

2019 AHR Expo Findings & Commercial HVAC Research





Goals for Attending AHR

- Identify key trends in commercial HVAC from the manufacturer perspective
 - Where is the market changing?
 - What is driving market change?
 - Where are momentum savings opportunities?
- Identify best opportunities to segment market for BPA momentum savings modeling purposes



Methodology



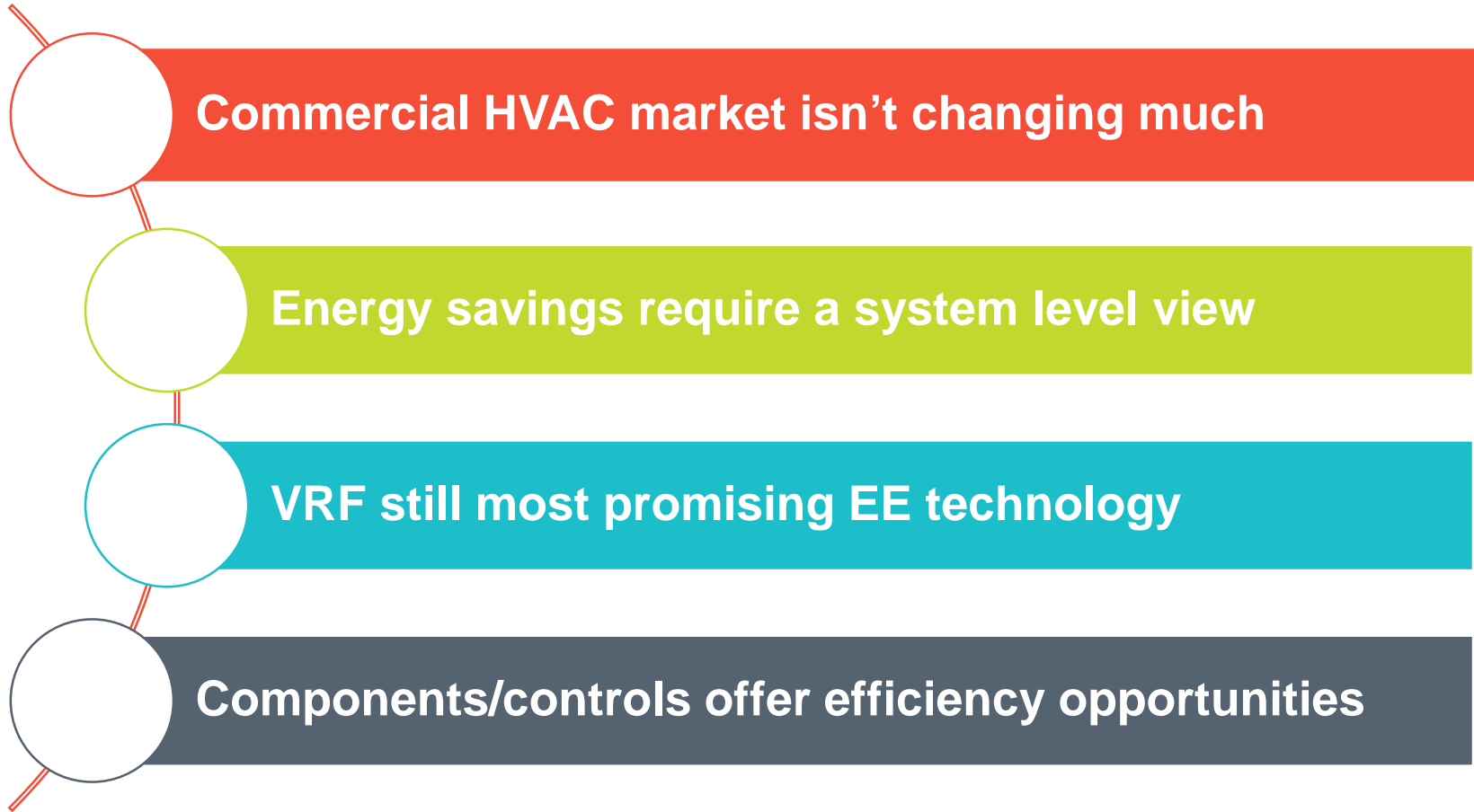
Important Reminder

- Findings are based on statements from manufacturers interviewed at the AHR Expo
- Any numbers and percentages presented are anecdotal, unless otherwise cited.

Key Findings



Four Key Finding Areas





A (Mostly) Stagnant Market



Commercial HVAC market isn't changing



Energy savings require a system level view



VRF still most promising EE technology



Components/controls offer efficiency opportunities



Limited Market Change



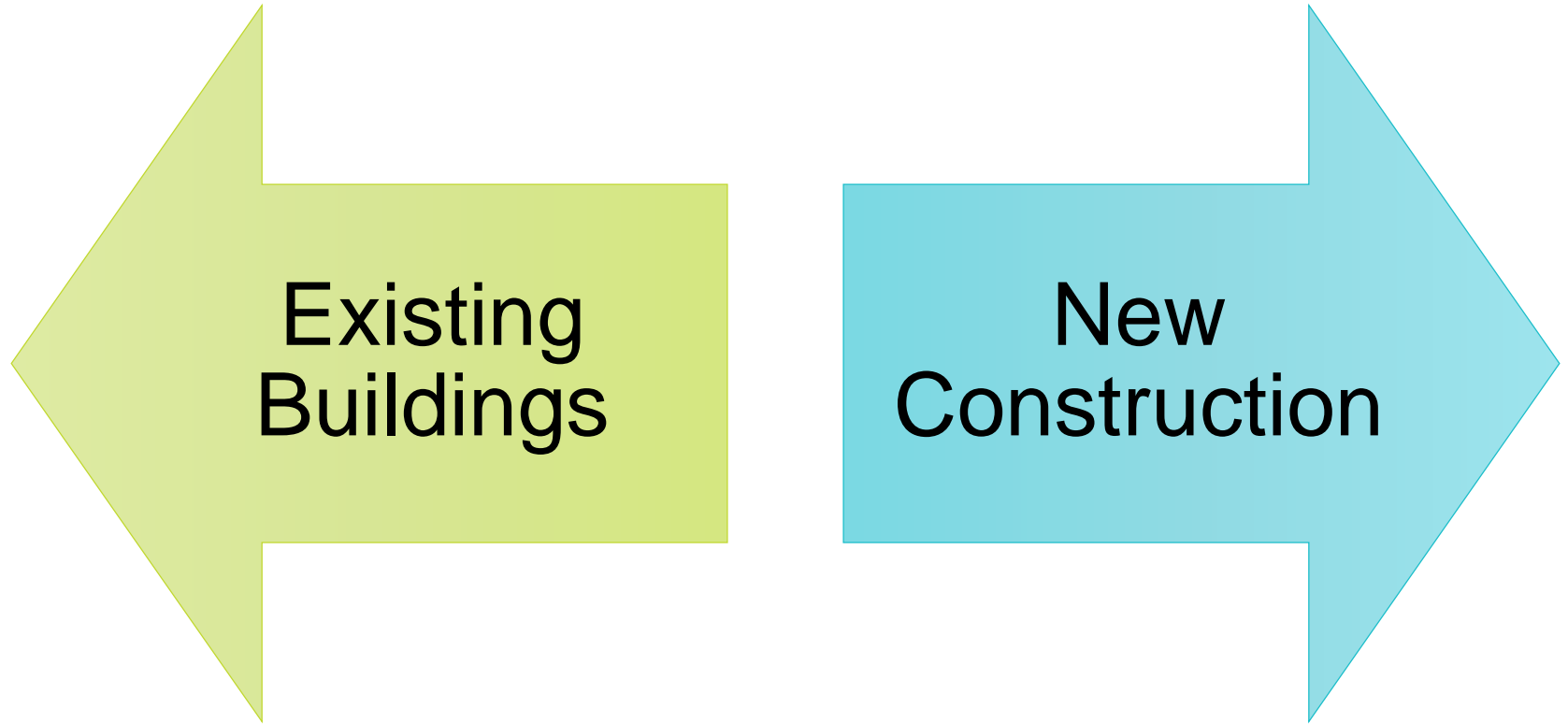
Unitary Isn't Going Away

- Dominating existing and NC markets
 - 35% in existing buildings (CBSA)
 - ~30–35% in new construction sales
- Gas/electric (~80%); HPs (~20%)





Really Two Separate Markets





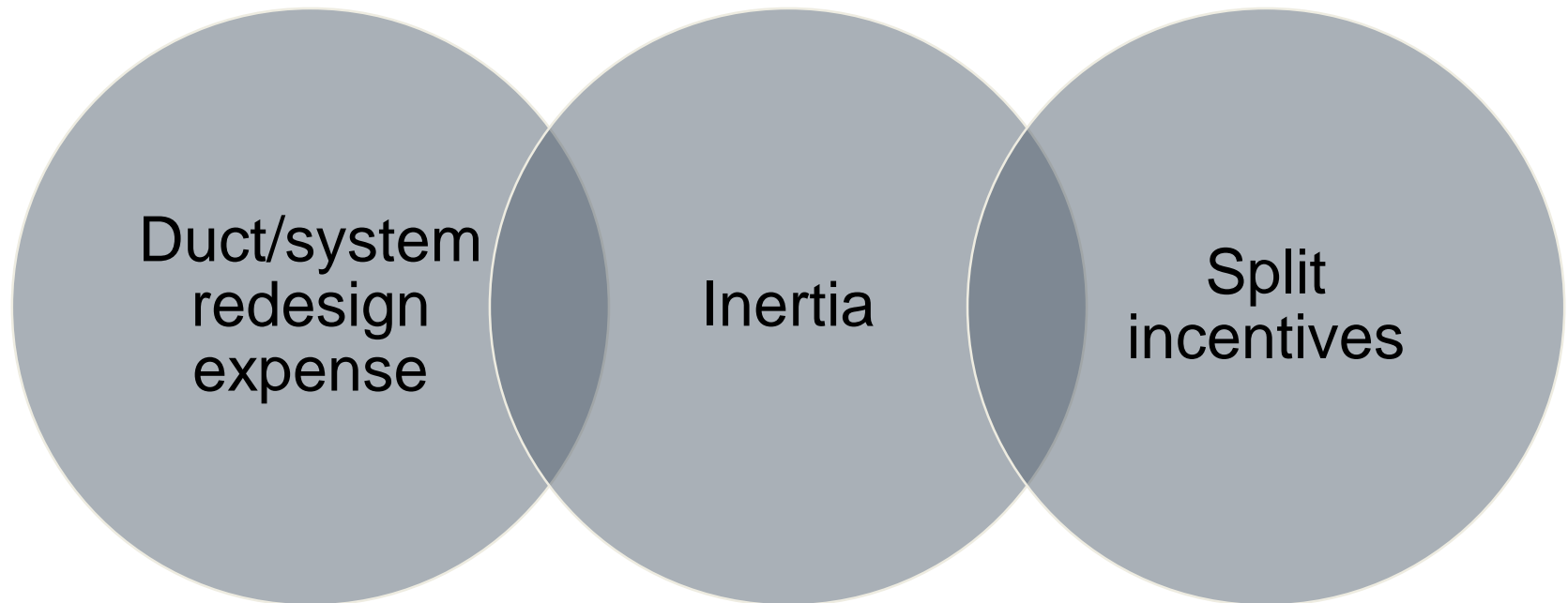
Existing Market is Stagnant

- The existing buildings market makes up 60–70% of the total market
- Manufacturers reported that from 40% up to 85% of replacements are like-for-like

“Manufacturers are mostly focused on designing drop-in replacements for each others’ units”



Why Isn't it Changing?

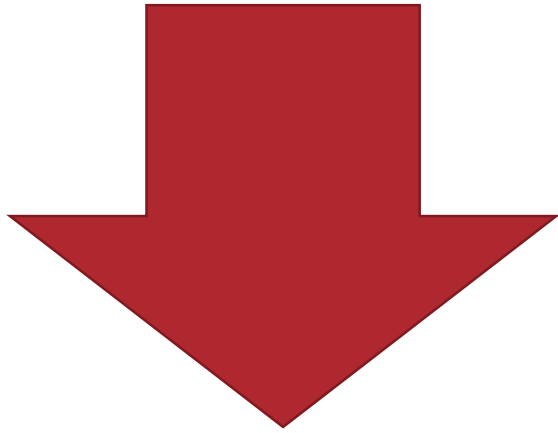




New Construction Market Better... But Not Changing



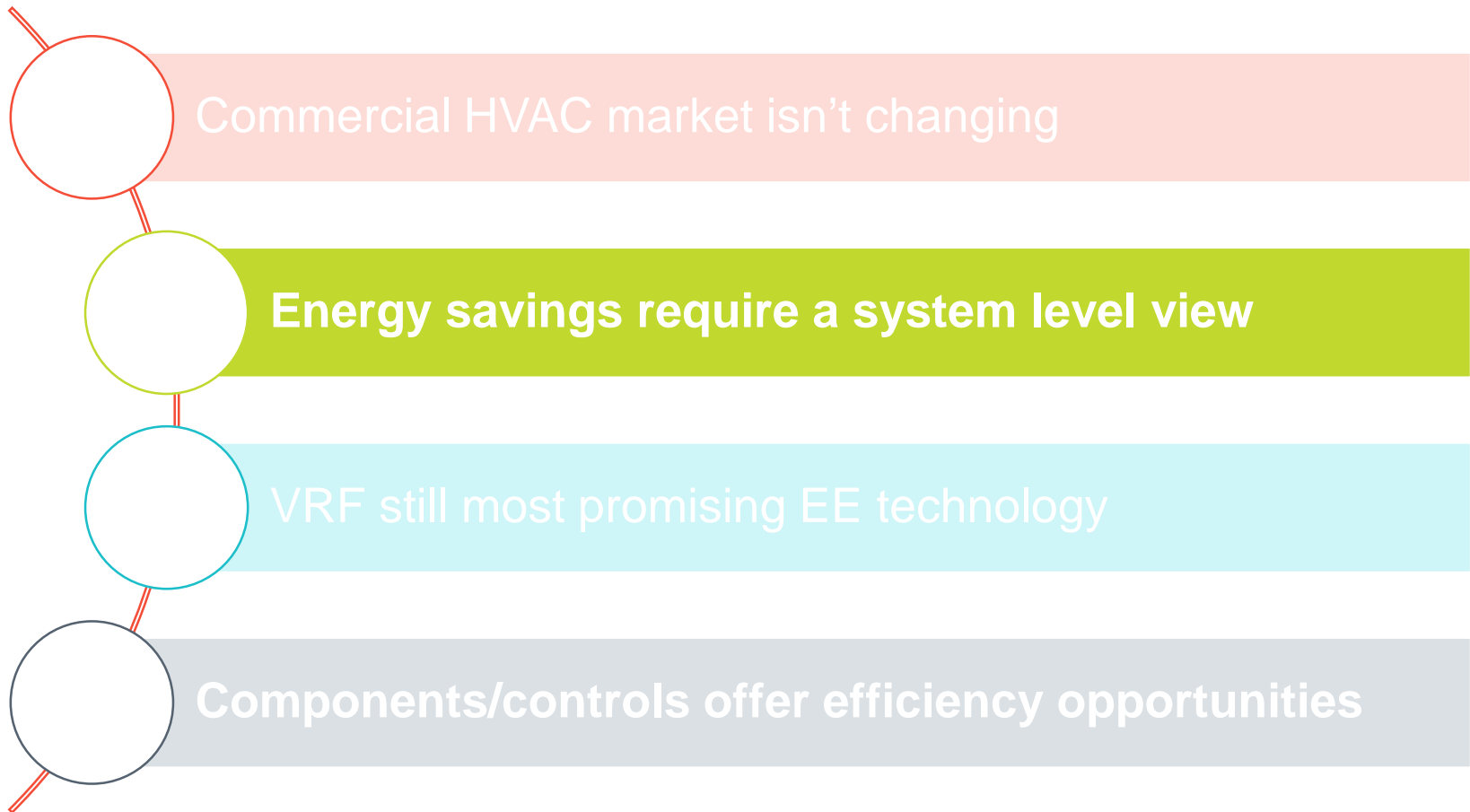
Design around efficiency
Codes drive building
improvements



Trend towards bigger
buildings could offset
trends in efficiency

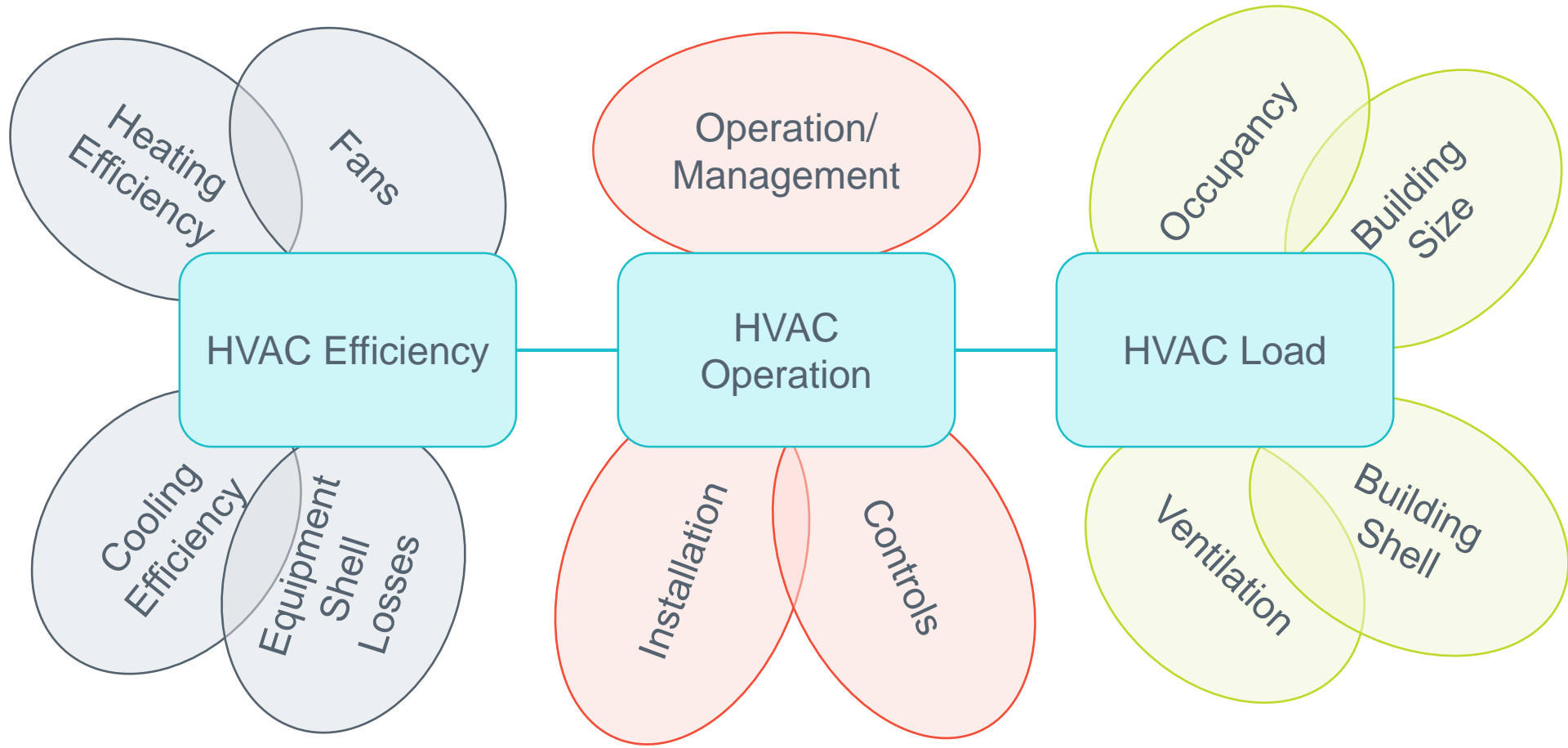


Where is There Energy Savings Potential?





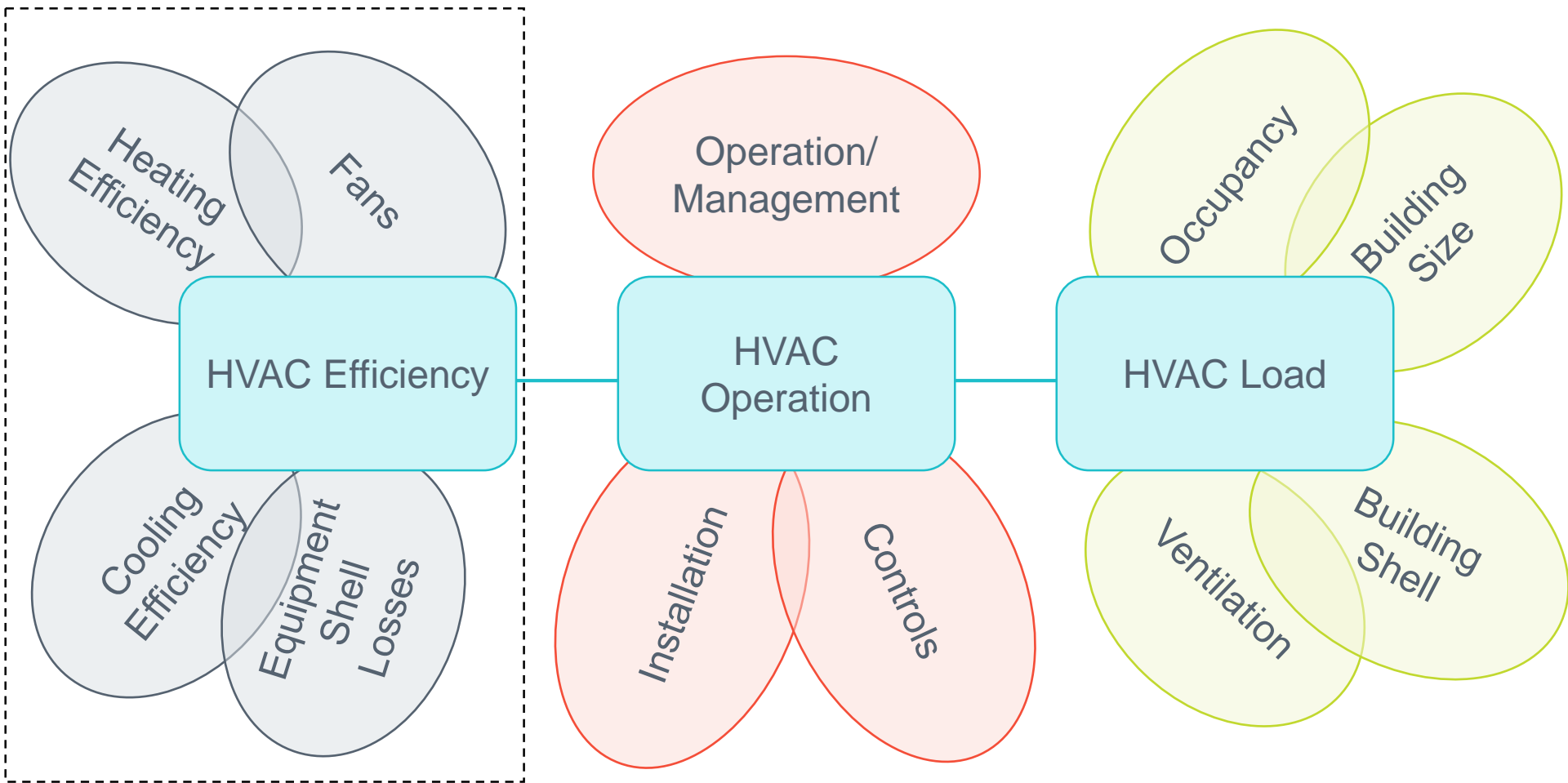
Drivers of Energy Consumption



Not an exhaustive list



Look First at HVAC Efficiency



Not an exhaustive list



Two Ways to Consider Efficiency

Floor

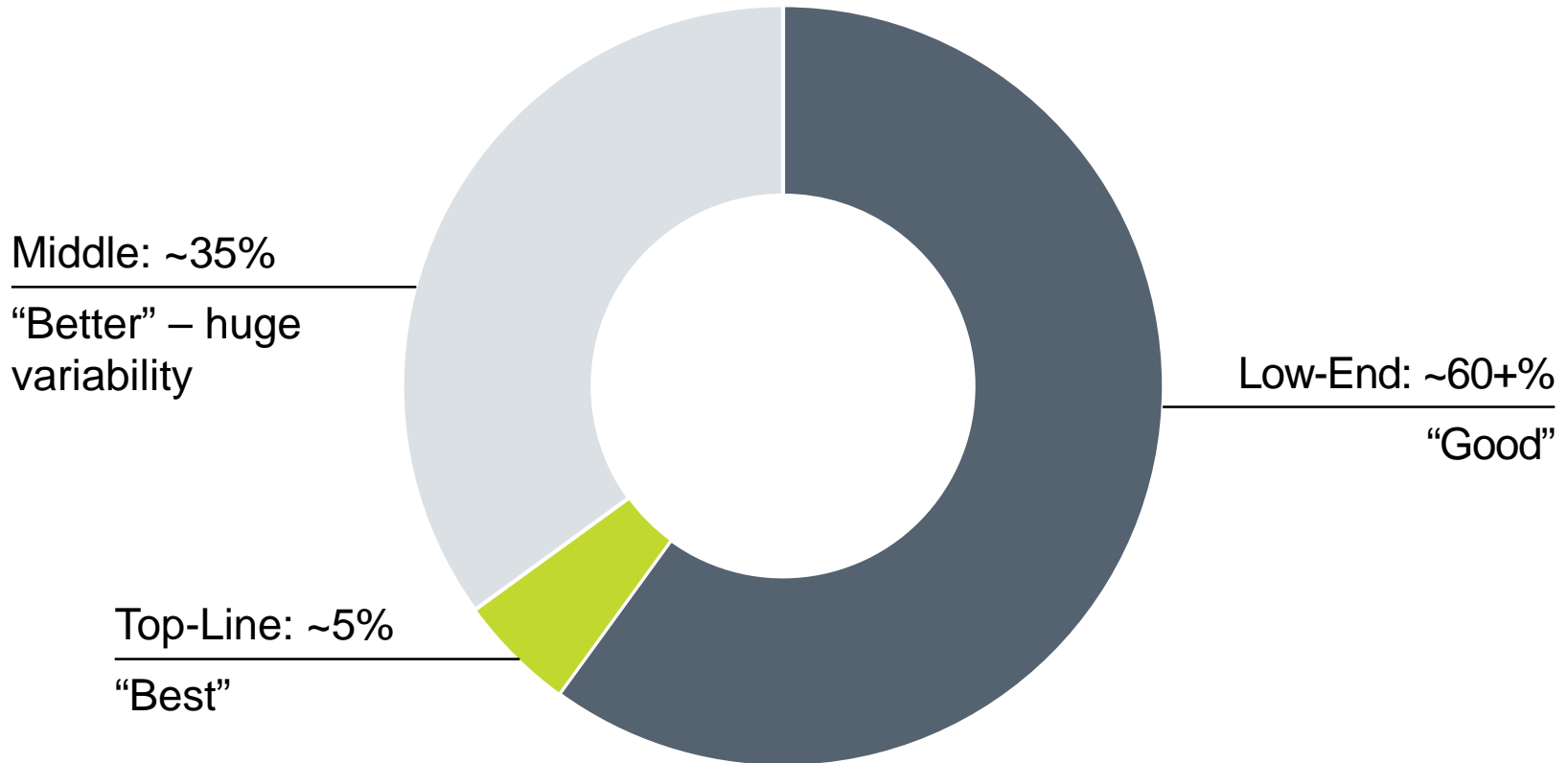
- Driven by: Federal efficiency standard
- Motivation: Minimizing cost of system re-design
- Market share: ~60+%

Ceiling

- Driven by: Competition
- Motivation: Improving brand reputation, appearing innovative/high end
- Market share: ~5%

 Potential opportunity to push existing stock towards high-end

Most Equipment Sales are Low-End





Standards Drive Low-End



Competition Drives High-End, but Uptake is Limited

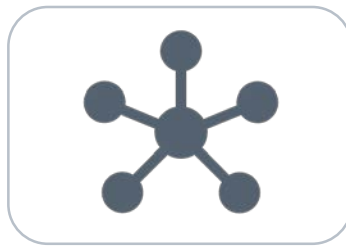


Manufacturers See Limited Efficiency Opportunities

- Manufacturers believe they are reaching the ceiling on equipment efficiency
 - Consistent with findings from the 2018 AHR Expo
- Future improvements will come from:



Operation



**System
Design**

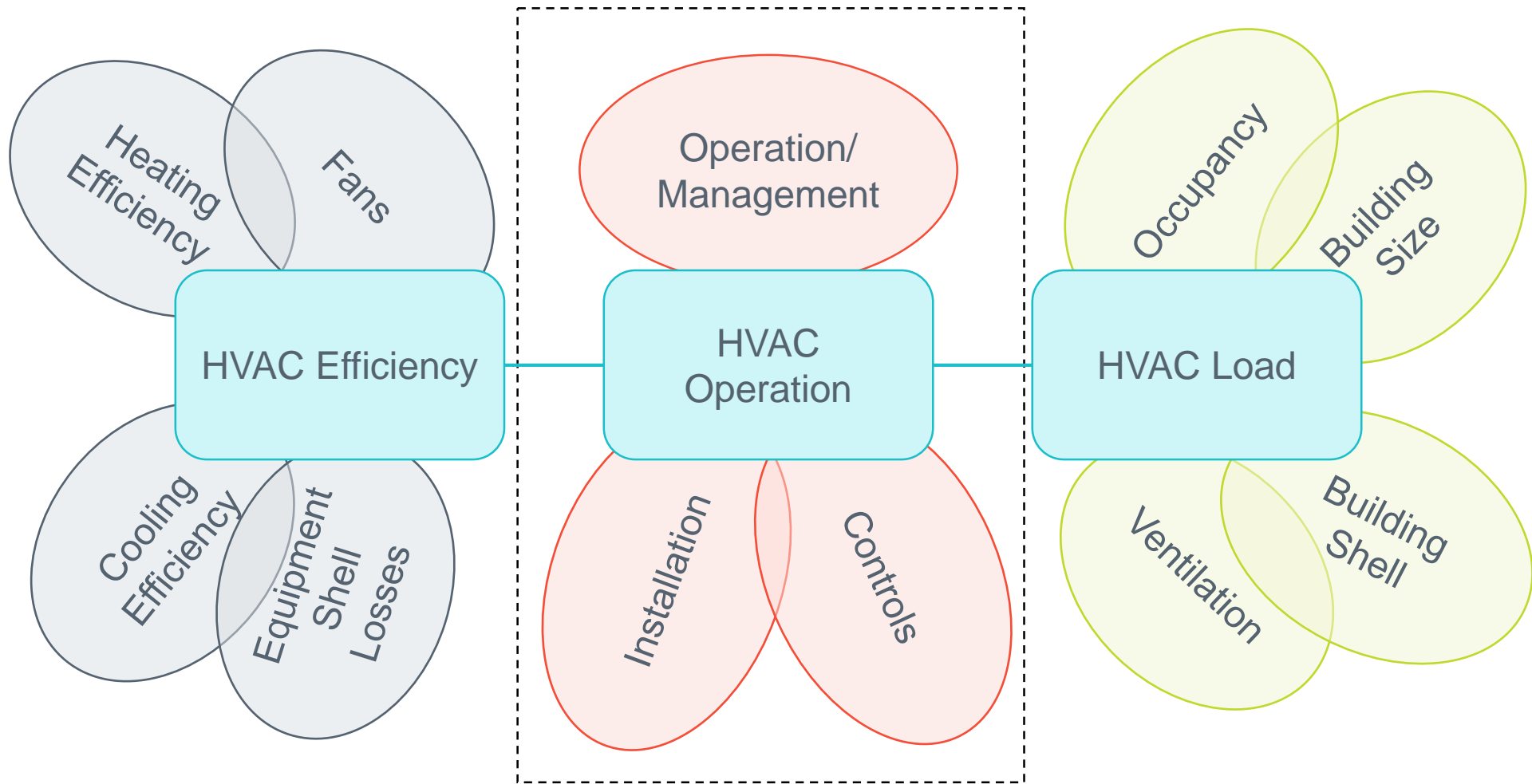


Controls



Components

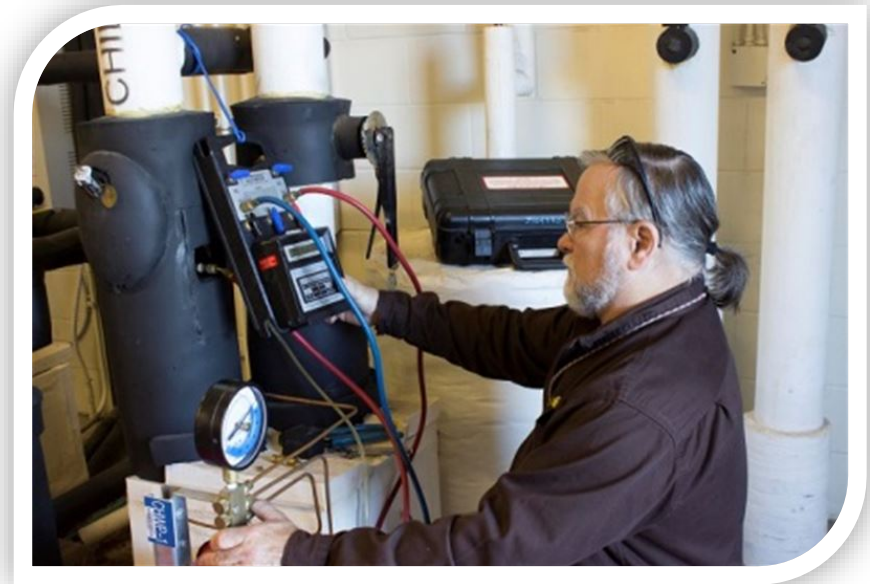
Now, Let's Consider Operation



Not an exhaustive list

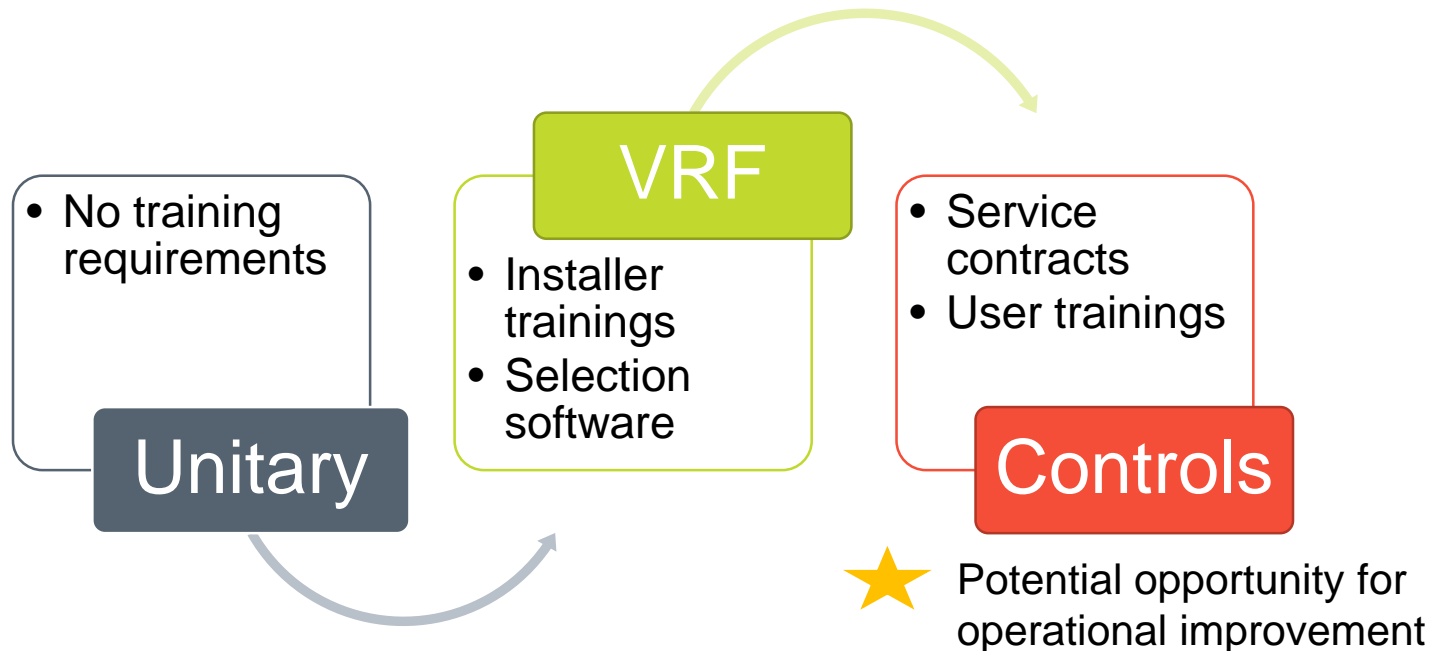
Operation is Still a Problem

- “Most commercial HVAC equipment is not operating as intended”
- Or, installed incorrectly and has never operated as intended

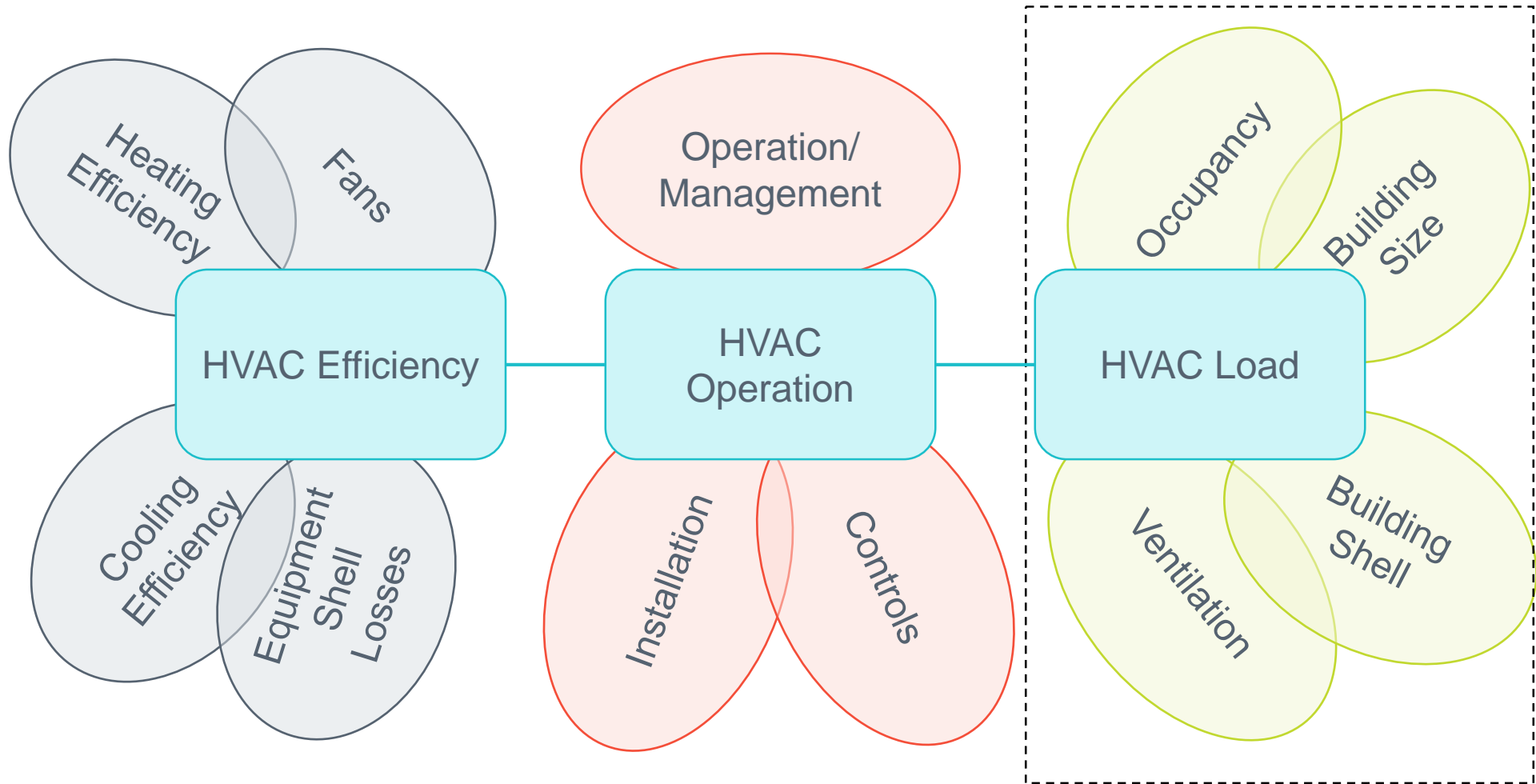


Moving Toward Better Installation

- Newer technologies = higher standards

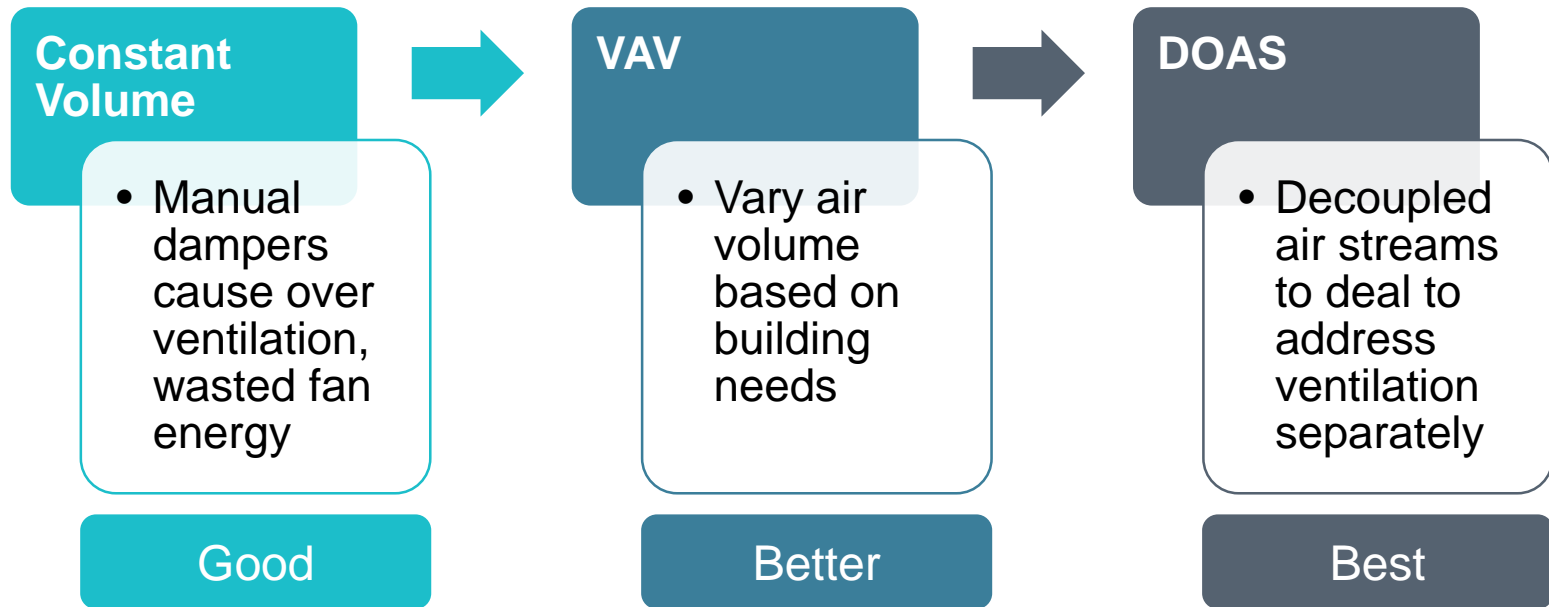


Finally, Let's Look at HVAC Load

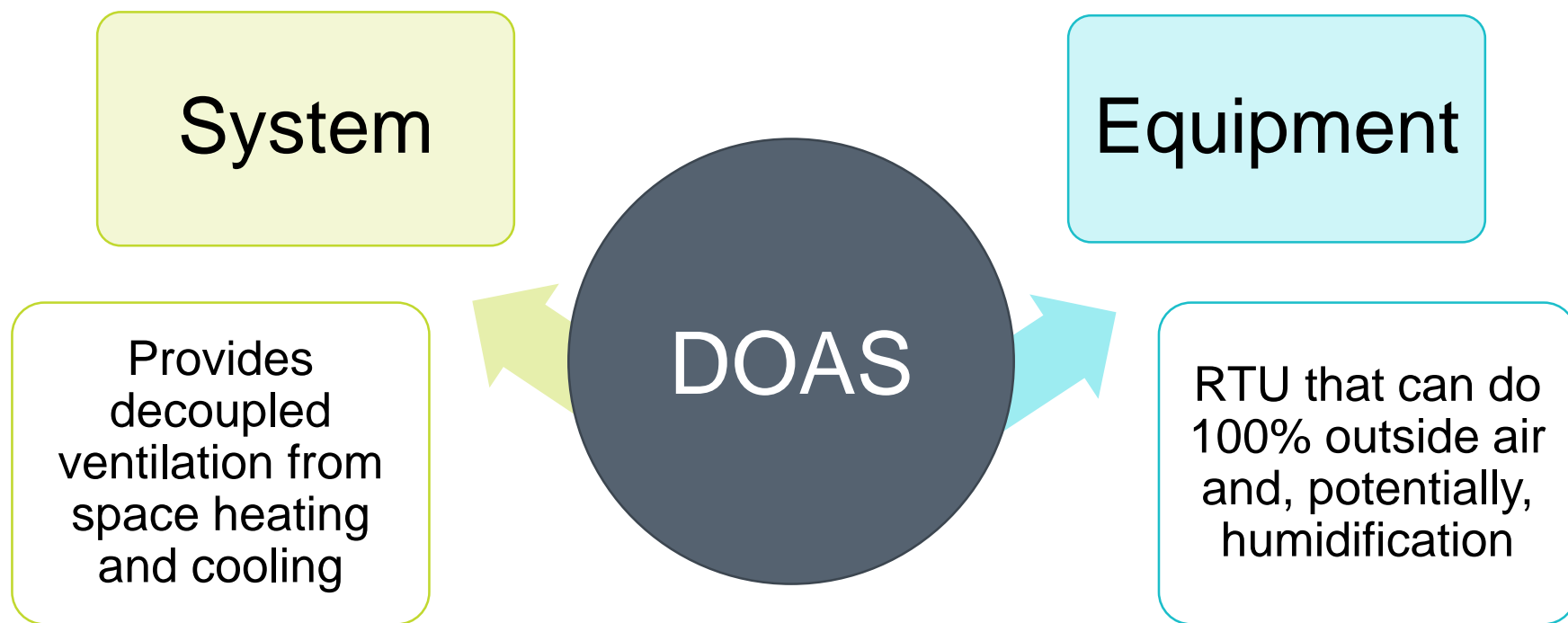


Not an exhaustive list

Several Ventilation Options, Different Efficiency Outcomes



What is DOAS?





Efficiency Opportunities



VRF and system redesign



Components driving efficiency



Controls as a growth opportunity



VRF is the Next Big Thing... Still



Commercial HVAC market isn't changing



Energy savings require a system level view



VRF still most promising EE technology



Components/controls offer efficiency opportunities

VRF Isn't a Niche Market

- Double digit growth year over year, but in small market segment
- Starting to see mid-market pricing competition
- But, applications are limited



~75% of VRF sales in PNW are in new construction



~50% of new office buildings in PNW installed VRF

VRF Requires System Design

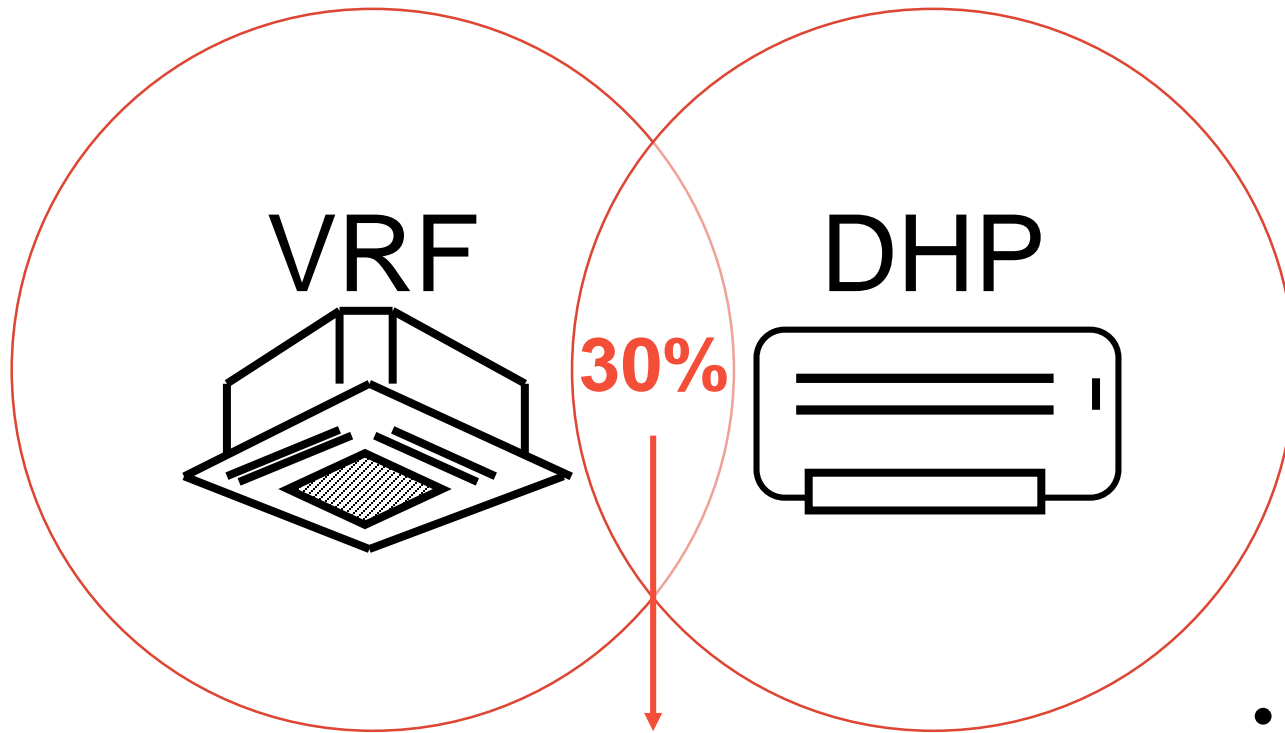
DIAMOND SYSTEM BUILDER

VRF DESIGN IS NOW QUICKER AND EASIER

Diamond System Builder is a layout and system selection tool for efficient and easy design of all Mitsubishi Electric systems.



VRF versus DHP



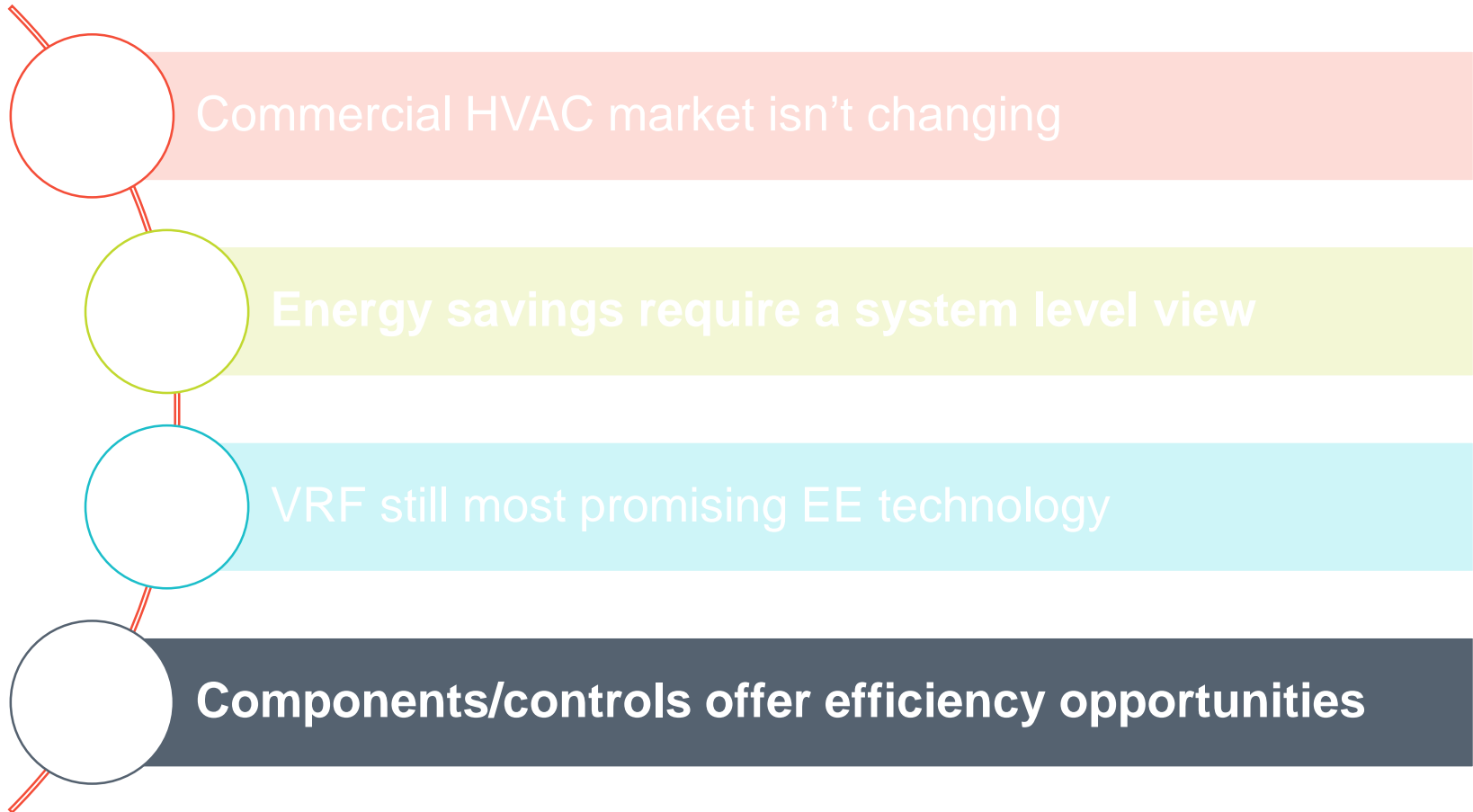
- New construction
- Sophisticated, but expensive

- Retrofit
- Simple and cheap, but limited

~30% of jobs that could go VRF end up going DHP



Efficiency Opportunity Through Components and Controls



Components Driving Energy Efficiency

Economizers



HRV/ERV



Other: variable speed fans/compressors

Controls: Promising but Limited

- Every manufacturer offers an integrated controls solution
- But, ~75% of buildings <50K don't have controls
 - ~70% of commercial buildings are this size





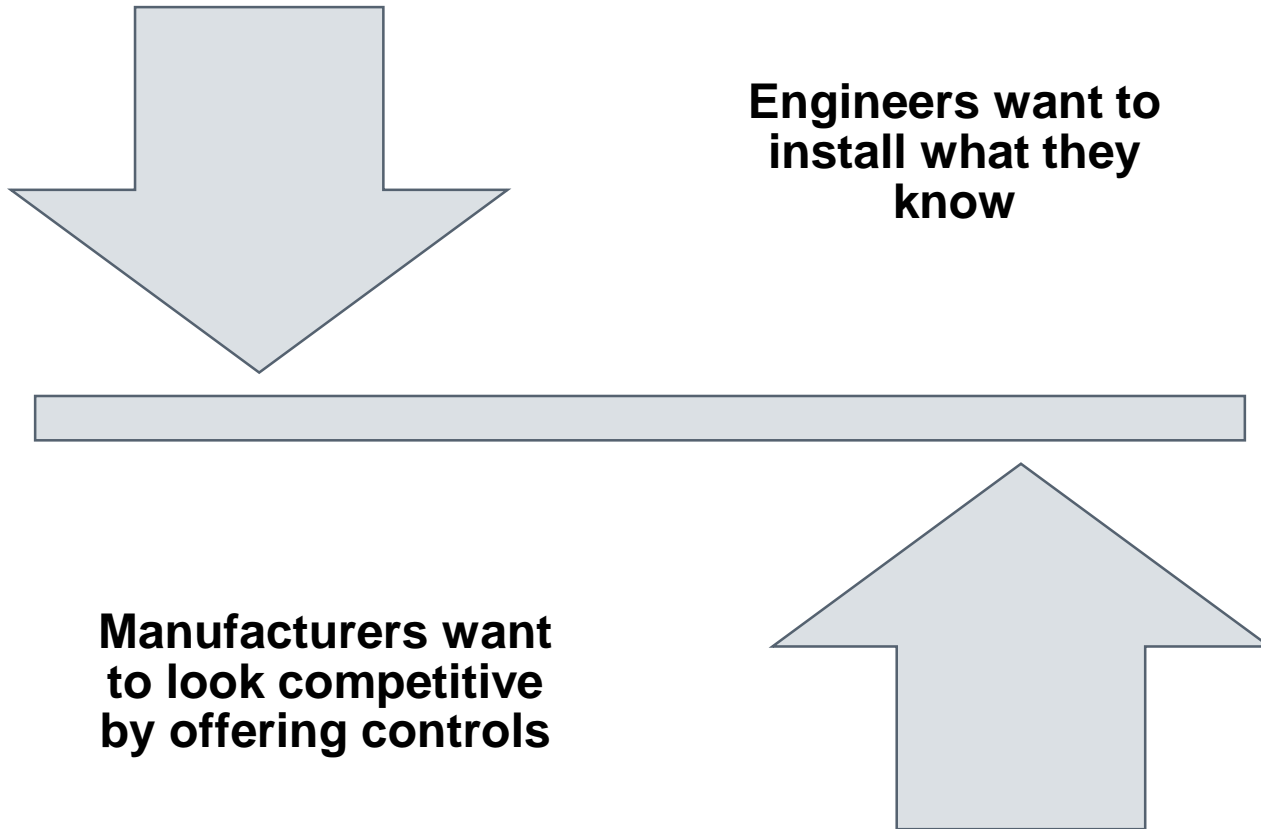
Lack of Owner Training

- Mis-managed/mis-operated/mis-installed
 - Losing out on energy savings
 - Happening across all systems at all efficiency levels

“It’s no one’s job to train owners on controls”



Market Inertia is Stifling Growth



Weak Use Cases for Controls

Two conflicting scenarios, neither mainstream:

Increased interest in data availability and visualizing system performance



Responsibility with the end user

Trend towards “servitization” and outsourced maintenance



Responsibility with service contract holder

What's Next for BPA Momentum Savings

Preview of upcoming project

Task 1. Pilot Data Collection

- Determine if there is enough evidence of above-code, energy-saving commercial HVAC equipment installations in a sample of permit data such that it is worth continuing a full-scale permit data collection project.

Go/No-Go Decision

- Develop a process for full-scale permit data collection based on lessons learned from the pilot.

Task 2. Confirm Program Activity

- Confirm that regional VRF and DHP projects are not entirely driven by programs and/or building energy code.
- Understand how programs are estimating savings from such projects to inform methodology development.

★ Go/No-Go Decision

Task 3. Develop High-Level Methodology

Use the information and knowledge gained in Tasks 1 and 2 to develop a high-level method for quantifying momentum savings from above-code VRF and DHP (and potentially other) systems.

Timeline

- Begin work: June 2019
- Completion: Fall 2019

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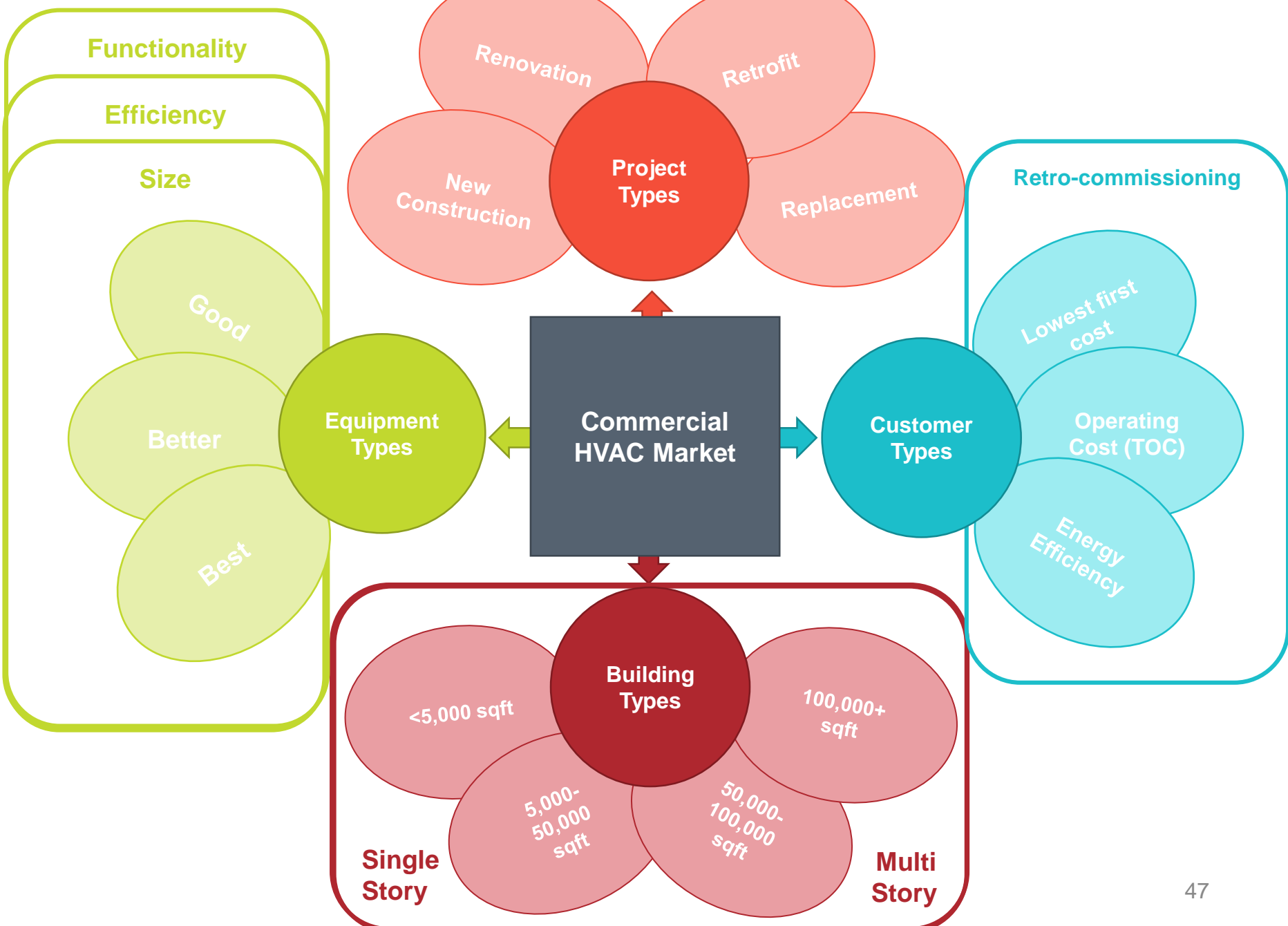
Appendix: Momentum Savings Modeling Market Segmentation

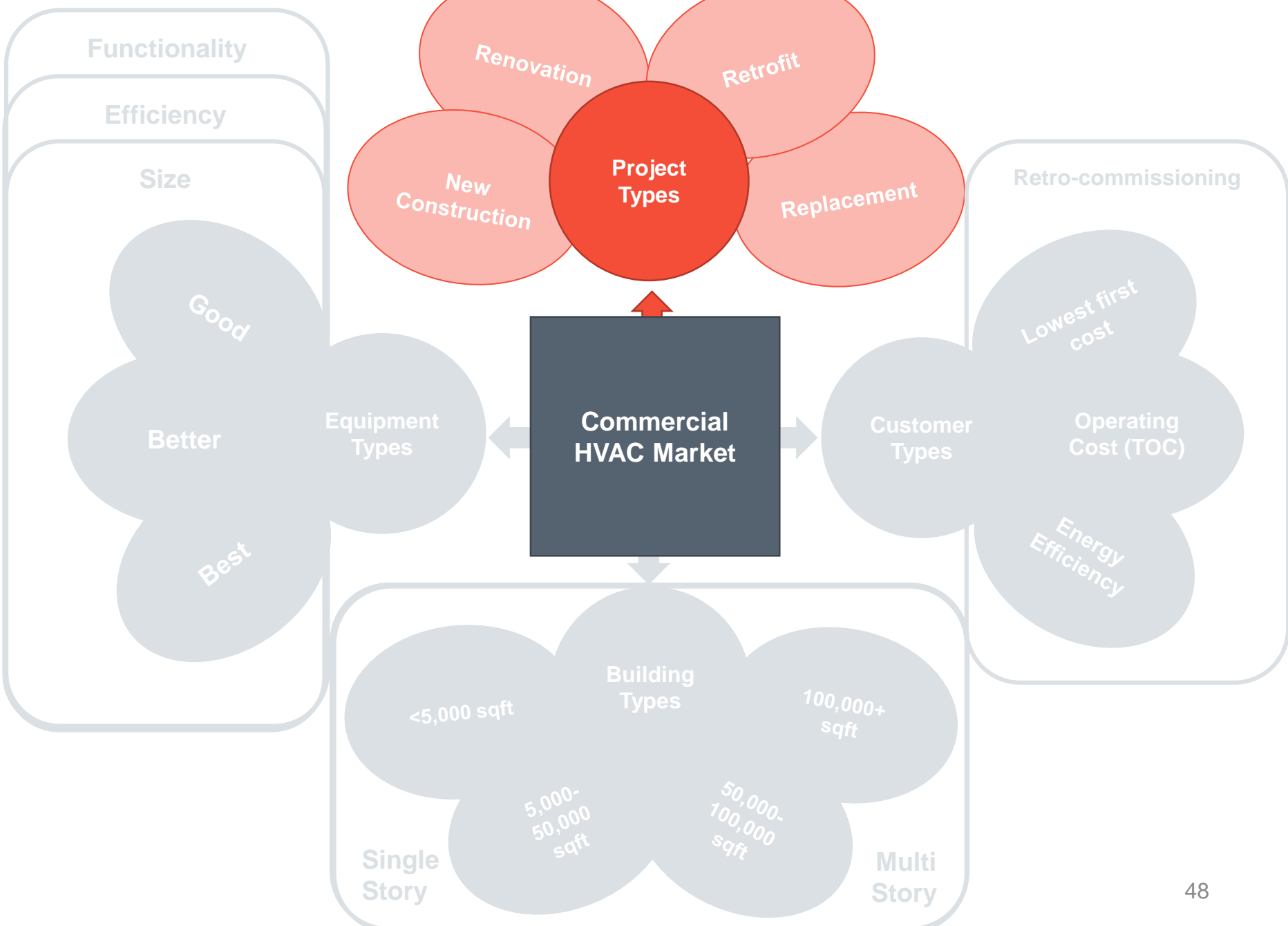


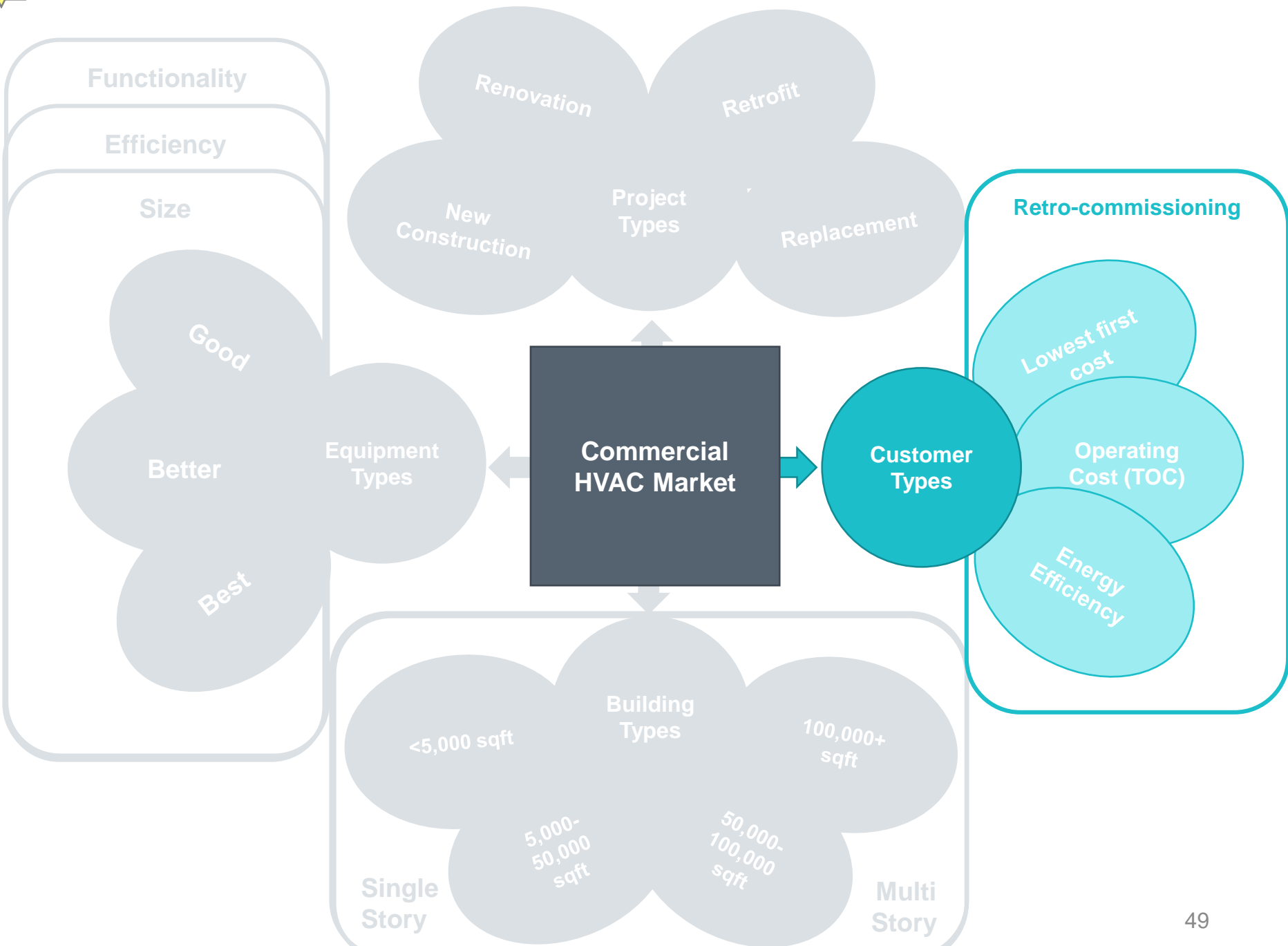
Understanding the Market...

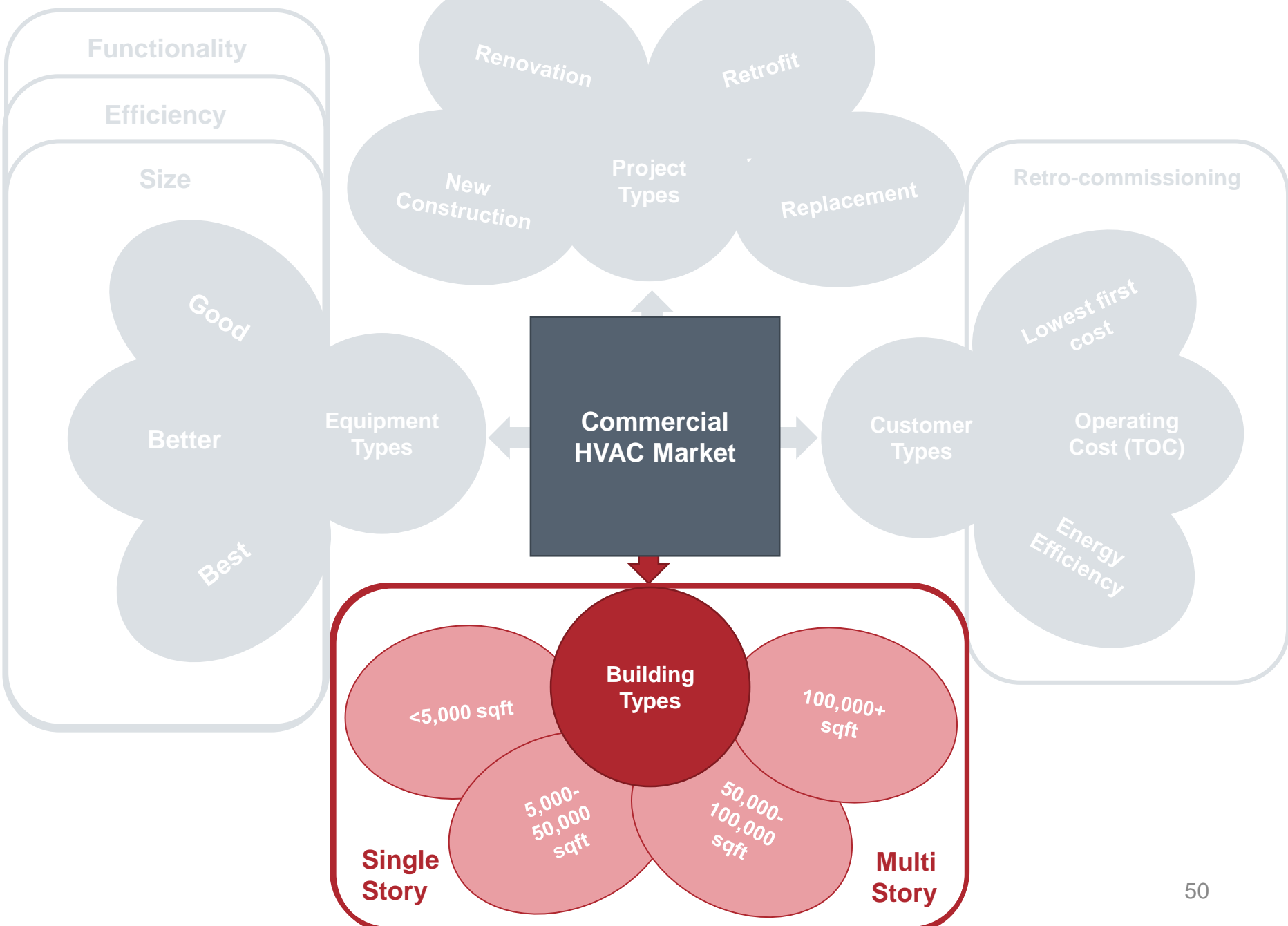
Where to Begin?

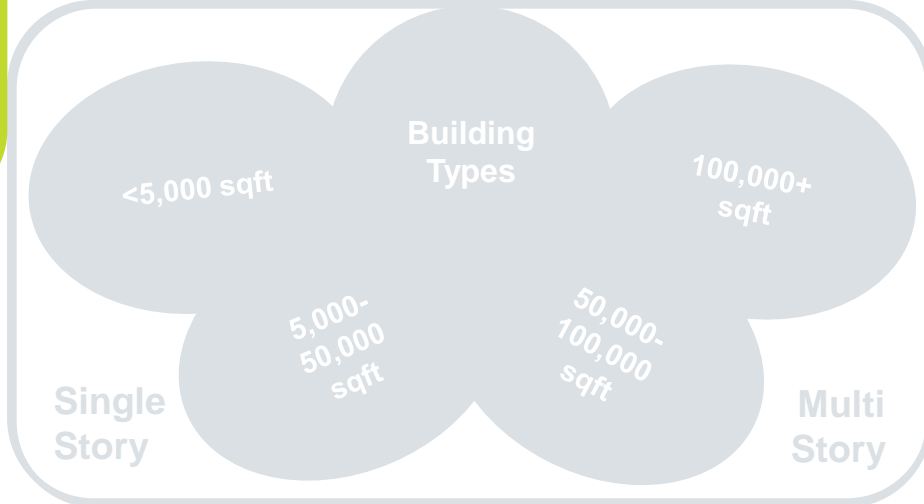
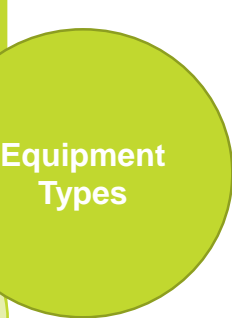
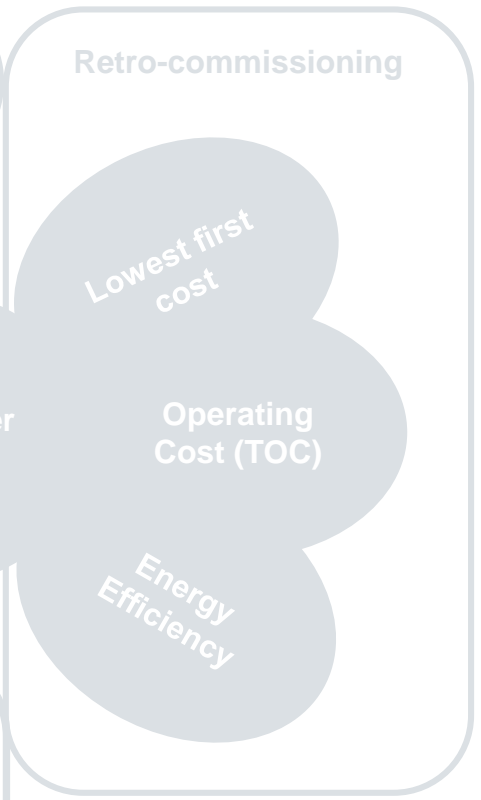
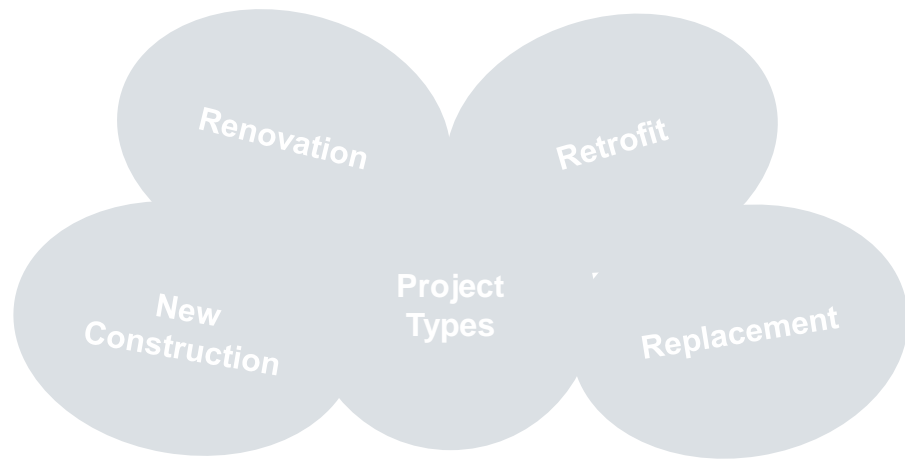
- Commercial HVAC is big → ~35% of commercial building energy use (EIA)
- It is diverse → high number of equipment types, component options, design options, and configurations
- So, developed a segmentation framework to narrow in on parts of the market that might be quantifiable for BPA modeling efforts



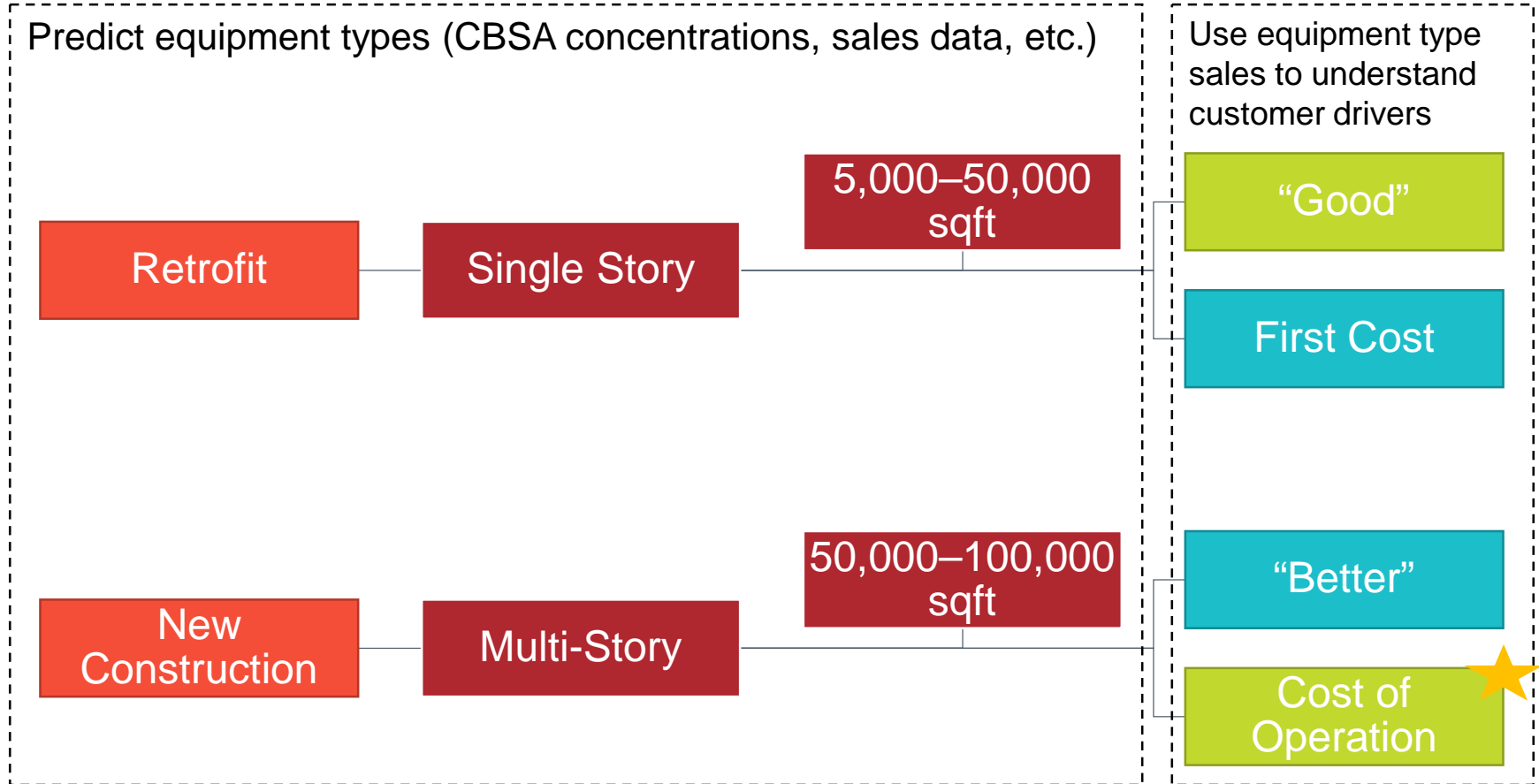








Layer Factors to Understand Market Drivers



Could be persuaded to purchase more efficient technology, represents savings opportunity