Trane: Improve Air Quality
VDR4

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Team Introductions

Jake Hamilton
Design Engineer

Nicholas Holm
Environmental Engineer

Andreu Santeiro
Quality Control Engineer

Joseph Thyer
Project Management Engineer

Gavin Young
Fluids Engineer

Andreu Santeiro

Sponsor & Advisor

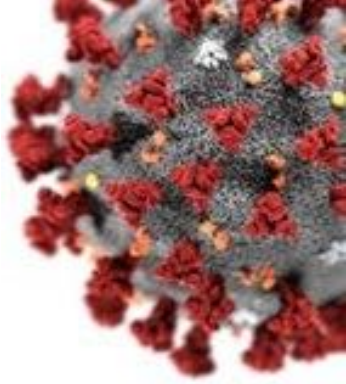
Engineering Mentor
Cameron Griffith
Trane Liaison

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

Andreu Santeiro

Objective

The objective of this project is to develop and verify an HVAC solution to improve air quality that adheres to current guidelines to combat COVID-19 while continuing to be sustainable in future markets.



Background

Key Goals

- Improve Air Quality
- Promote Sustainability

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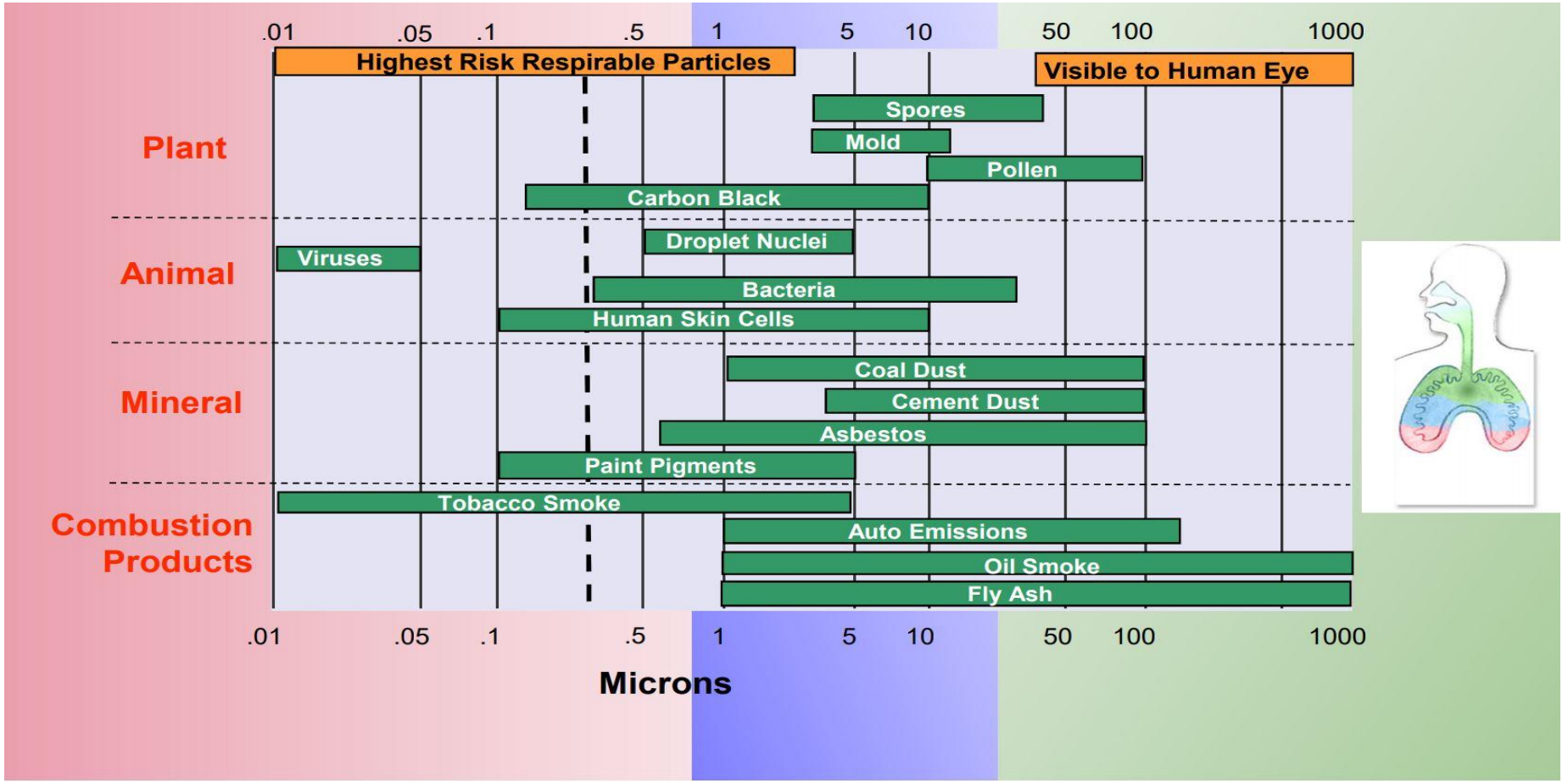
Particulate Sizes



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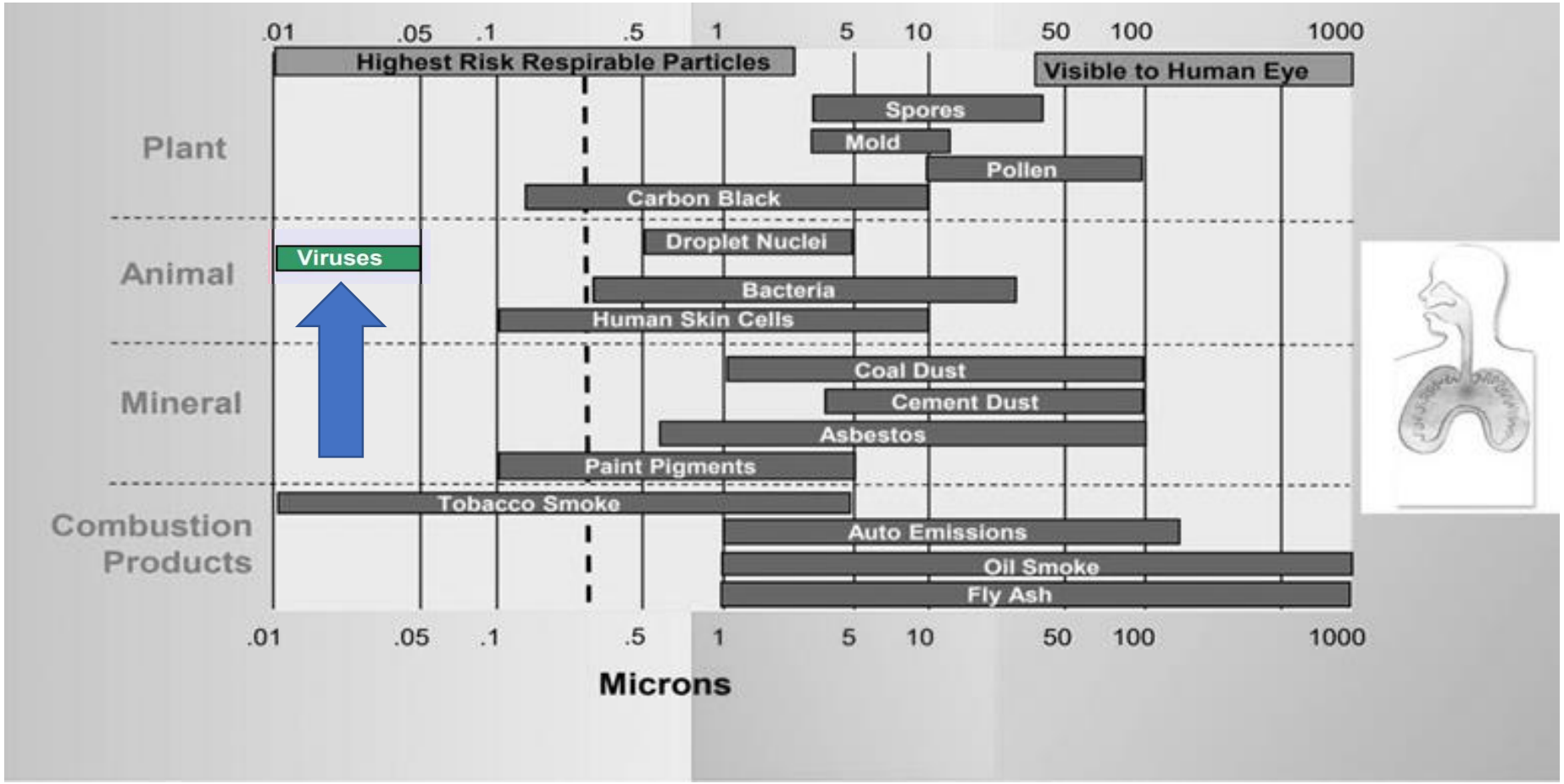
Particulate Sizes



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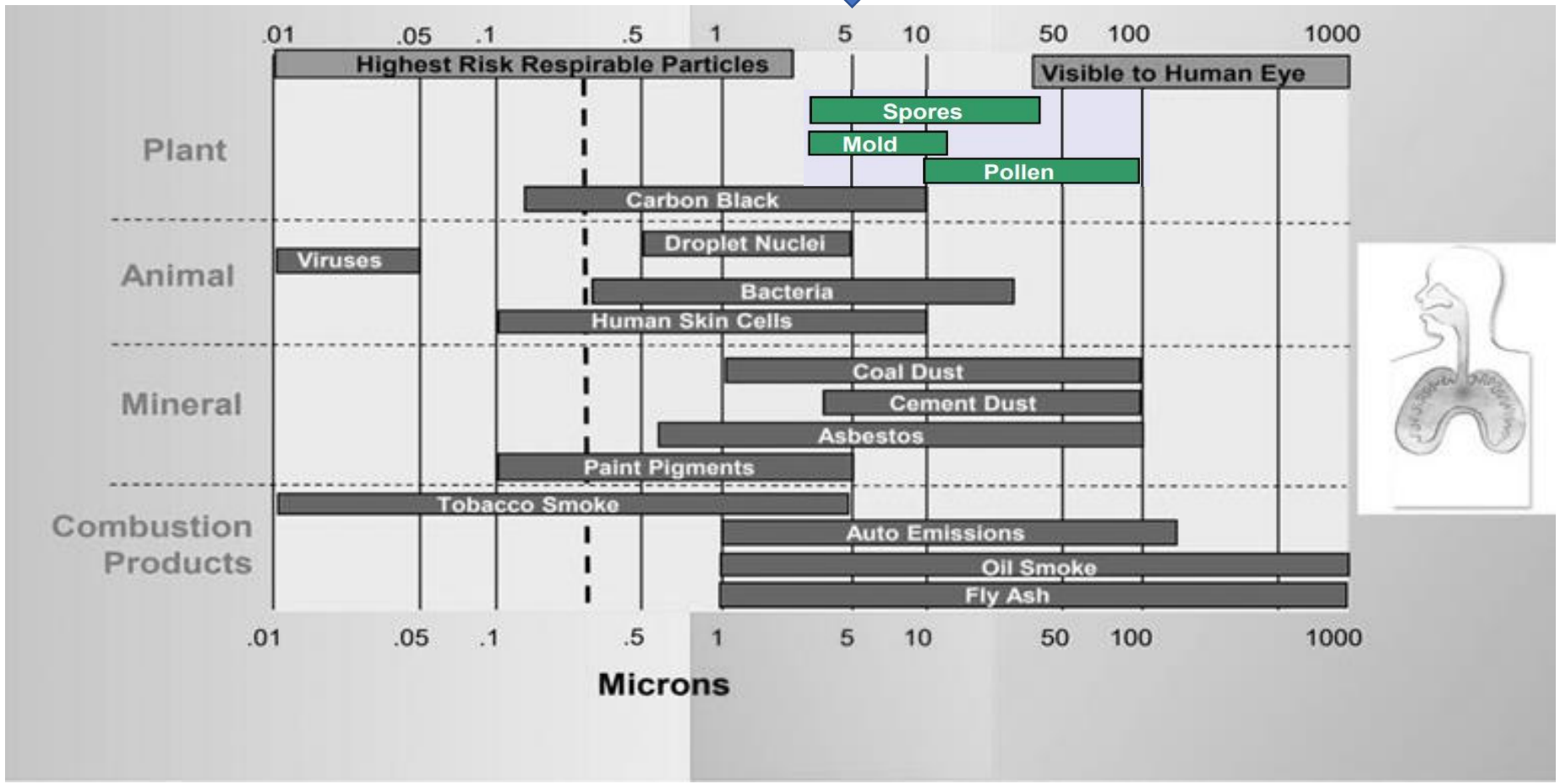
Particulate Sizes



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Concept Generation & Selection

Joseph Thyer

Top 8 Concepts

- Bipolar ionization
- Smart HVAC system
- Geothermal heat exchangers
- Higher rated filters
- Antimicrobial duct lining
- Photohydro ionization
- Photocatalytic oxidation
- Increase fan speed

Joseph Thyer

Top 8 Concepts

- Bipolar ionization
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Joseph Thyer

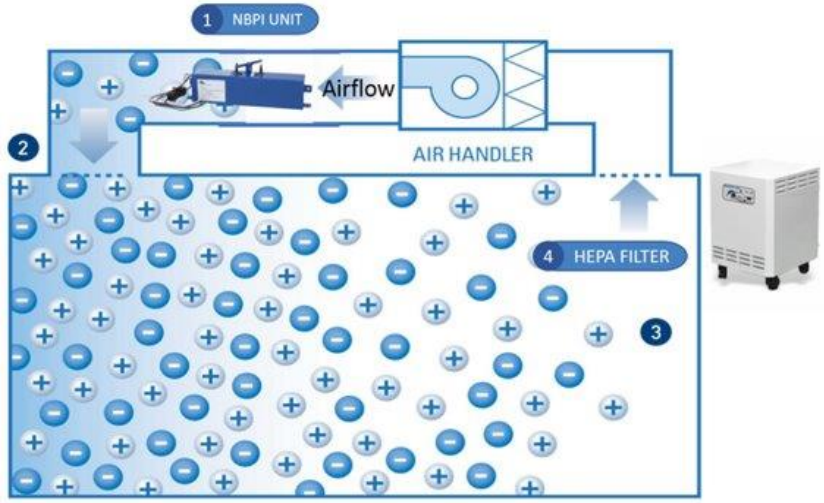
Ionization

- Creates a plasma field, creating positive and negative ions
- Attach to contaminants, rendering them inactive
- Makes particulate easier to filter
- Needlepoint bipolar ionization (NPBI) does not produce ozone
- Used on industrial scale

Joseph Thyer

Advantages of Ionization

1. Low pressure drop
2. Easy installation
3. Works on particulate of all sizes
4. No chemicals involved
5. Energy savings



Joseph Thyer

Validation

Significant Design Considerations

- Multiple dependent variables
- Working with organic particulate
- Test chamber to mimic air duct

Joseph Thyer

Dependent Variables

- Air flow rate
- Particulate concentration
- Energy usage

Virus Testing

- Extremely specialized equipment
- Extremely high safety concerns

Joseph Thyer

Mold Testing

- Closest approximation to virus
- Health risks
- Market sustainability
- Notable concern for FSU

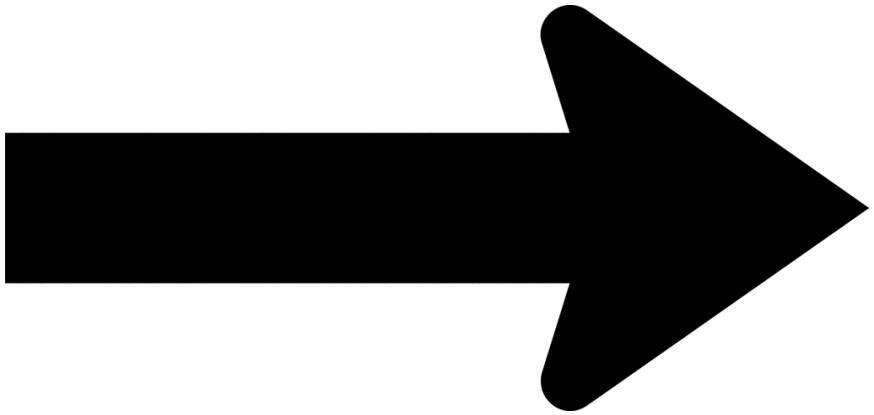
Joseph Thyer

Test Chamber

- Mimic air duct conditions
- Contain potentially harmful substances
- Maintain controlled environment

Joseph Thyer

Moving Forward



- Over the next few weeks
  - Meet with FSU Facilities
  - Design experiment
  - Order components

Joseph Thyer

Conclusion

1. We need to improve air quality in a way that affects COVID but is useful independent of COVID.

2. Particle Ionization is the selected concept.

3. A test will be designed, built, and conducted to validate the technology.

Questions?

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