ENERGY STAR Computers v8 Simplified Expandability Score Category Concept

Presented to ENERGY STAR®

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PG&E

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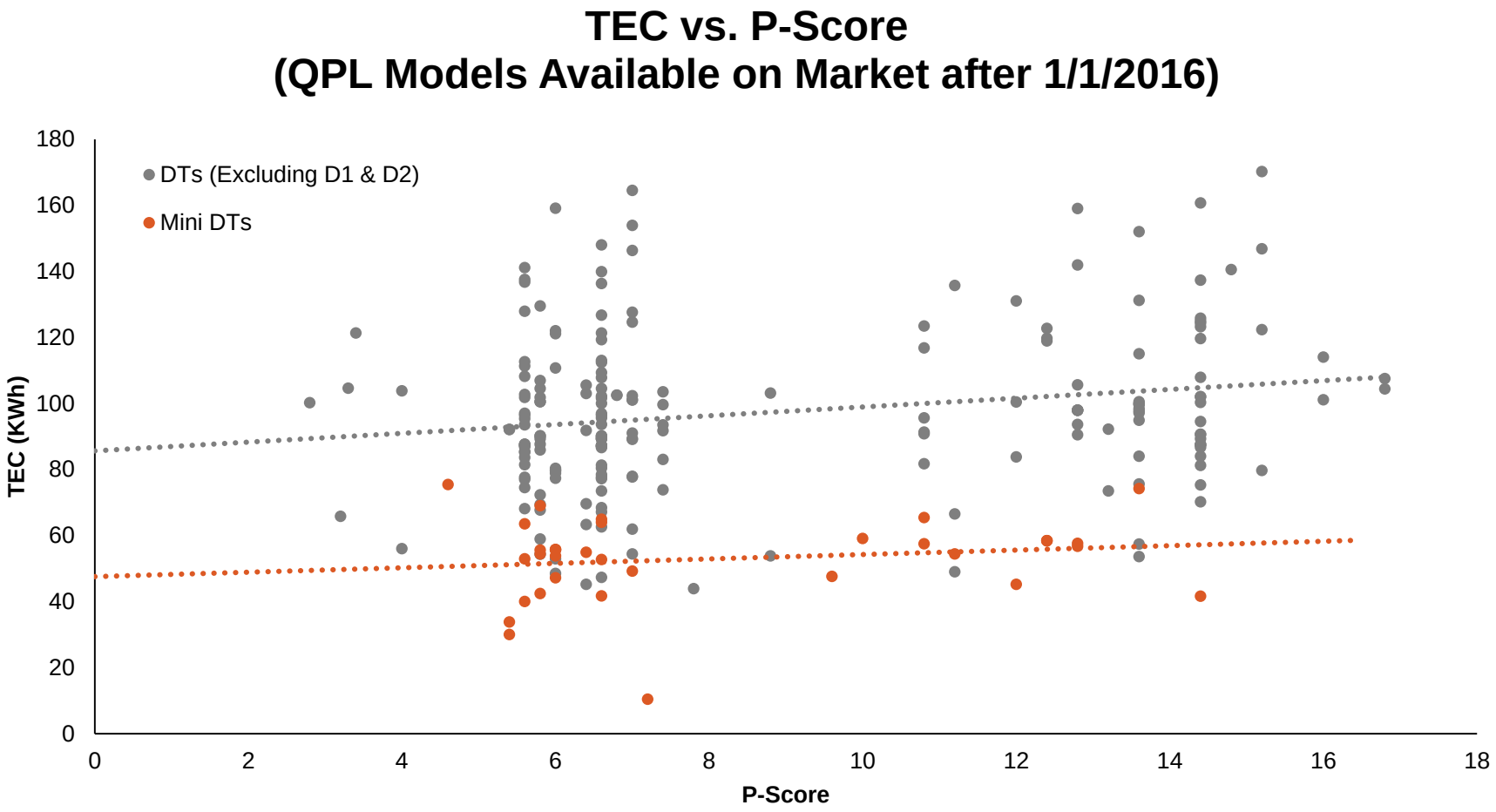
Objectives

1. Discuss existing categorization approaches and challenges
2. Simplified expandability score concept
3. Compare alternatives and discuss pros-cons

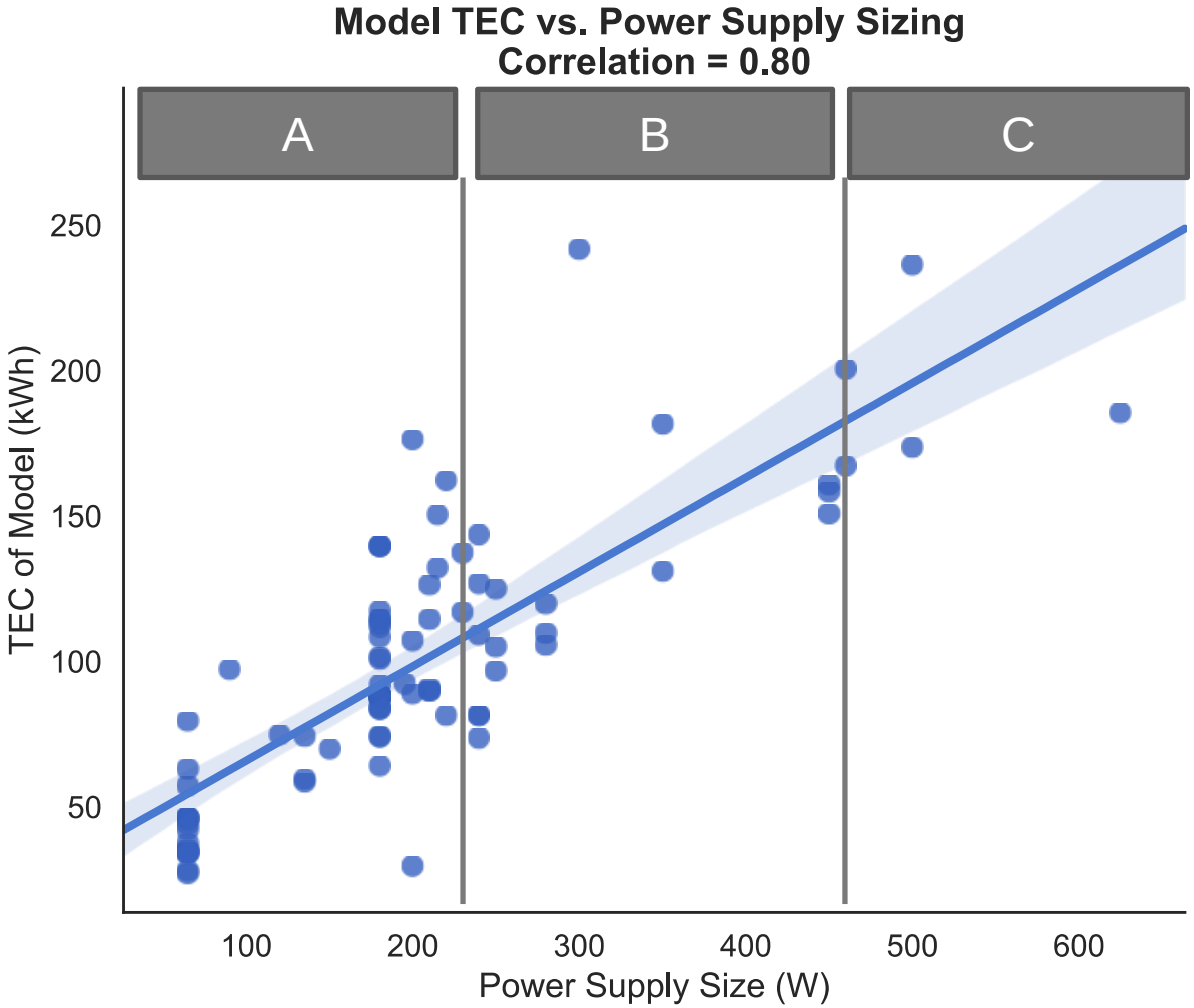
Challenges with P-Score Categorization

- Only a **weak correlation** between P-score and a system's TEC
- P-score ignores other computer design trends, such as growth in **high-bandwidth interfaces**
- Does not capture the differences in amenity between large and small form factor systems and **power supply up-sizing** implications

TEC Does not Scale with P-Score, Especially in Mini Desktop Systems



Why not categorize based on power supply sizing?



- Boundary effects
- Upsizing incentive
- **Does not capture hardware amenity**

Alternative:
Simplified Expandability Score

Concept: use combination of PSU sizing and expandability attributes to differentiate amenity/performance

Simplified expandability score (SES) =

A * (#**PCIe slot lanes**) + B * (#**High-speed external data ports**)

#PCIe slot lanes: PCIe lanes accessed by motherboard slots

#High-speed data ports: the number of external data ports (accessible outside the product enclosure) with maximum bandwidth exceeding 10 Gbps

Today, this means Thunderbolt 2, 3 and USB 3.1, but could include future high-bandwidth ports

Example:
PSU Size + Simplified Expandability

<u>High Expandability Gaming</u>

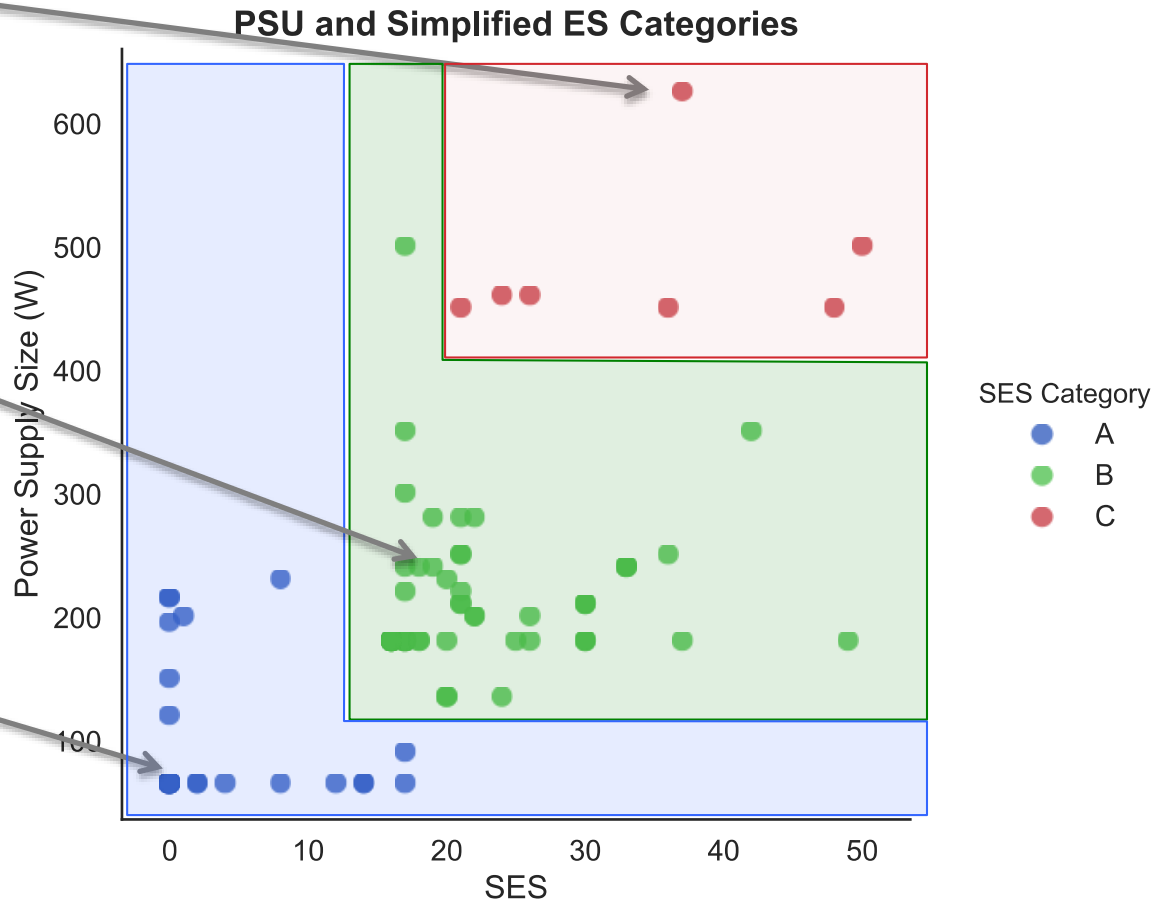
- D2 gaming PC w/dGfx and liquid cooling
- Tower form factor
- 2 PCIex16, 5 PCIex1
- CEC ES = 595

<u>Mainstream Business PC</u>

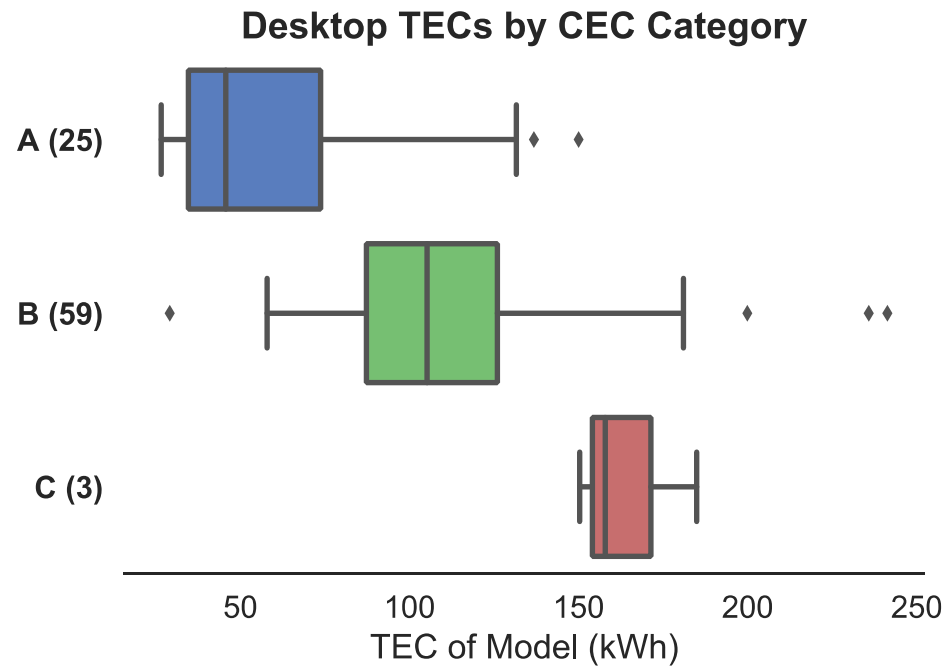
- Integrated graphics
- Minitower form factor
- 1 PCIex16, 3 PCIex1
- CEC ES = 370

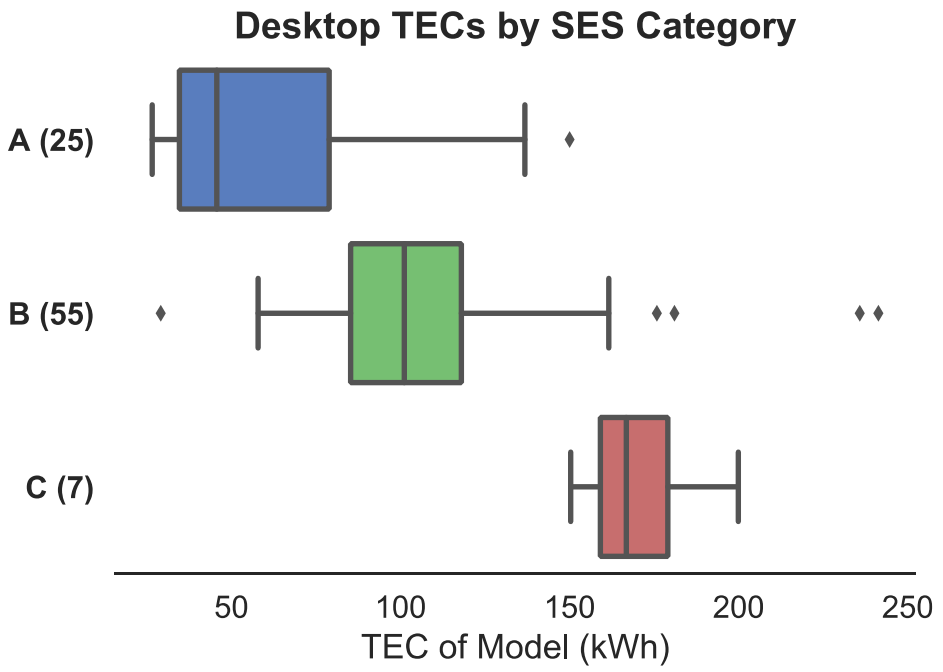
<u>Low expandability mini desktop</u>

- Mini desktop
- 1 M.2 port
- CEC ES = 150



Similar Segmentation as Expandability Score, But Fewer Attributes



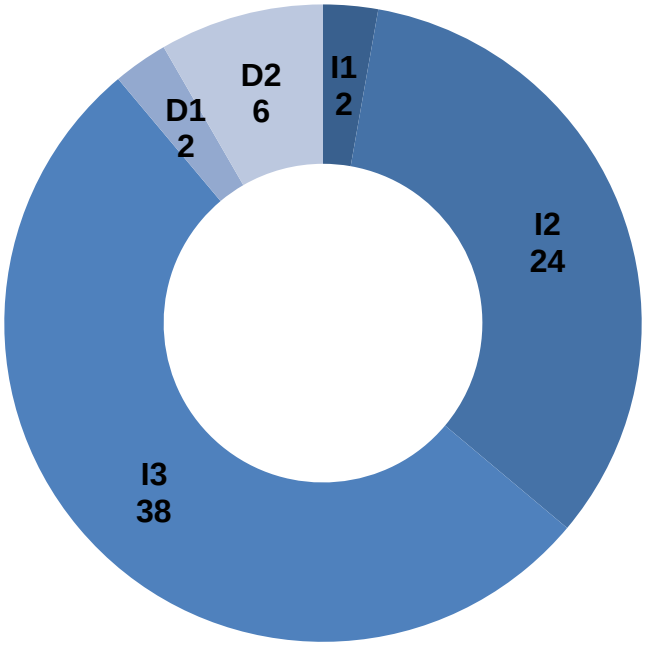


Only 8 of 87 models change category

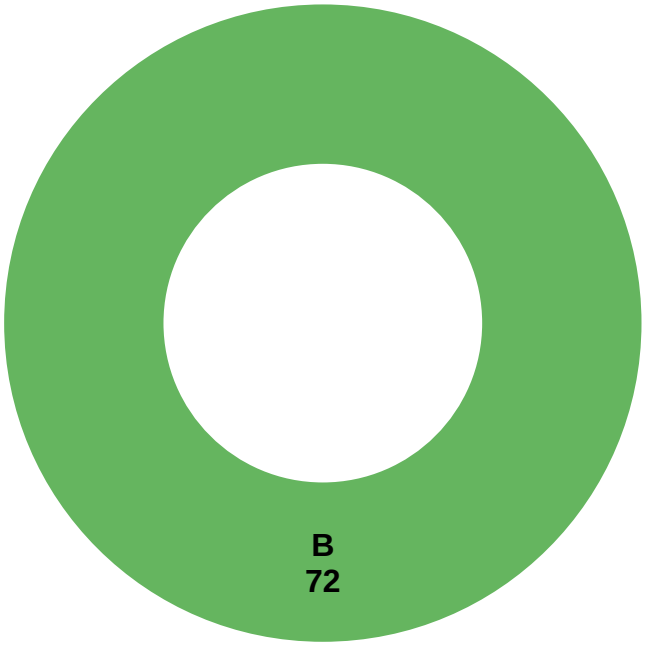
Categorization within Desktop Product Family

Business desktop, 72 configurations

ENERGY STAR v6 Categories



SES Categories



Less differentiation within product families.

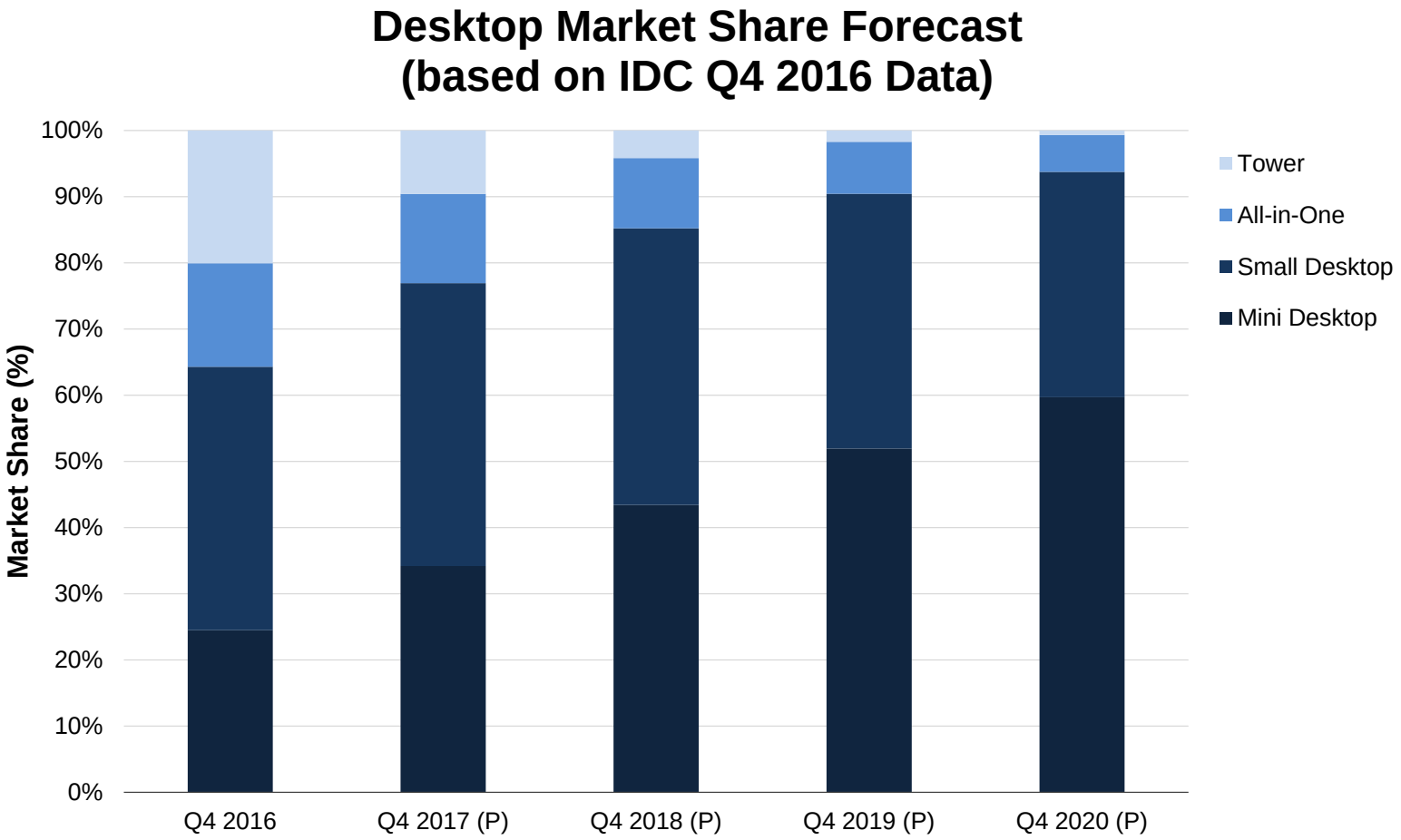
Summary of Categorization Approaches

- Tracks TEC needs of models better than P-score
- Approximates the CEC's expandability score with simpler inputs
- Provides less differentiation within individual product families

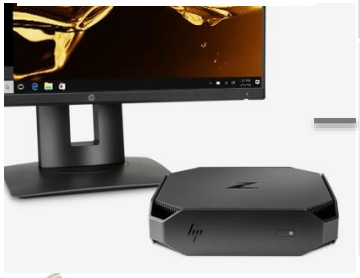
Needed: broader attribute collection to test, compare, and validate categorization approaches.

BACKUP MATERIALS

Small Form Factor and Mini DTs Will Soon Dominate Mainstream DT Sales

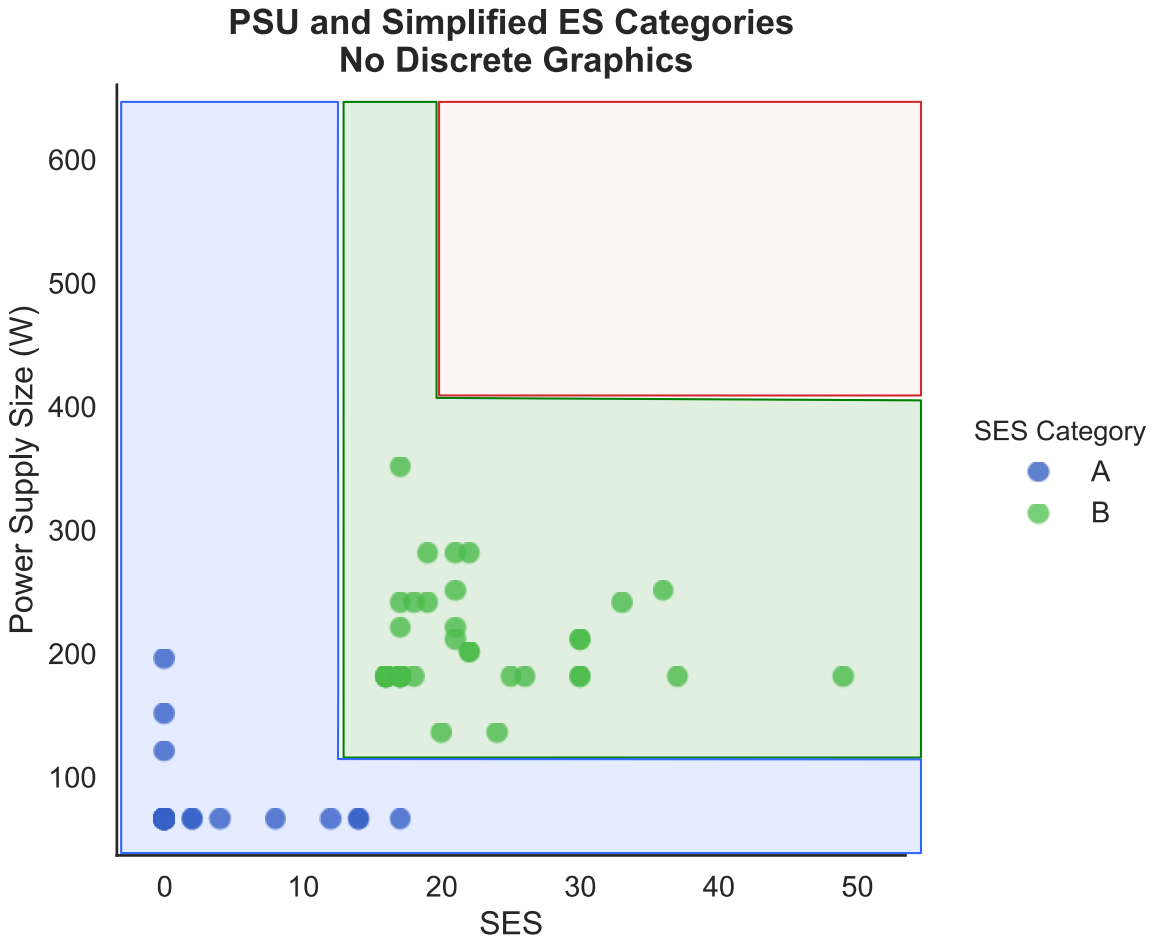
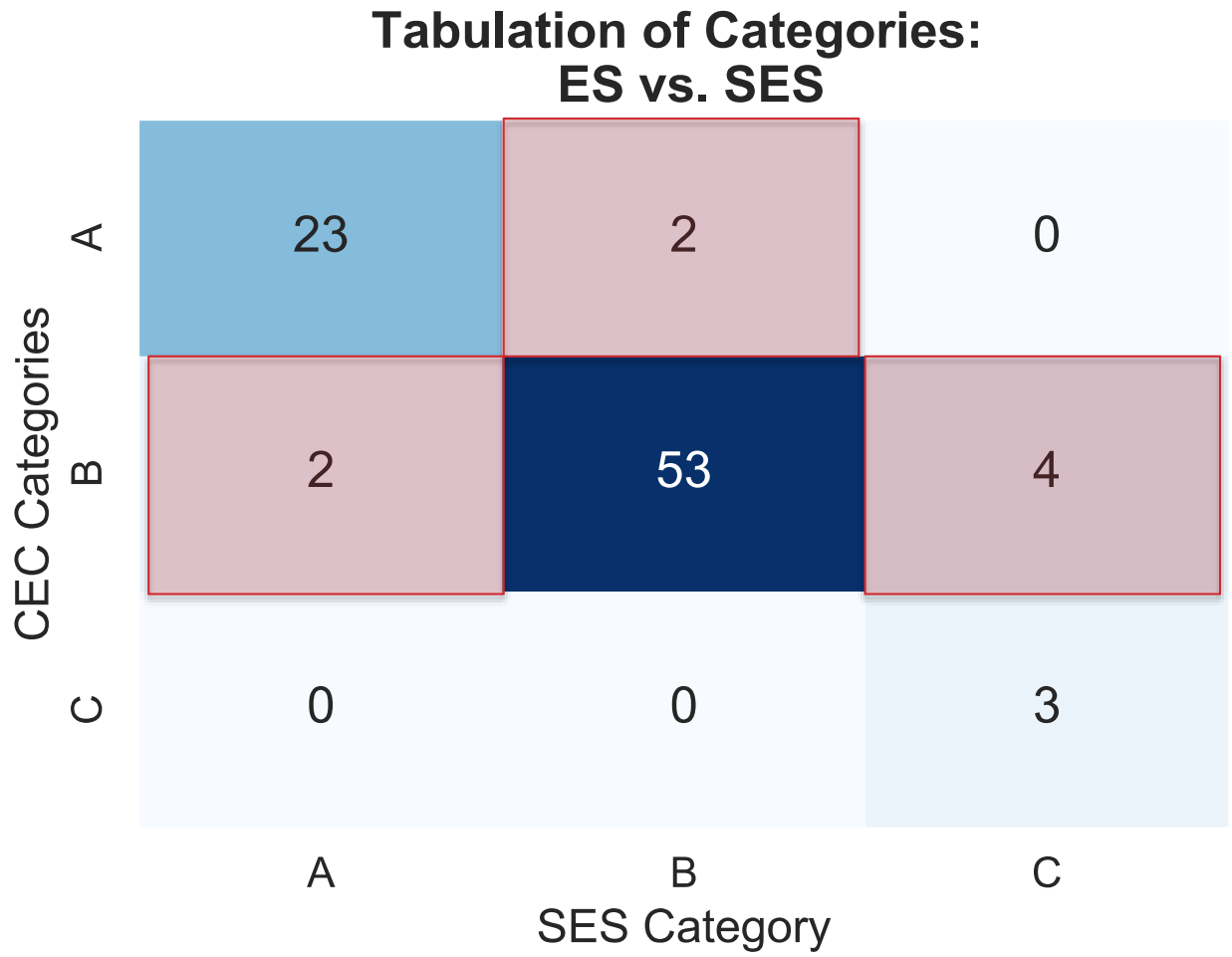


Minis Are Inexpensive, Efficient, Space-Saving, Increasingly Popular



Model	MSRP	P-Score	Features
Asus Chromebox	$205	2.8	Bare bones
Dell Inspiron i3050	$229.99	4.82	Home, small office
HP Pavilion Mini	$319.99	3.4 – 3.8	Home, media streaming
Acer Revo One	$393	4.2	Home, media streaming
Mac Mini	$499.99	2.8 – 5.6	Home, small office
HP Z2 G3 Workstation	$699.99	7.4 – 13.6	CAD workstation

Without Discrete Graphics Systems



Which systems change category?