

How Hot is that Air?

Measurement & Verification of PWHP Installations

Presented at the 2024 ACEEE Hot Air Forum



PRESENTER



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Presentation Summary

Project Goals

- Answers to the Big Questions
- M&V Criteria



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M&V Plan

- Power Monitoring
- Temperature Monitoring
- Installation/Operational Observations



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Revised Plan

- A More Active Approach



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Lessons Learned

- Plan, Meet Reality
- Musings for the Future



Project Goals

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Answers to the Big Questions

Is heat adequate for all apartment spaces?

- Kitchens, bathrooms not directly heated



Project Goals

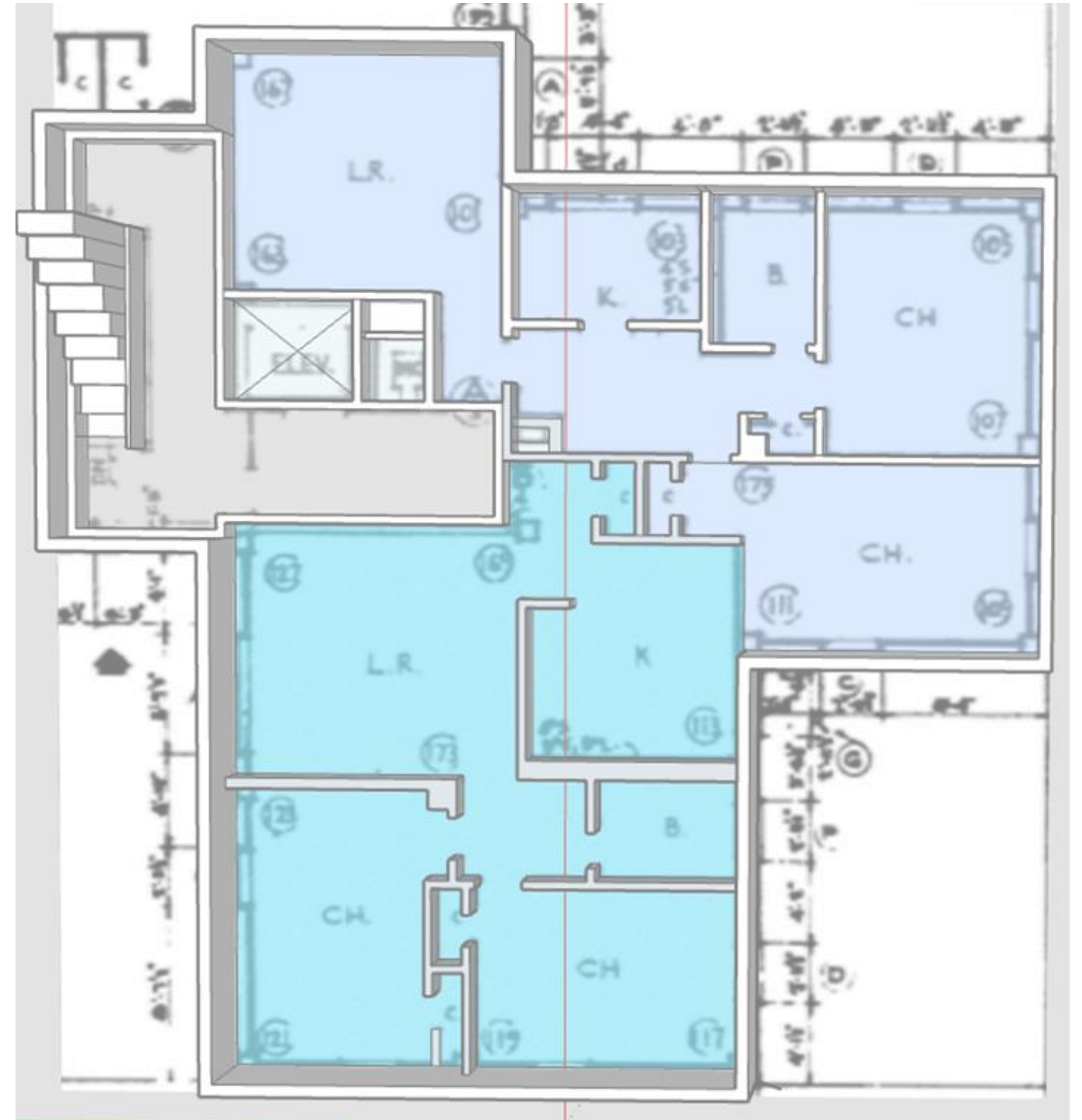
Answers to the Big Questions

Is heat adequate for all apartment spaces?

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What is the peak coincident load?

- Electrical risers were not upgraded



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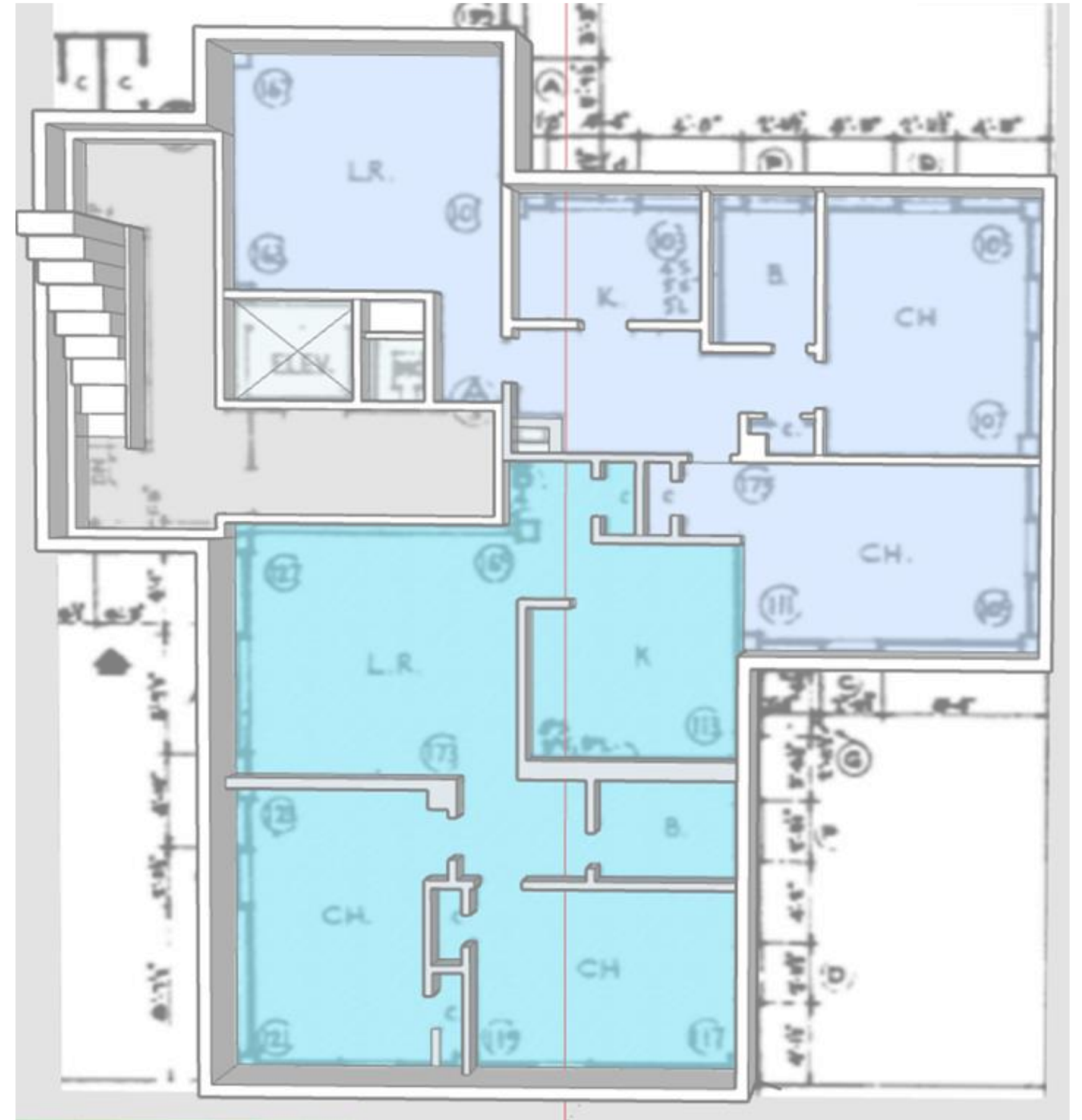
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What about condensate?!

- Novel disposal methods



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Installation/Operational issues?

- Air leakage rate
- Sound levels (inside and out)

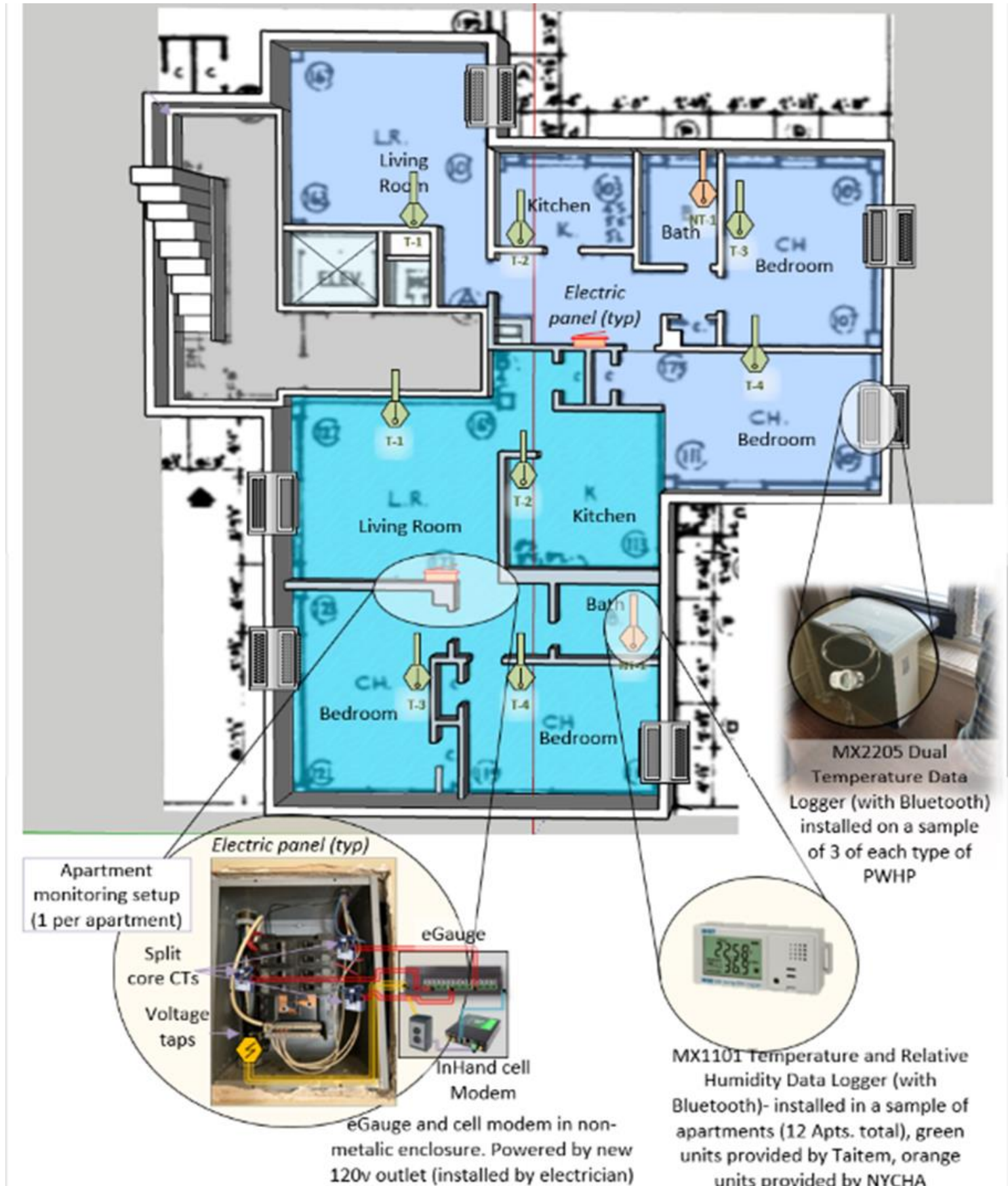


Project Goals

M&V Criteria

Remote Monitoring Capabilities

- Regular access to apartments can be difficult



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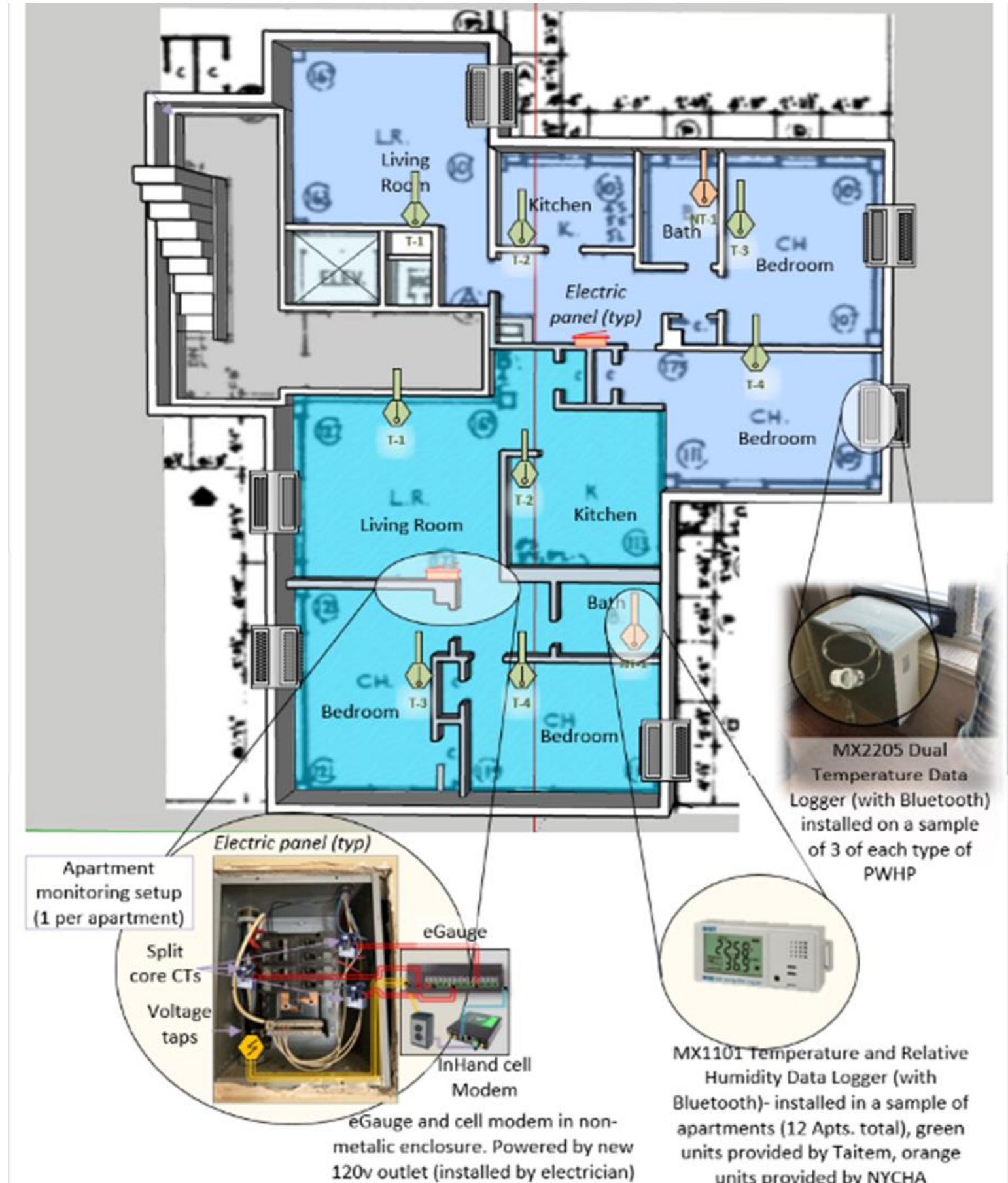
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Remote Monitoring Capabilities

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Minimal Resident Impact

- Unobtrusive equipment



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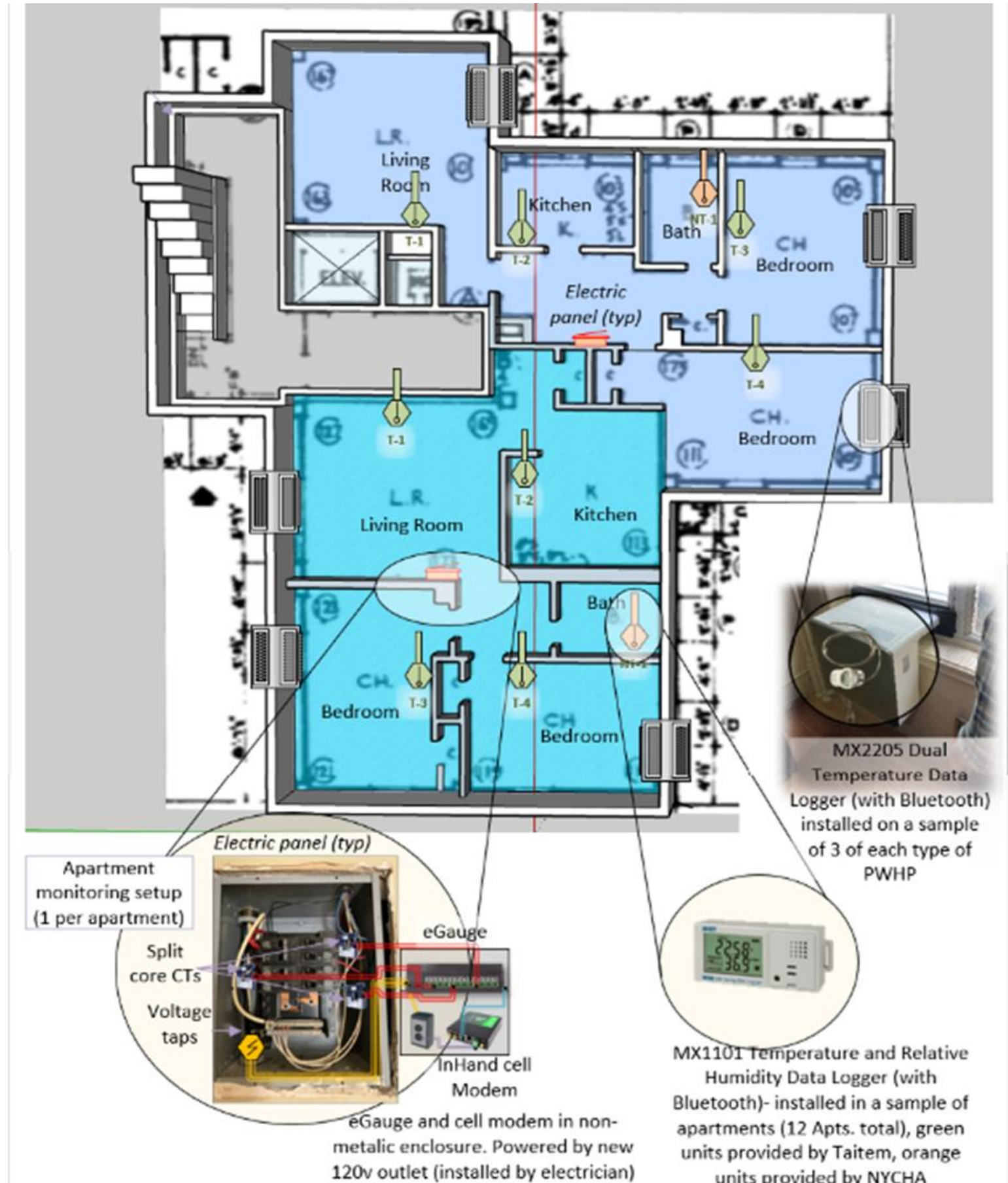
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No Drilling through Walls or Floors

- Asbestos concerns



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Technology Reliability

- Data integrity of utmost importance





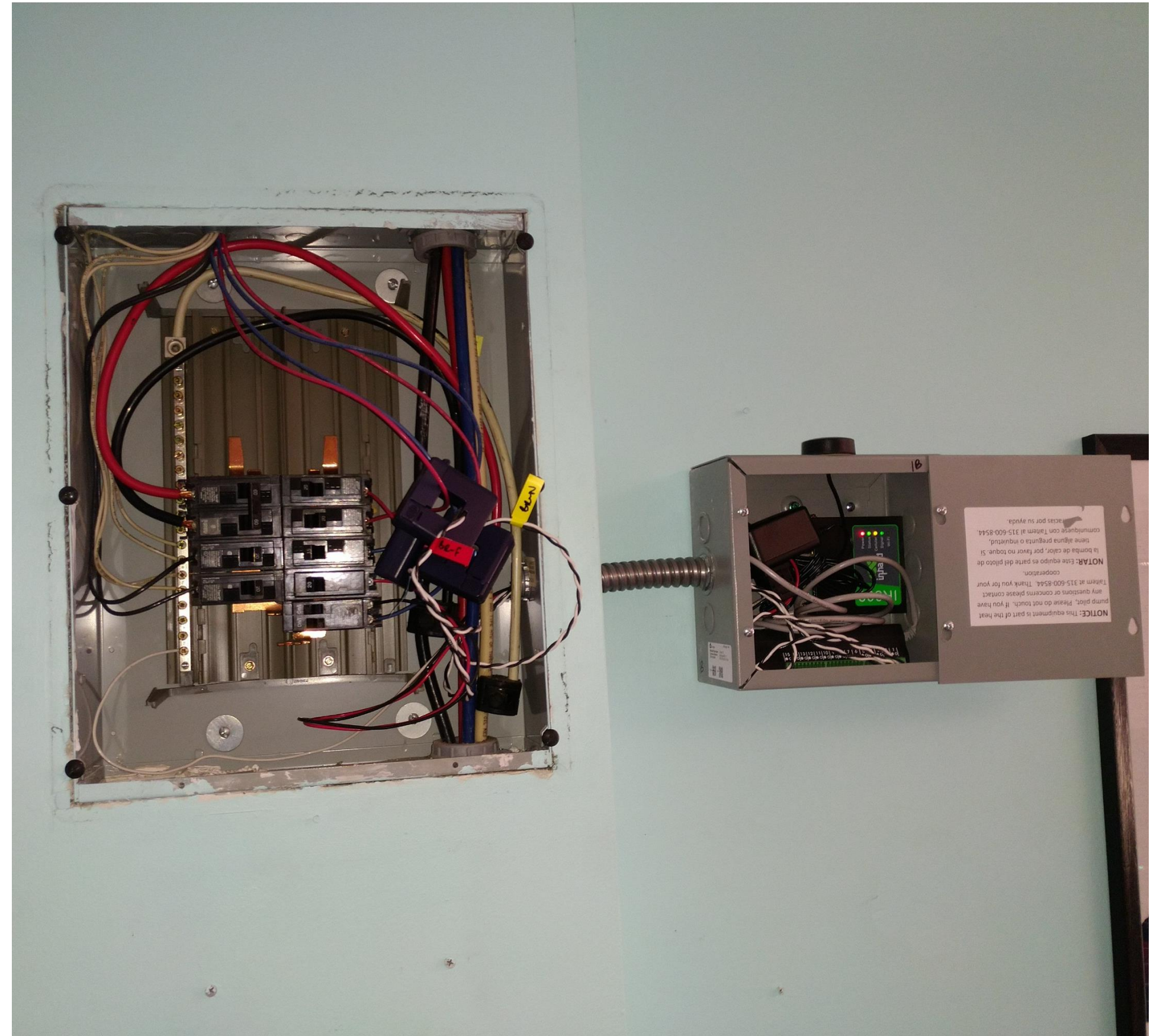
M&V Approach

M&V Plan

Power Monitoring

eGauge Energy Meters

- One per apartment
- Cell router provides internet connectivity



M&V Plan

Temperature Monitoring

Hobo MX Bluetooth Loggers

- No internet access
- Require biweekly readings from hallway
- Match loggers already deployed by NYCHA staff



M&V Plan

Installation/Operational Observations

Condensate Management

- Visual observations

Sound Measurement

- Inside and outside

Air Leakage

- Blower door testing apparatus





Revised Plan

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A More Active Approach

Initial Approach: Passive Observers

- One full year of data collection
- Final Analysis at the end
- Conflicted with manufacturer pilot timeline



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Revised Approach: Active Participants

- More commissioning focused approach
- Earlier/more frequent data analysis
- Intensive product testing
- Identify issues
- Collaborate on solutions
- Test solutions





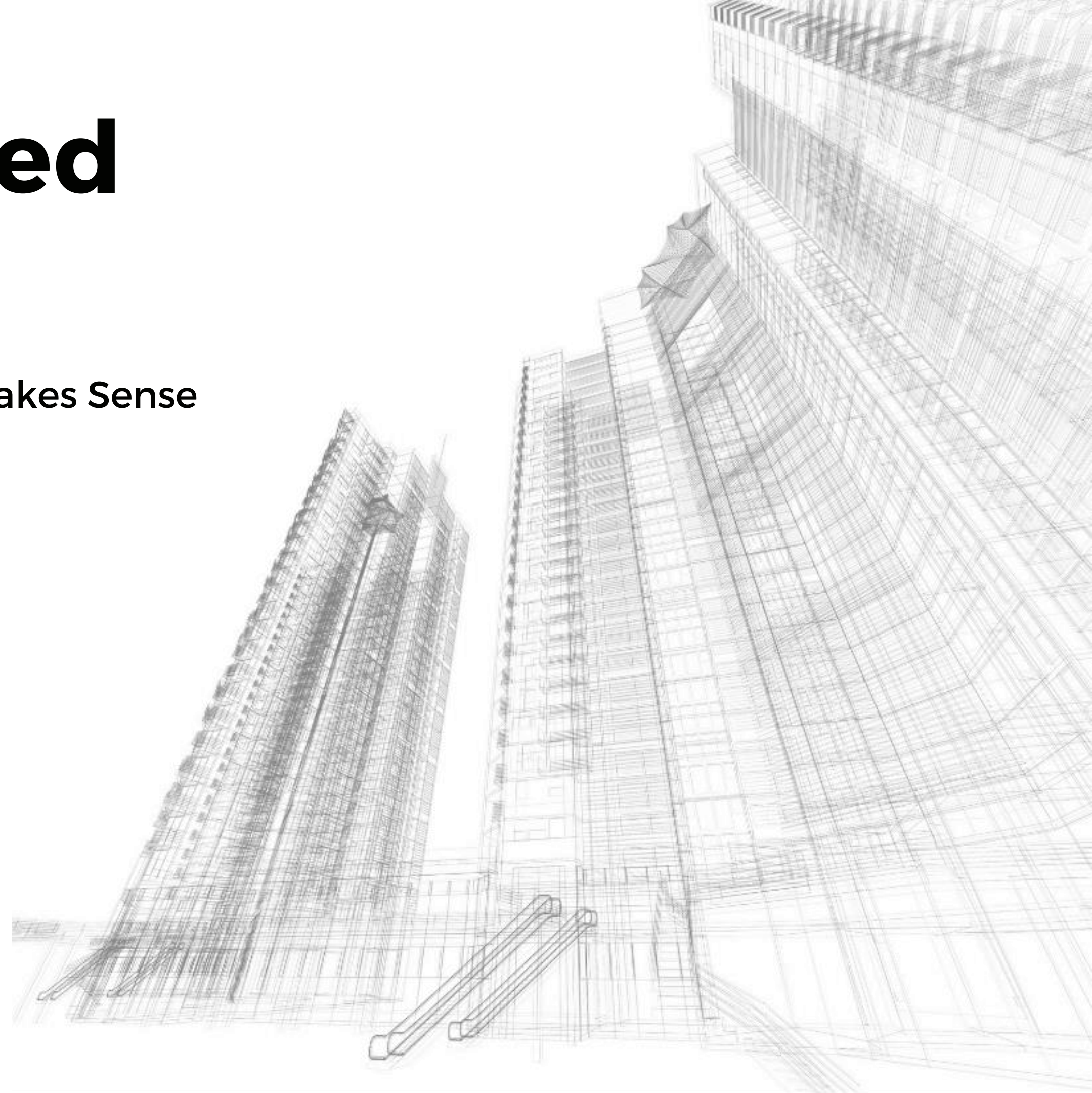
Lessons Learned

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Plan, Meet Reality

Measurement Based Commissioning Makes Sense

- For new product demonstrations



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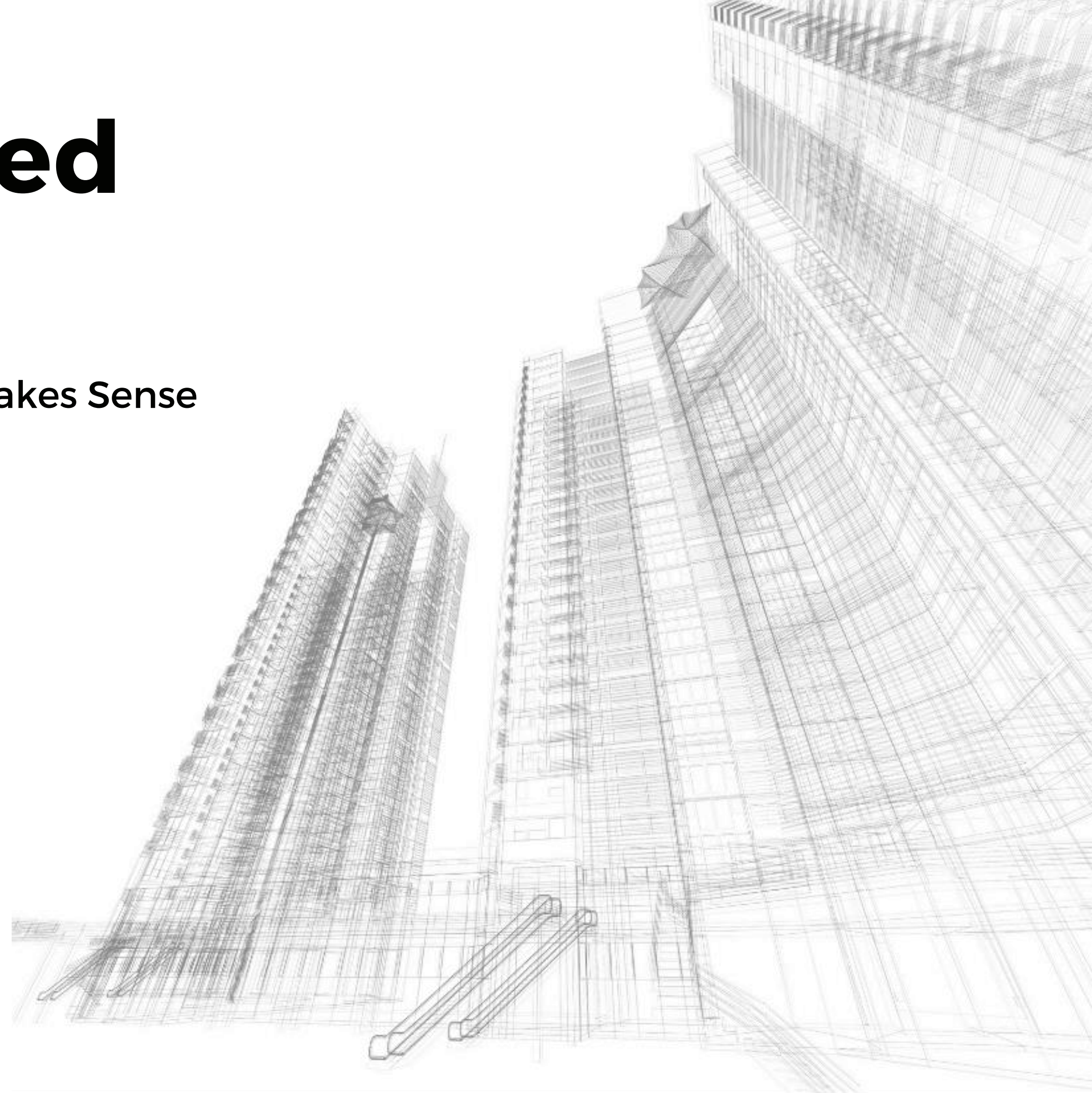
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- Data access still vulnerable to local situations



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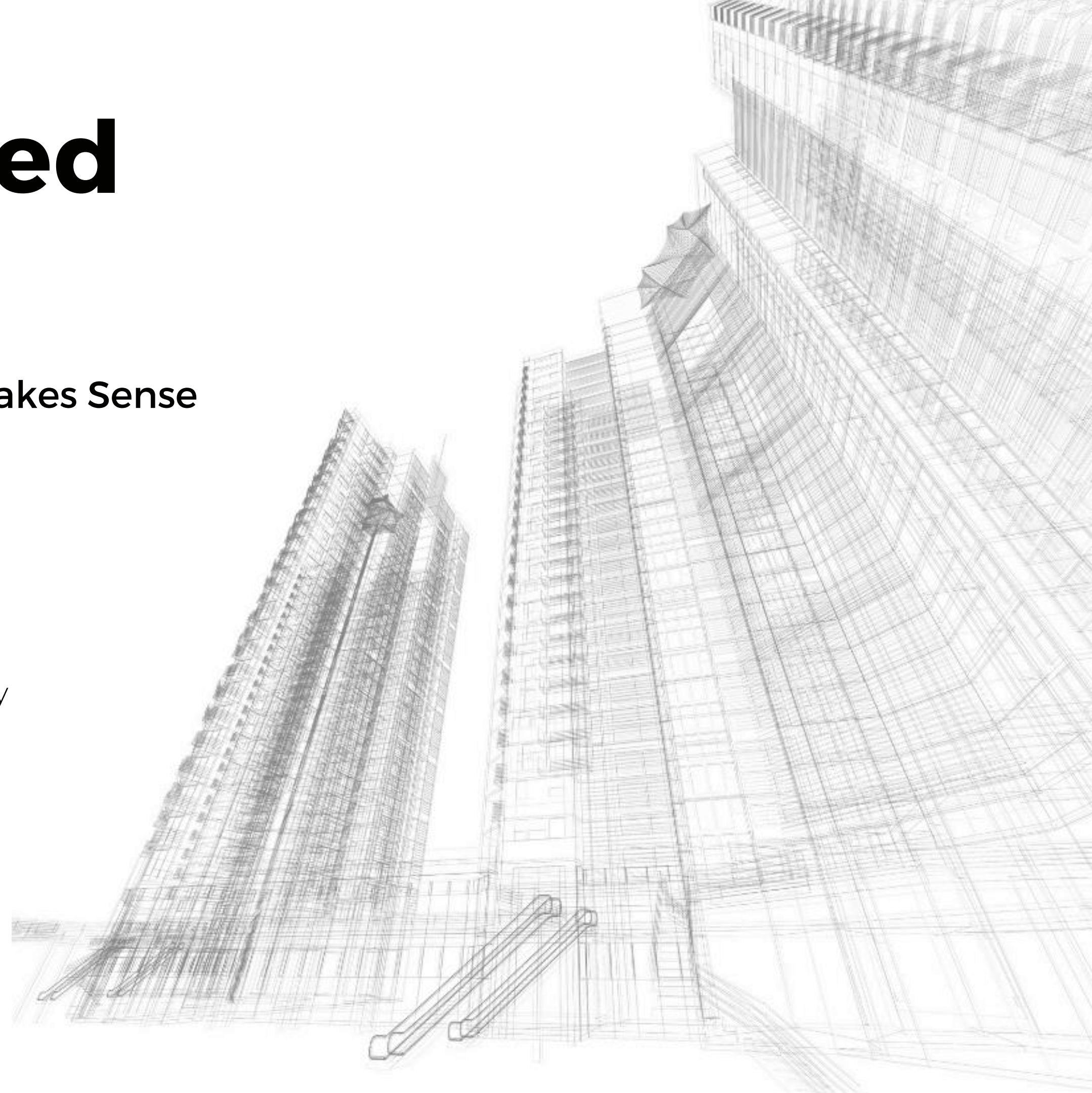
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Human Behavior is Unpredictable

- The way residents use the equipment varies widely



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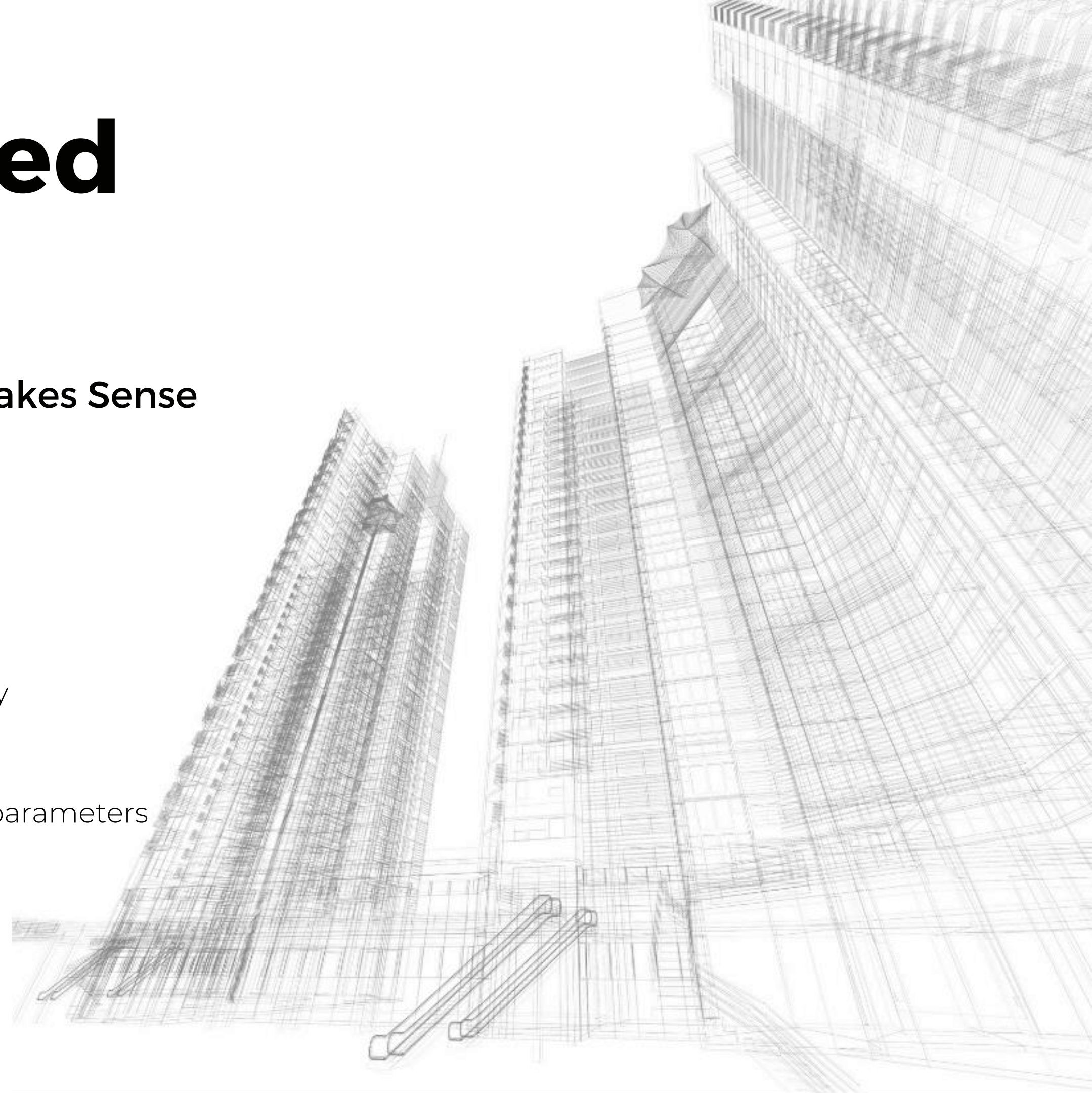
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- The way residents use the equipment varies widely

Obtainable Information is Limited

- It isn't practical or possible to observe all relevant parameters



Lessons Learned

Musings for the Future

Integration with Manufacturer Controls

- Lots of inputs and outputs are being managed by modern control boards
- Hoards of extremely useful data is potentially available for M&V
- Successful integration requires manufacturer support



Q&A

Taitem Engineering, Ithaca, New York

