*Design  
Engineer*



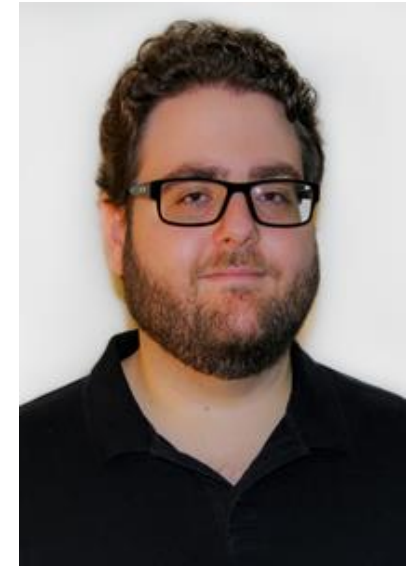
Nicholas Holm  
*Environmental  
Engineer*



Andreu  
Santeiro  
*Quality Control  
Engineer*



Joseph Thyer  
*Project  
Management  
Engineer*



Gavin Young  
*Fluids  
Engineer*

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# Sponsor & Advisor



Engineering Mentor  
Cameron Griffith  
*Trane Liaison*



Academic Advisor  
Juan Ordonez, Ph.D.  
*Energy Conversion Systems  
Director & Professor*

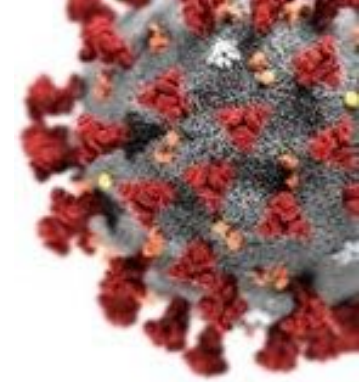
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# Objective

Develop an energy-efficient HVAC solution that improves air quality while adhering to current guidelines to combat COVID-19 that continues to be sustainable in future markets.

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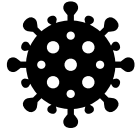


# Background



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# Pollutant Categories



## Biological

- Bacteria
- Viruses
- Fungi
- Dust Mites
- Animal Dander
- Pollen



## Chemical

- Accidental chemical spills
- Cleaning Supplies
- Paints & Adhesives
- Products of combustion (CO, H<sub>2</sub>CO, NO<sub>2</sub>)

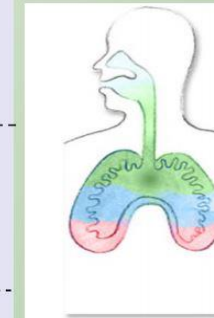
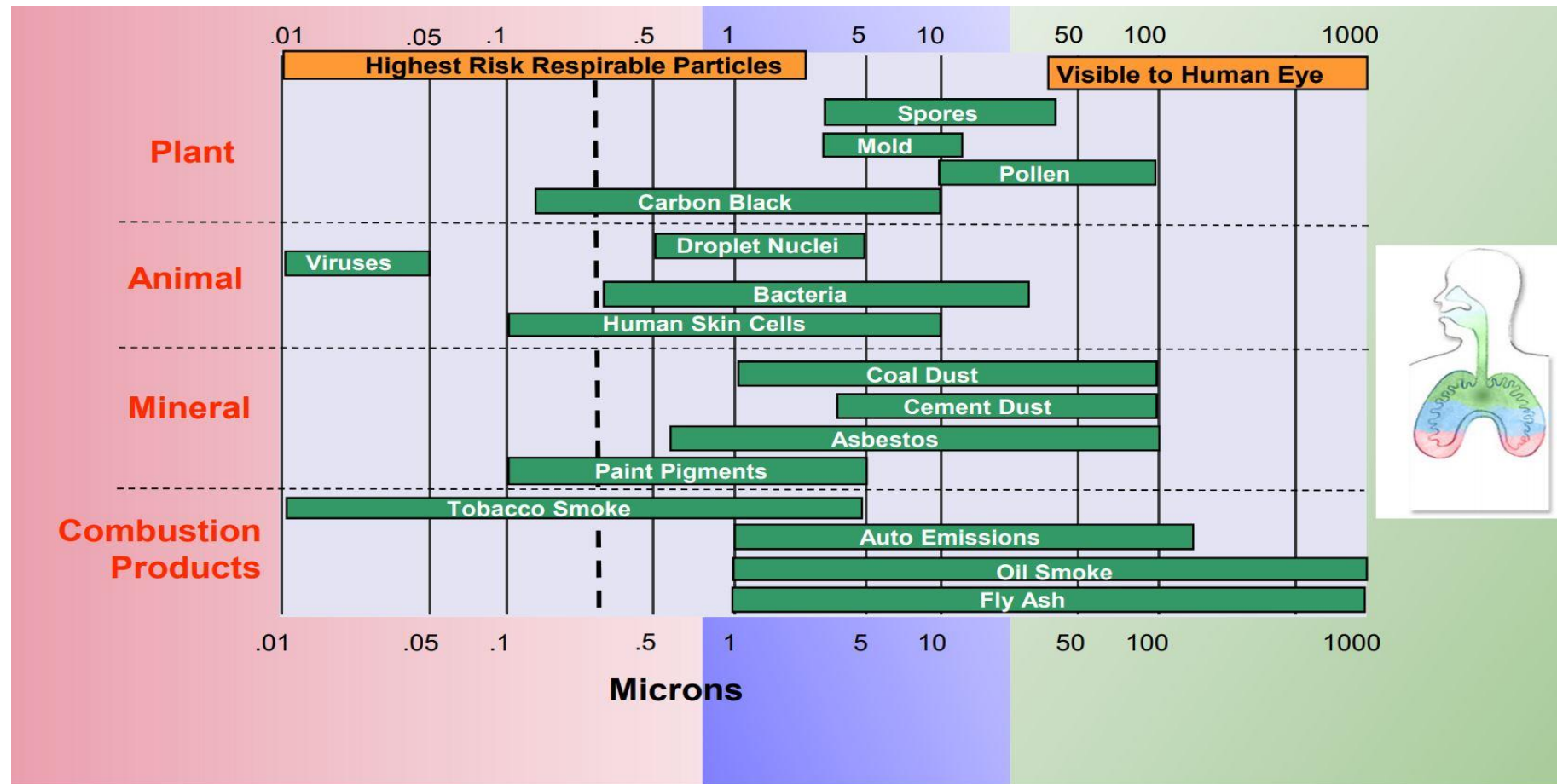


## Particle

- Dust
- Dirt

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# Particulate Sizes



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# Project Scope



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# Key Goals

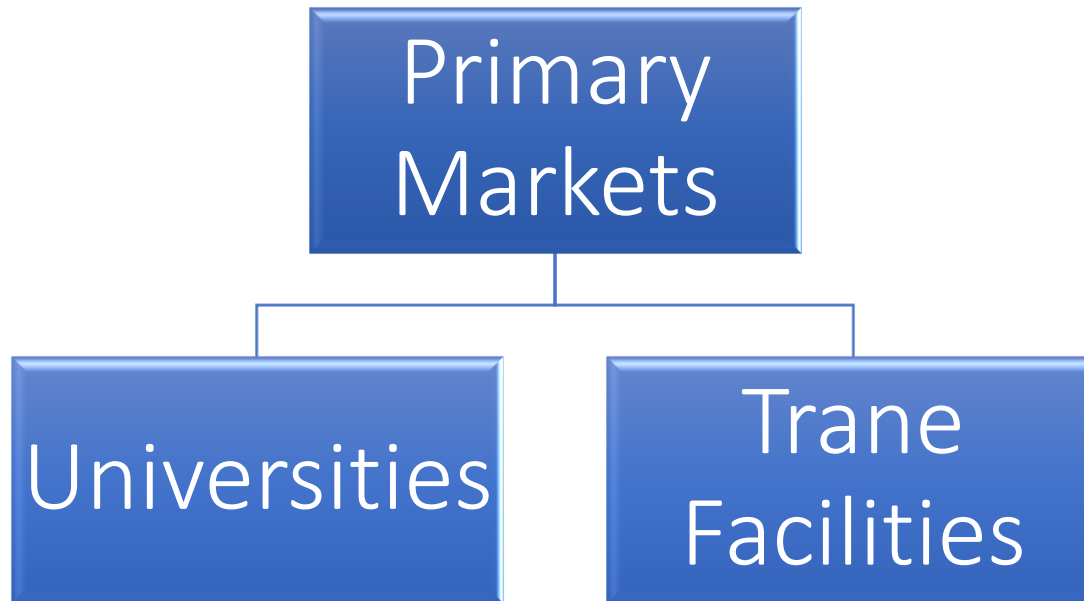
Improve Air  
Quality

Promote  
Sustainability



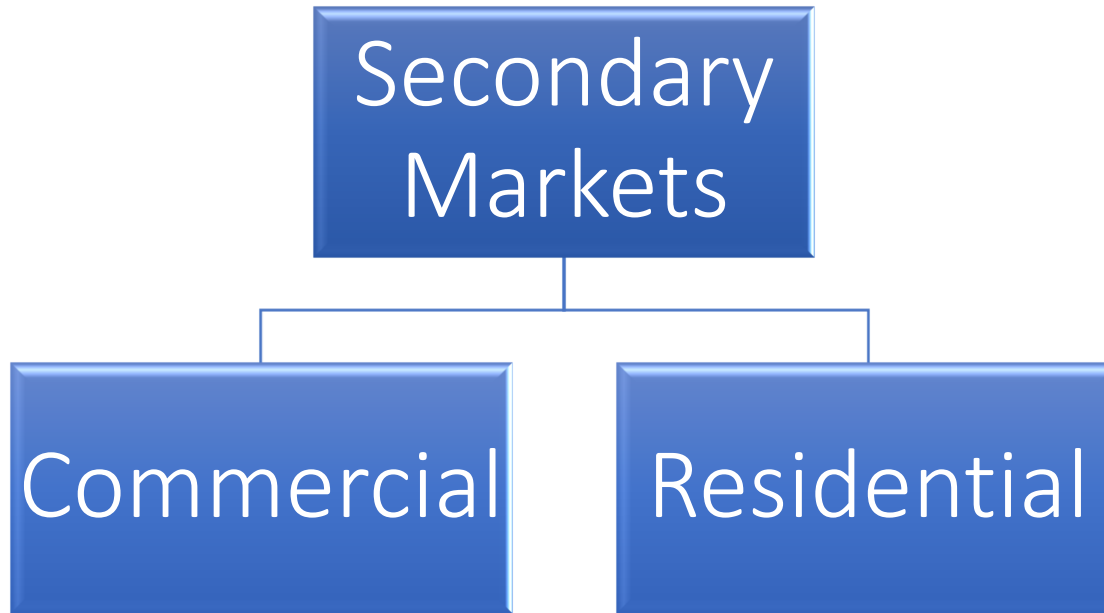
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# Primary Markets



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# Secondary Markets



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# Assumptions

- Existing infrastructure
- Government & environmental guidelines
- Market specific guidelines/budget
- Testing done in Florida climate



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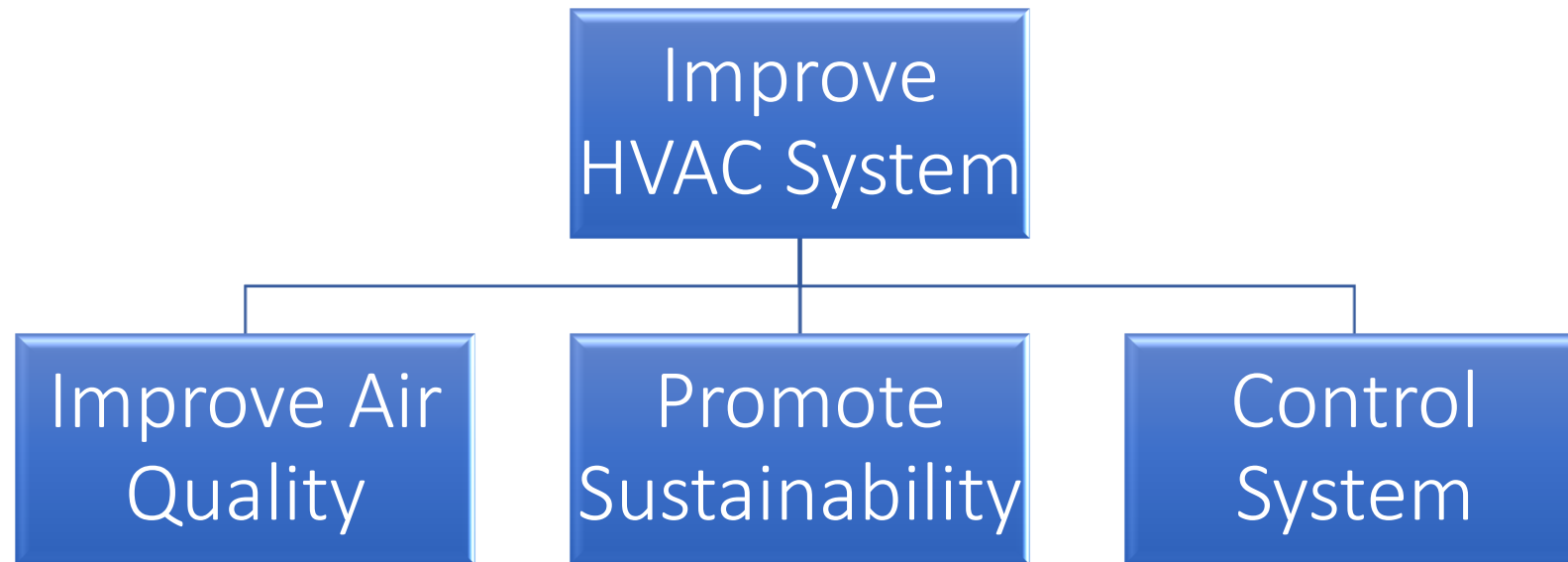
# Customer Needs

- Improve air quality
- Maintain cost efficiency
- Remains useful into the future
- Promote Trane's ideals



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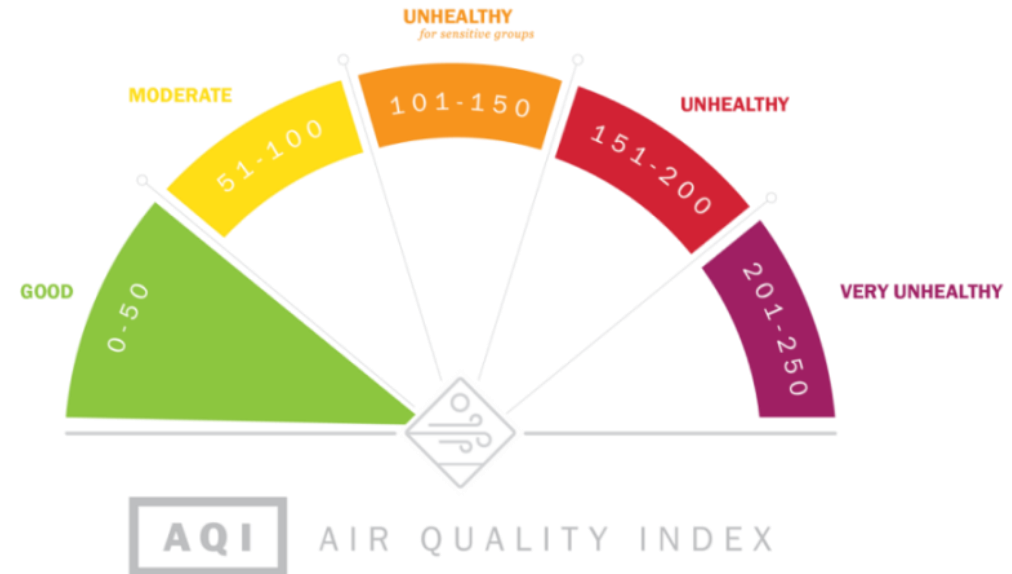
# Functional Decomposition



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# Functional Decomposition cont.

- Improve Air Quality
  - Clean Indoor Air
  - Dilute Indoor Air
  - Exhaust Indoor Air
  - Contain Indoor Air



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# Functional Decomposition cont.

- Promote Sustainability
  - Minimize operating costs
  - Improve system longevity
  - Optimize energy-efficiency
  - Fit existing HVAC systems



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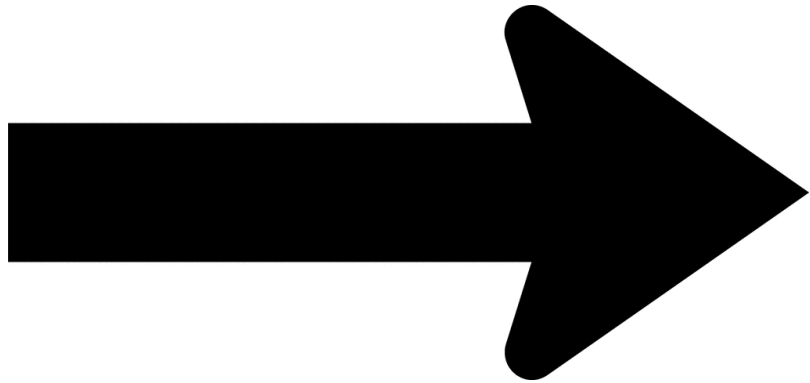
# Functional Decomposition cont.

- Control System
  - Maintain recommended humidity levels
  - Maintain recommended CO2 levels
  - Maintain comfortable temperature
  - Monitor VOC concentration



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# Moving Forward



- Over the next weeks
  - Research national standards
  - Ideation process
  - Communicate with FAMU-FSU faculty

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# Conclusion

1. Keep people safe as they return to work & school.
2. Do so in a way that remains relevant post-COVID.
3. Do so in a way that is affordable and sustainable.
4. Promote the ideals of Trane and FAMU-FSU.



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# Questions?



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# Customer Needs Process

## Customer Statement

- Indoor air quality is not sufficient enough to diminish the threat of harmful viruses
- Trane is driven to provide the lowest life cycle cost, efficient energy usage to reduce carbon emissions, and for sustainability in future markets

## Interpreted Need

- The solution must **improve air quality**
- The solution must be **cost-effective** and be **sustainable**

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