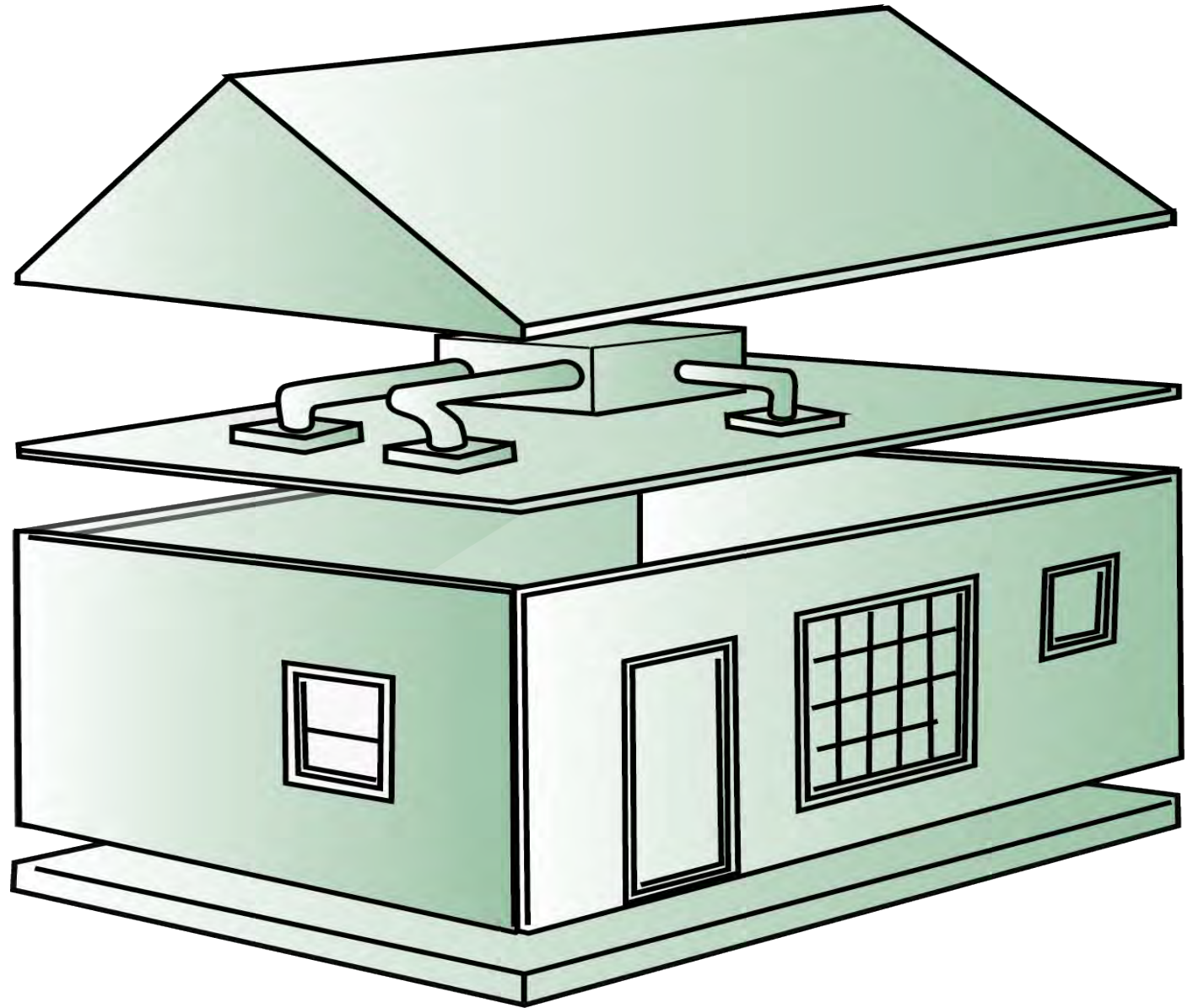


Where Home Performance Meets HVAC Design

David Richardson
National Comfort Institute
davidr@ncihvac.com

Adam Mufich
A-Team Heating & Air Conditioning

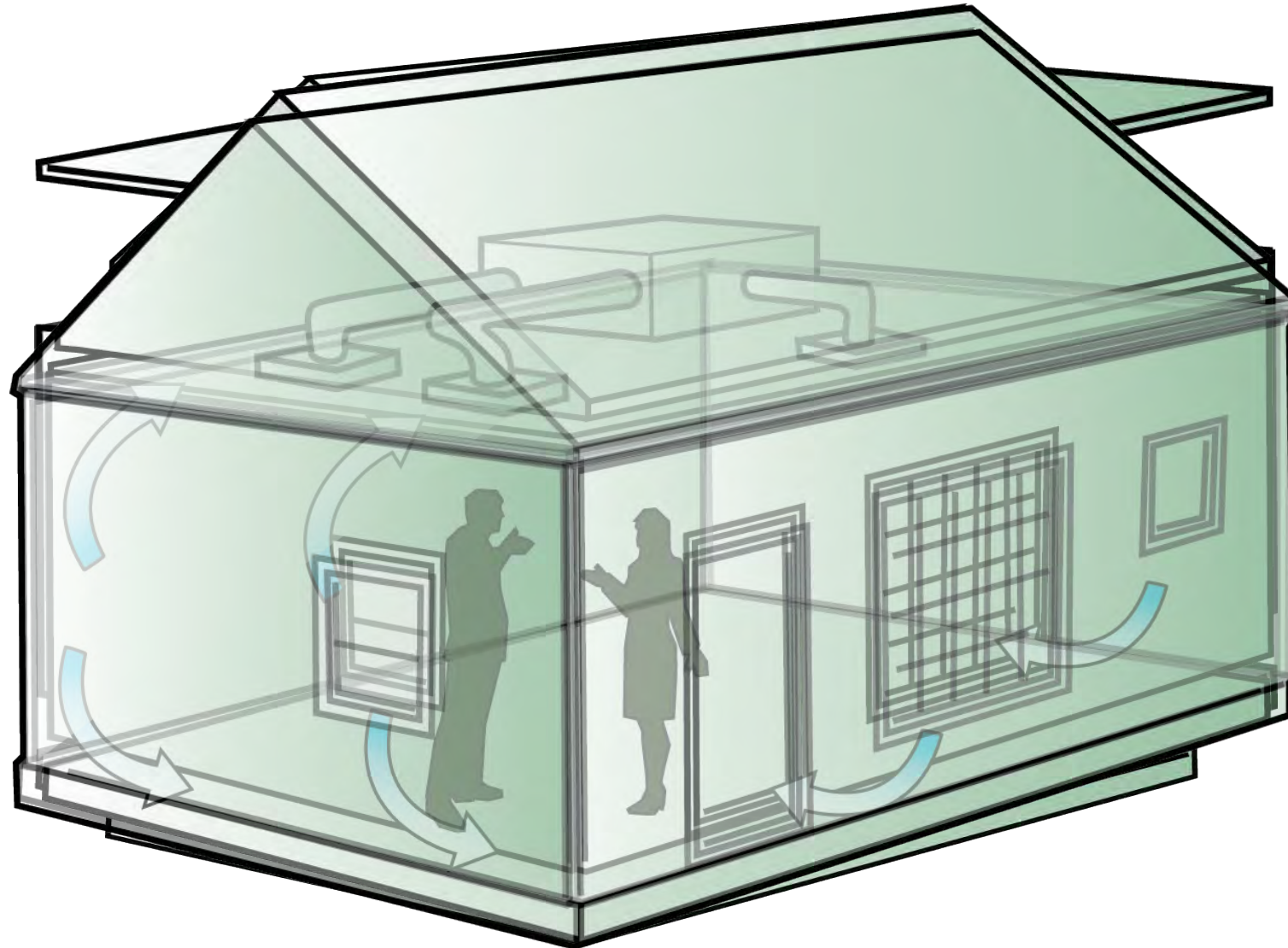
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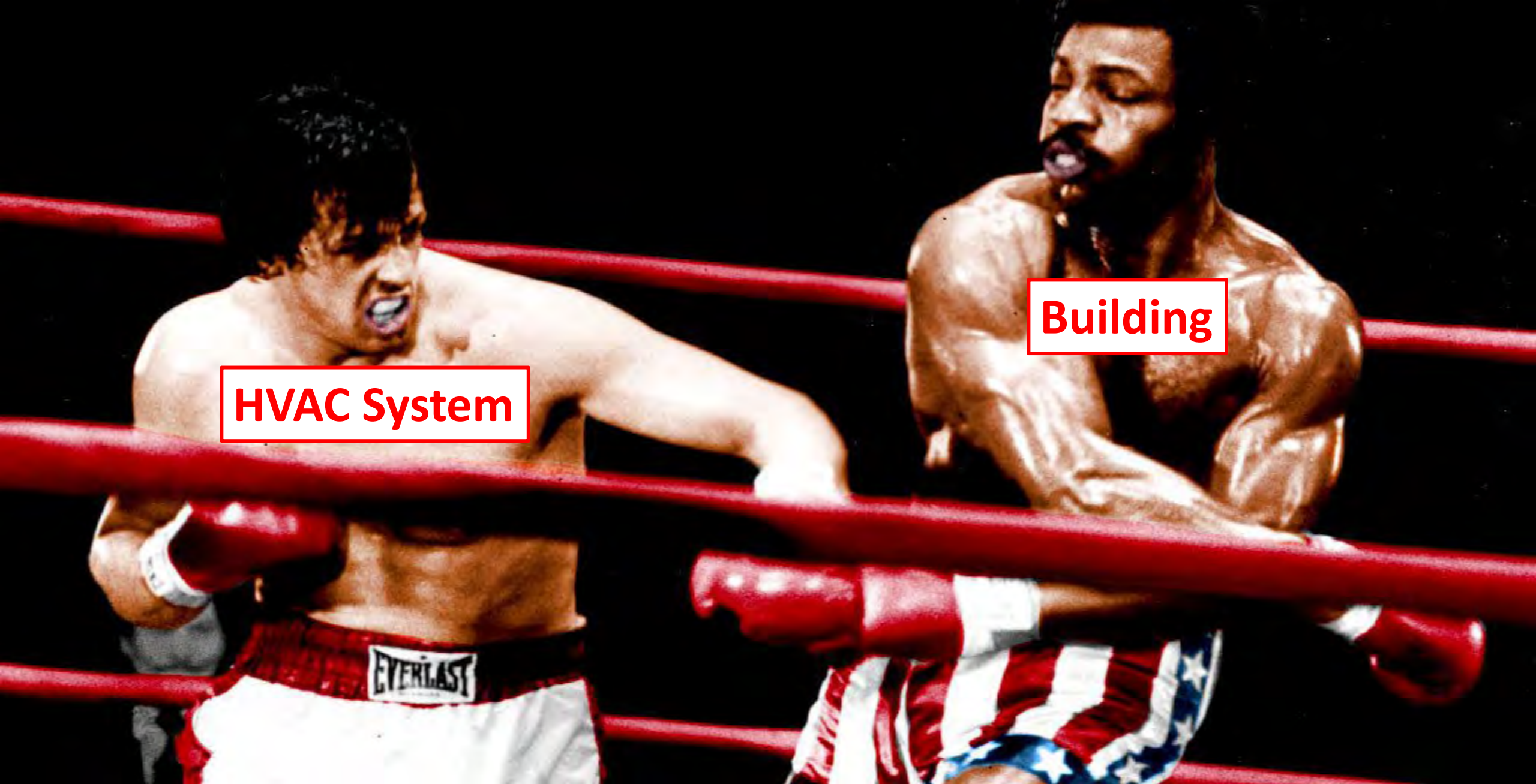
Preview

- **A Systems Approach Battle**
- **HVAC Performance Meets Home Performance – An Example**
- **A Different View of the HVAC and Building**
- **Review and Next Steps**

A Systems Approach



Where Home Performance Meets HVAC Design



HVAC System

Building

Unintended Casualties



Safety



Health



Comfort



Efficiency

thermal \ (1742) :

a: of, relating to, or caused by heat

**b: a state of matter dependent upon
temperature**

Merriam-Webster's

dissonance \ (1565) :

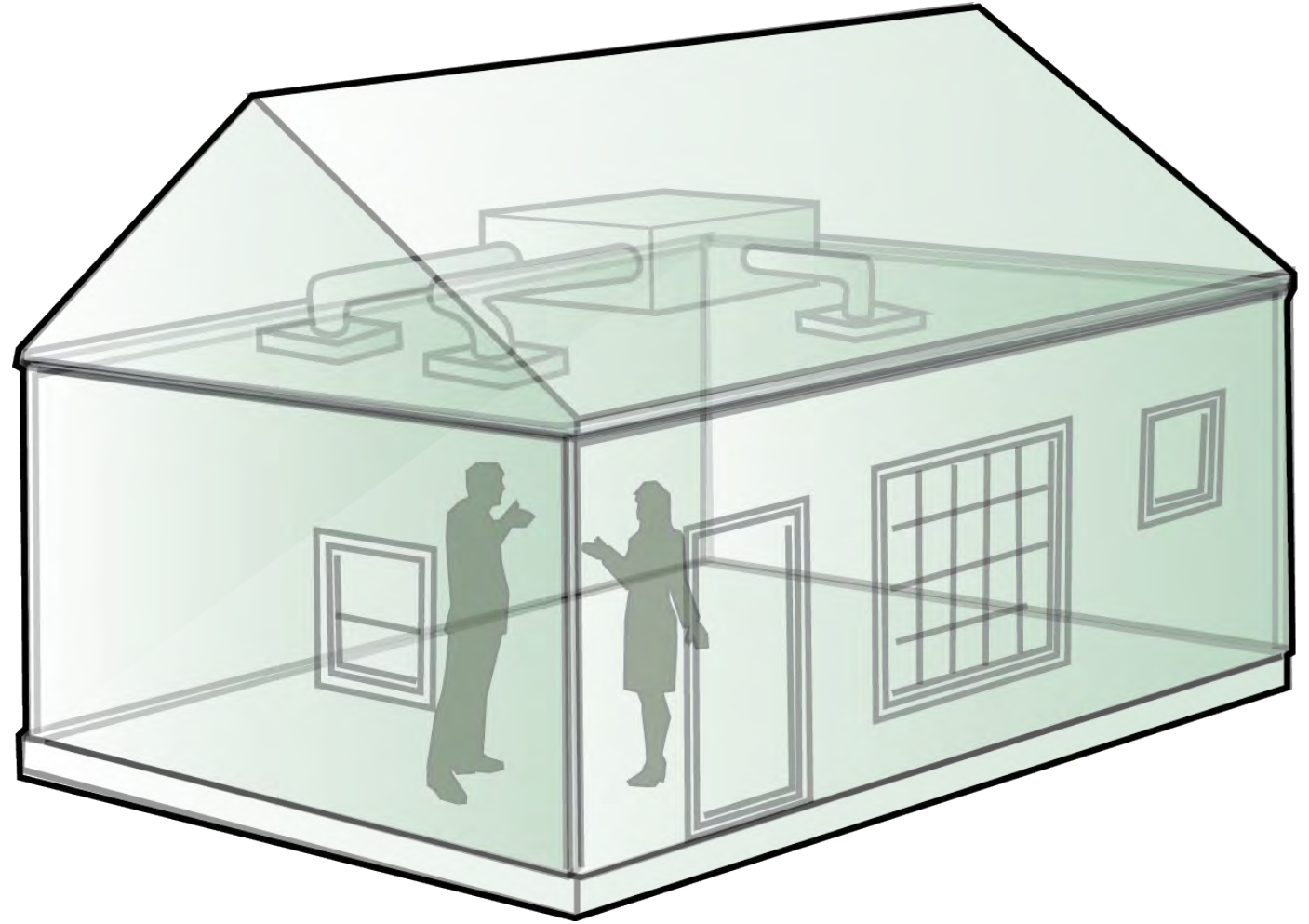
a: a lack of agreement

**b: an instance of inconsistency or
disagreement**

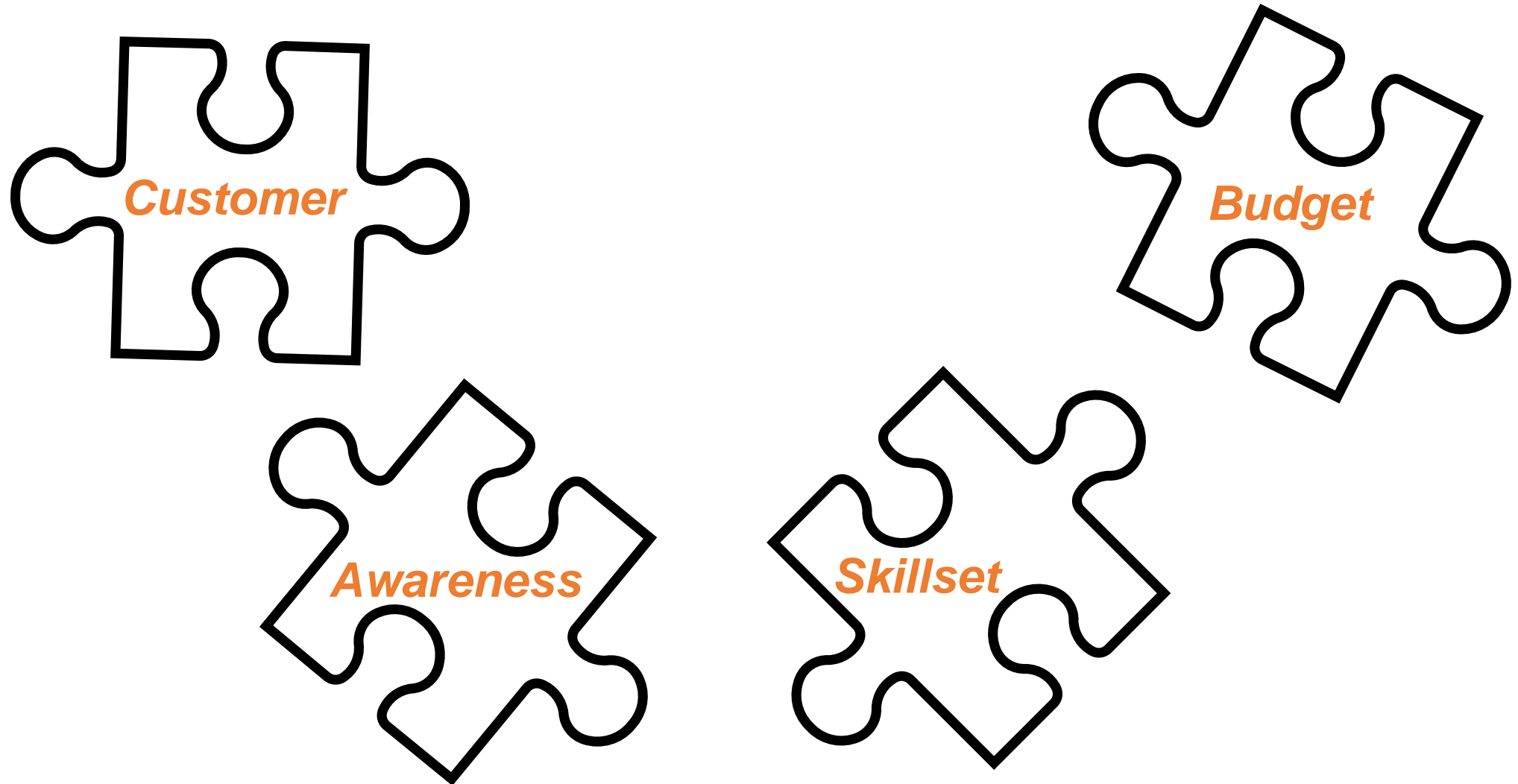
Merriam-Webster's

Thermal Dissonance

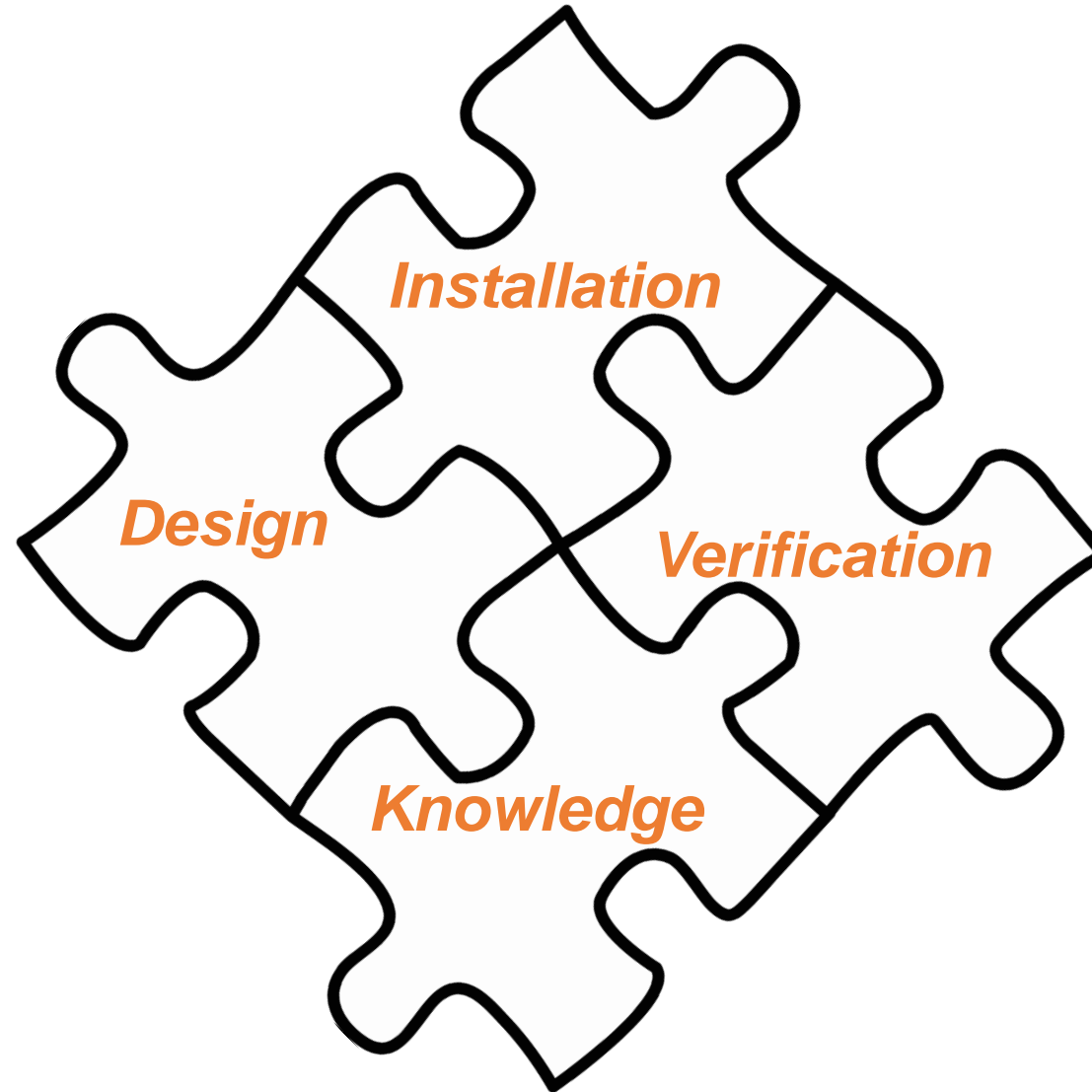
A conflict between systems in an as built environment.



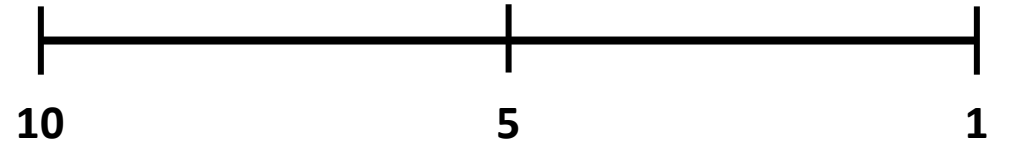
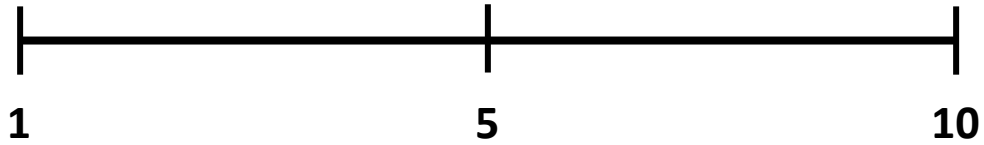
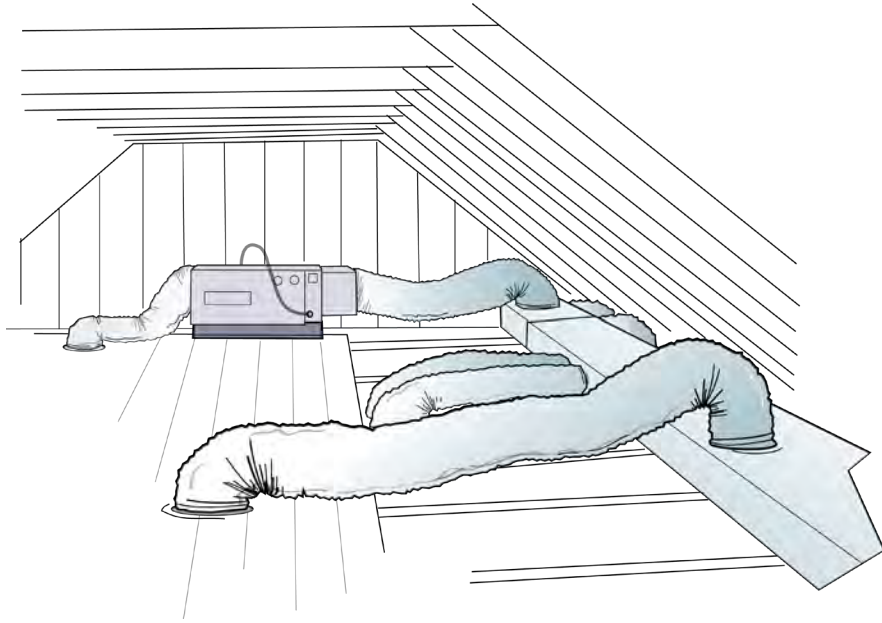
Thermal Dissonance Obstacles



Thermal Dissonance Factors



The Thermal Dissonance Scale



William G. Barfield



Built in 1902

Where Home Performance Meets HVAC Design

What Is A Passive House?

- Building Standard
- Energy Efficient
- Quality Construction
- Thoughtful Design
- Comfortable
- Sustainable



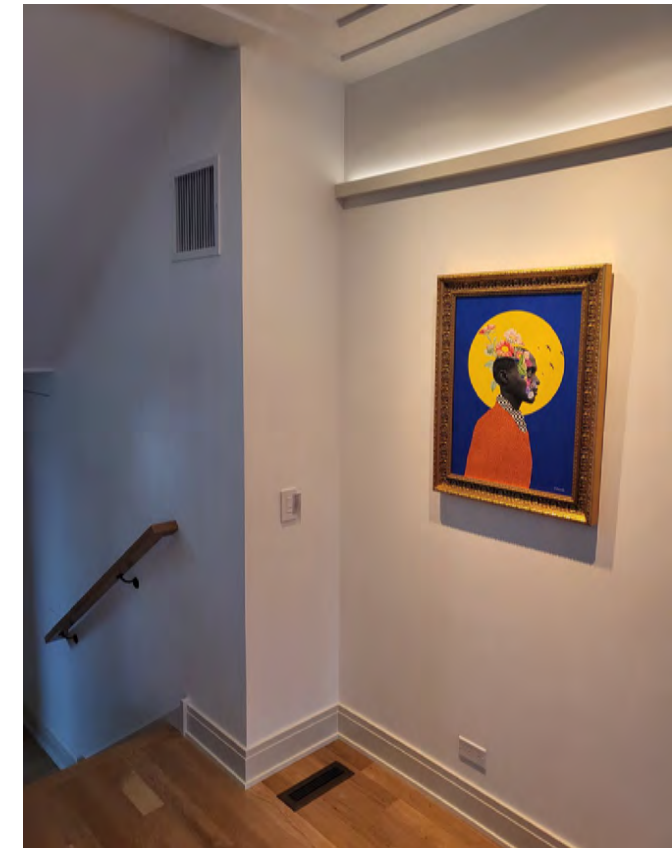
HVAC Design

- Heat Loss/Gain (Manual J)
- Equipment Selection (Manual S)
- Air Distribution/Grille Selection (Manual T)
- Duct Layout/Sizing (Manual D)



Anthony Amadio – www.PEloadcalcs.com

HVAC Design



Kitchen Exhaust



1.65 CFM Leakage @ 50 Pa

Duct Tightness



BEFORE SERVICE

343.4 CFM of Leakage, equivalent to a
64.9 Square Inch Hole or
34% of the system capacity of 1000.0 CFM

AFTER SERVICE

9.7 CFM of Leakage, equivalent to a
1.8 Square Inch Hole or
0.97% of system capacity

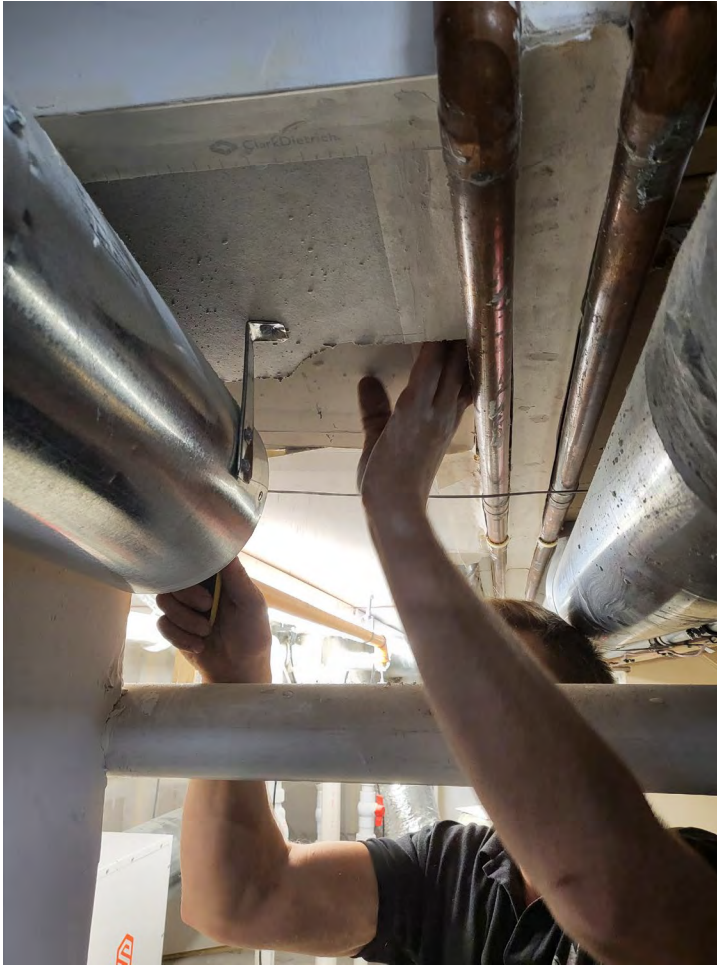
Air Balancing



Commissioning



Air Sealing



Manual D

"There is a uniform sensation of comfort for the entire living space, when the temperature difference between any two rooms is 2°F or less. However, for most architecture it is difficult, if not **IMPOSSIBLE**, to satisfy this requirement with a single-zone air distribution system"

Outside

21:40, Jan 14

-2.1 °F 65.0 %

Basement

21:48, Jan 14

69.5 °F 46.5 %

1st Floor

21:56, Jan 14

70.6 °F 44.2 %

2nd Floor

21:49, Jan 14

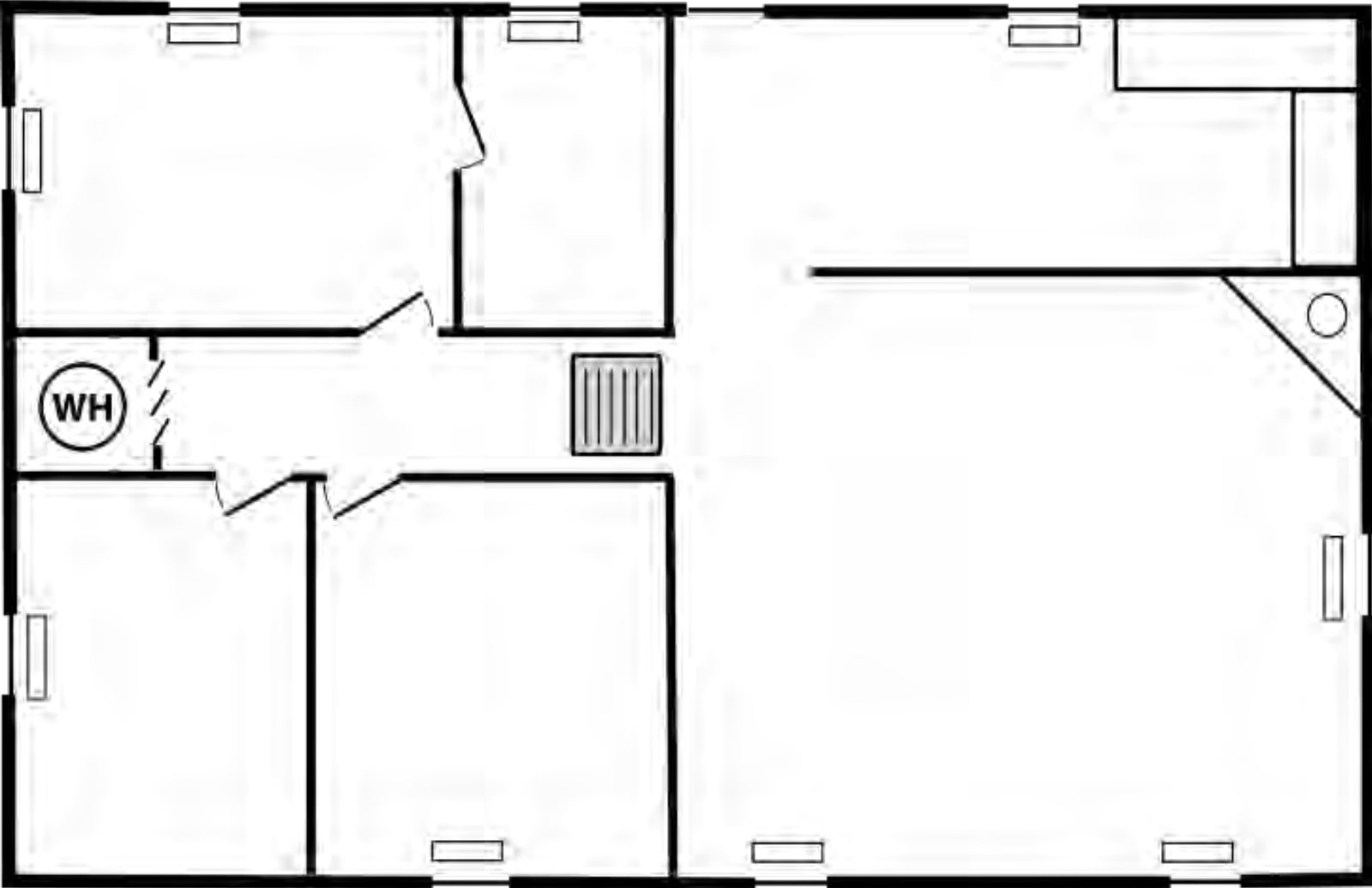
71.0 °F 46.3 %

3rd Floor

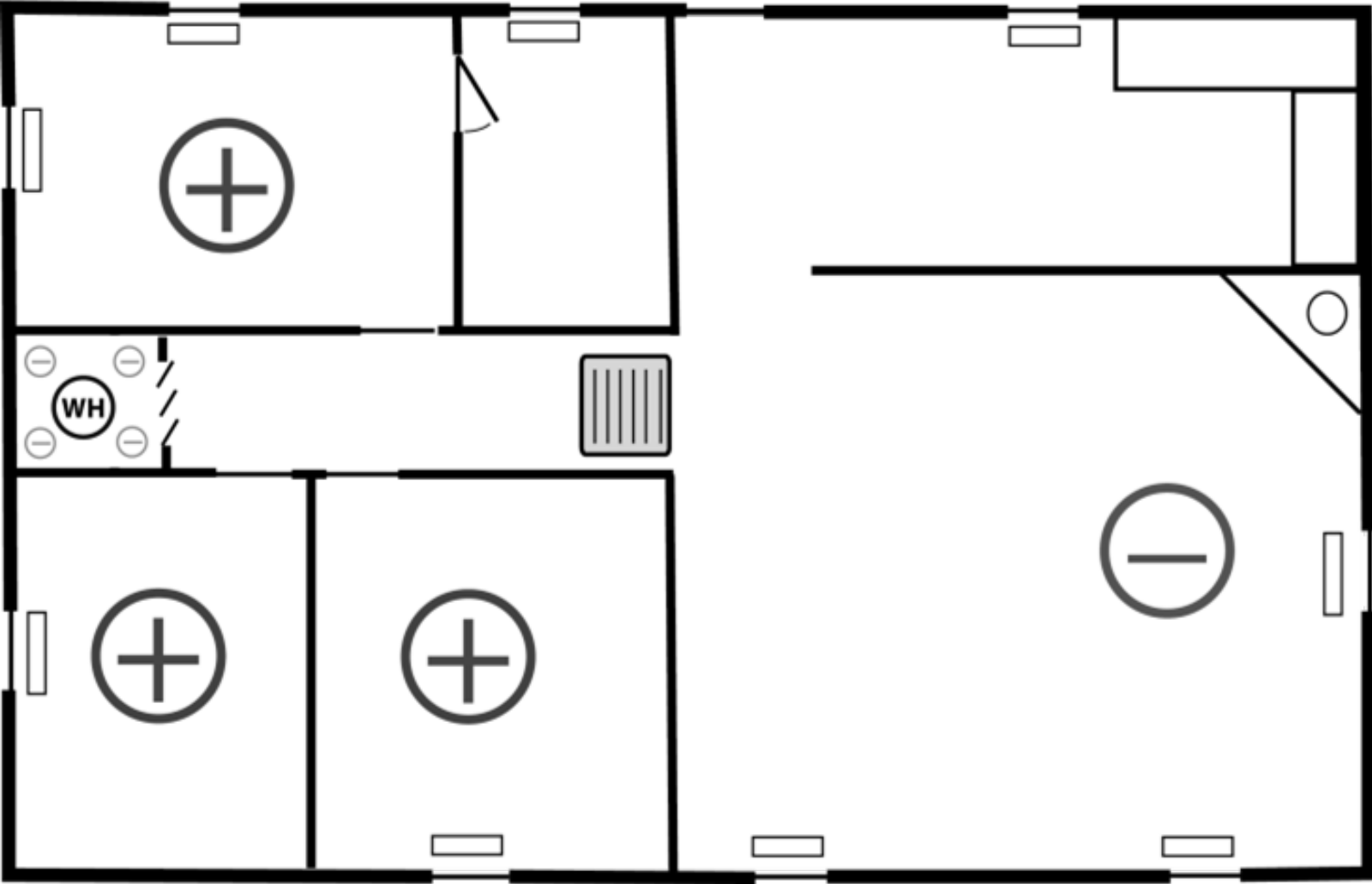
21:44, Jan 14

71.5 °F 44.2 %

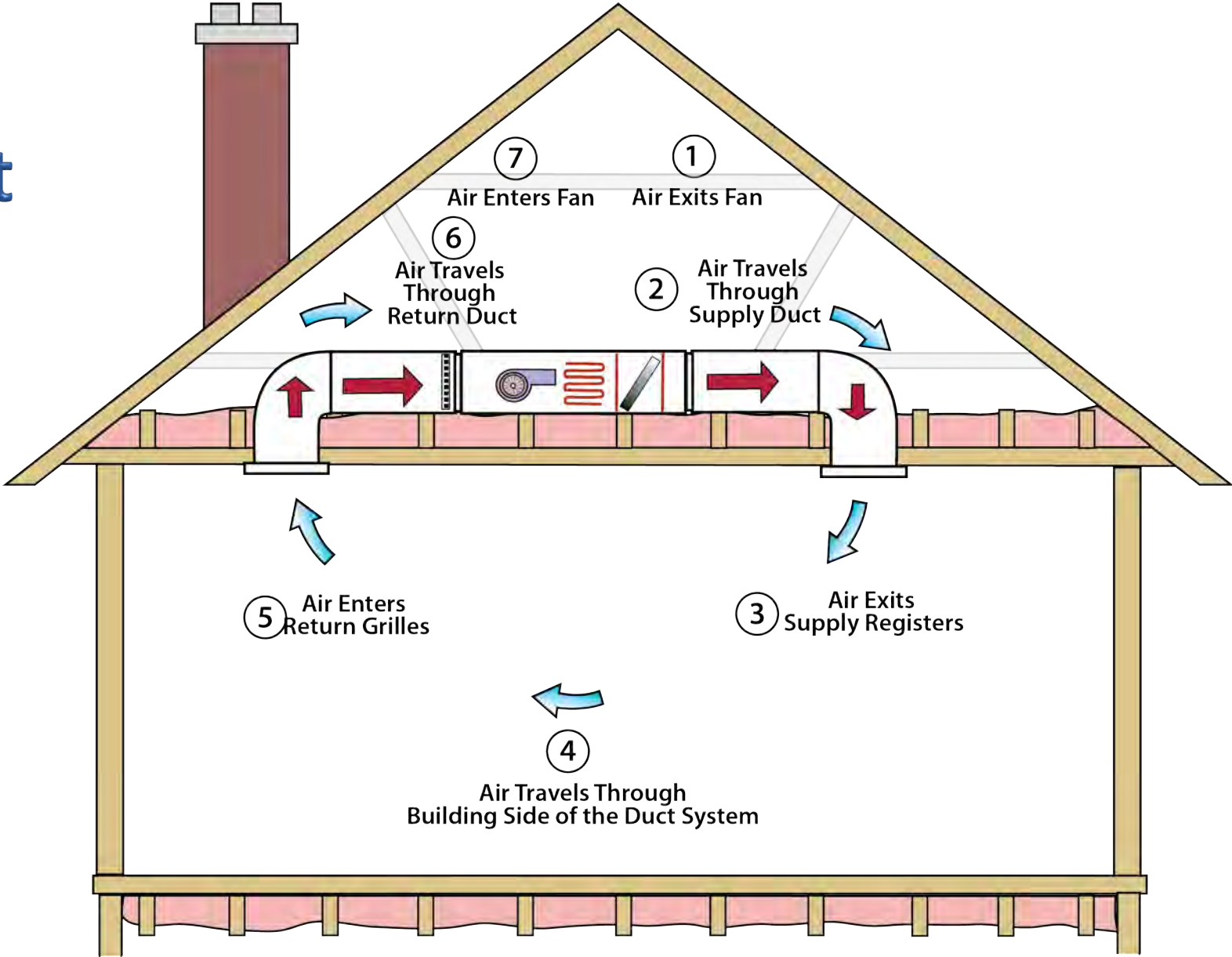
A Different View of the HVAC and Building



A Different View of the HVAC and Building

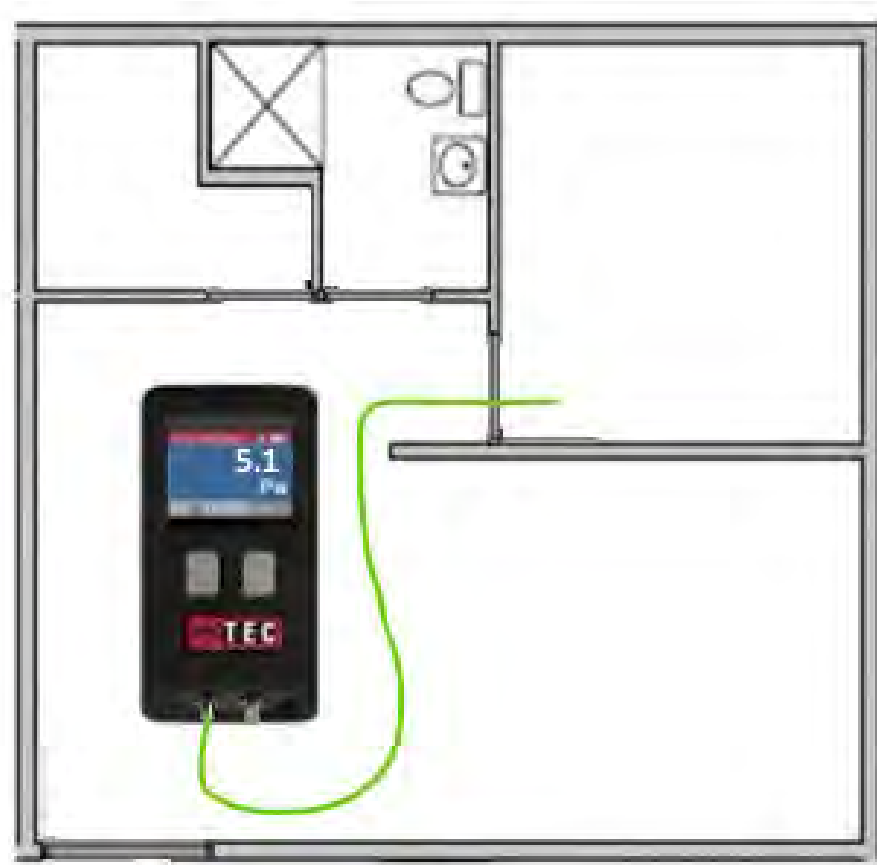


Two Different Ducts

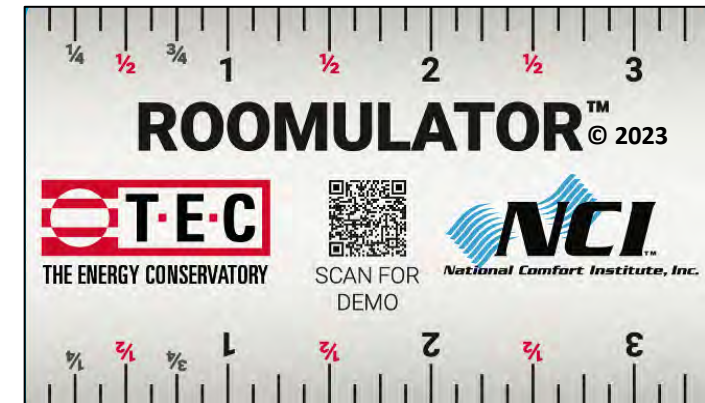
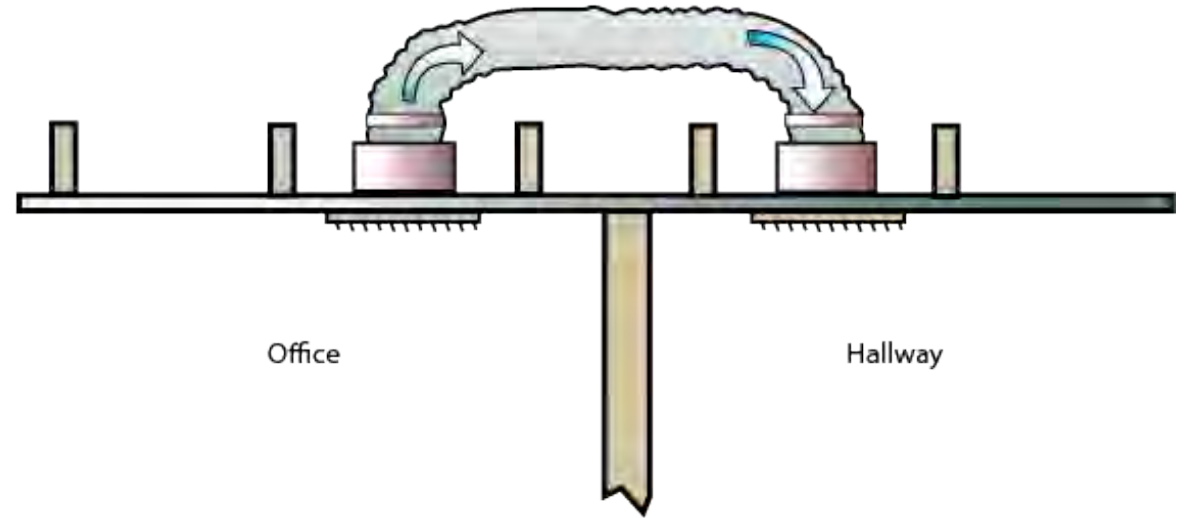


Where Home Performance Meets HVAC Design

Measure Room “Static Pressure”



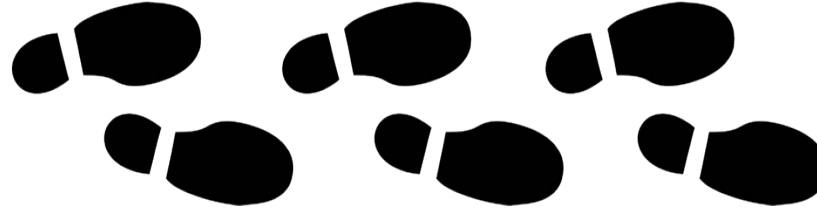
Size Passive Return Air



Preview

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Next Steps



1. Figure out why you should combine HVAC and Home Performance.
2. Purchase any needed test instruments you may not currently own.
3. Practice by testing and diagnosing your home or office.
4. Teach others as you learn.
5. Add room pressure testing to your service calls and installs.
6. Advance your testing skills beyond room pressure.
7. Become known as the “specialists” in your community.

About NCI

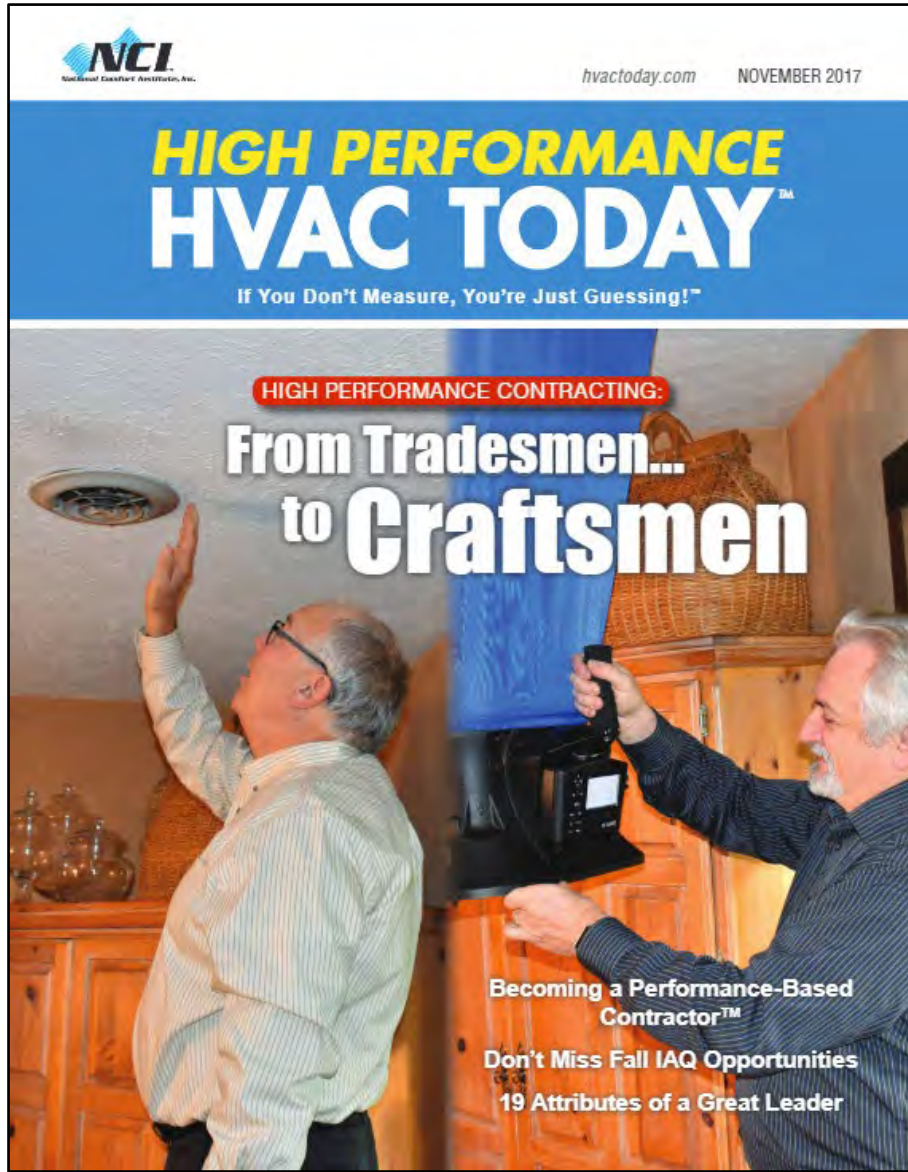
Currently we train over 3,000 industry professionals each year and have certified over 50,000 people since our beginning in 1993.

In addition to innovative business and technical training, we offer memberships with distinctive member benefits.

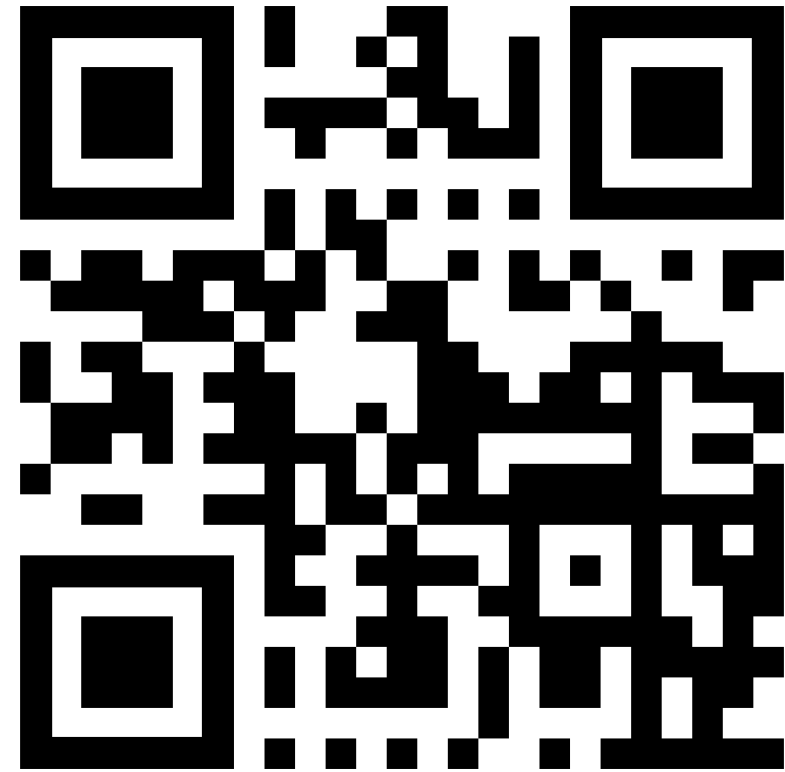
With a dedicated staff nearly 30 strong, NCI wants to continue to be a resource supporting your ongoing learning and business success.



www.nationalcomfortinstitute.com



**FREE
SUBSCRIPTION**



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