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Disruptive Innovation & Implications for MT programs

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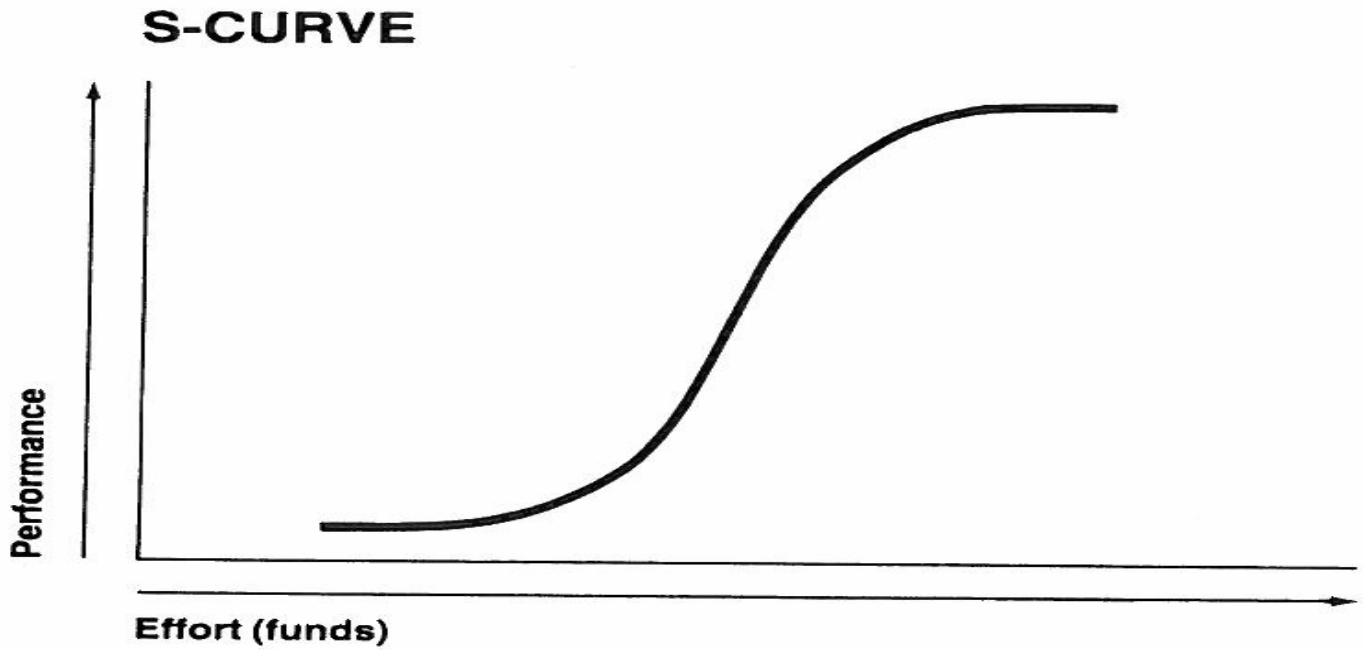
Session Goals

- What are Disruptive Innovations?
- Do they bite?
- How can we house-break them?
- If the value proposition is different, how do we capture it?

Who Killed the Electric Car?

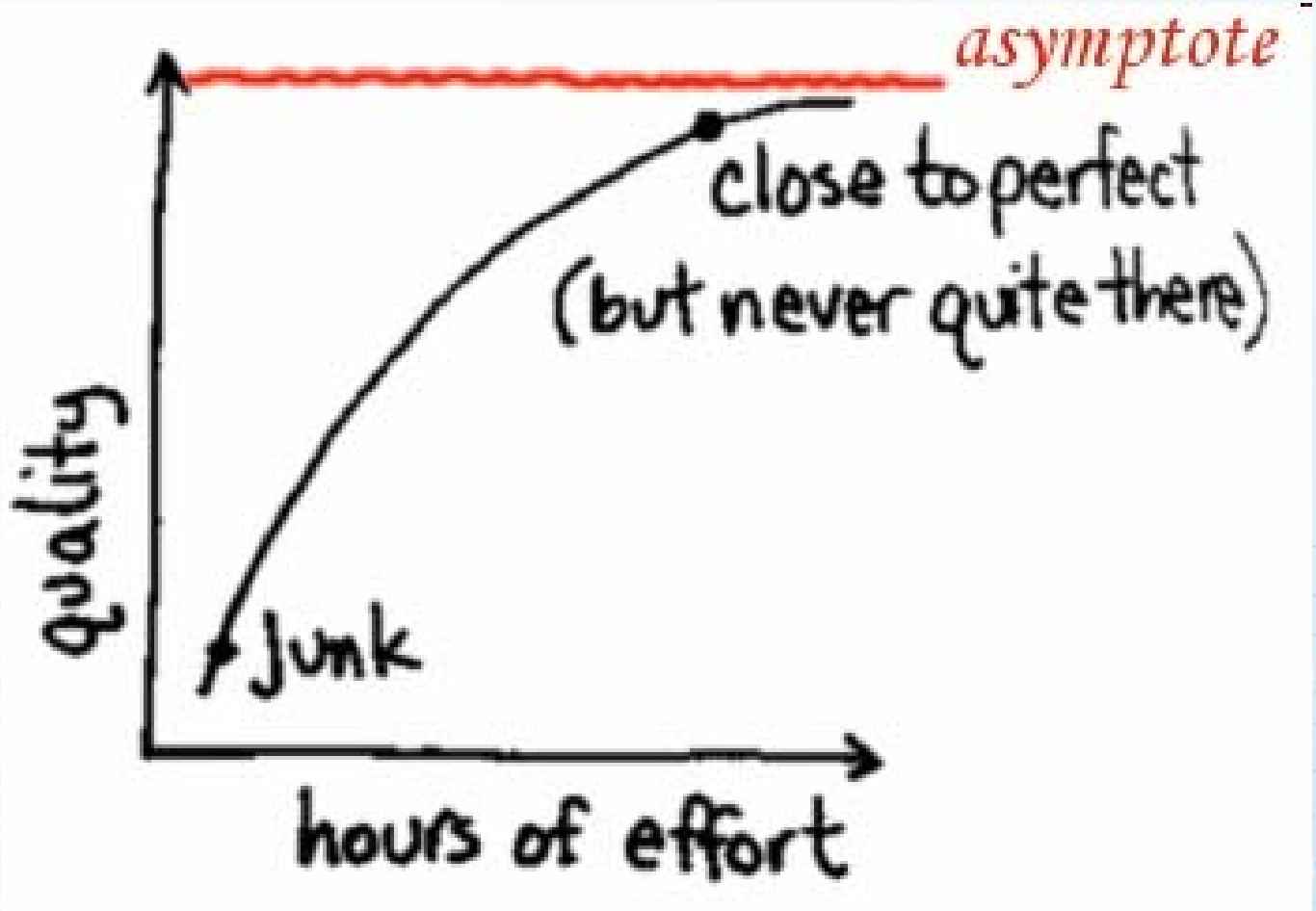
Consider the pre-1911 Gasoline Car

We work a long time before we see any progress.

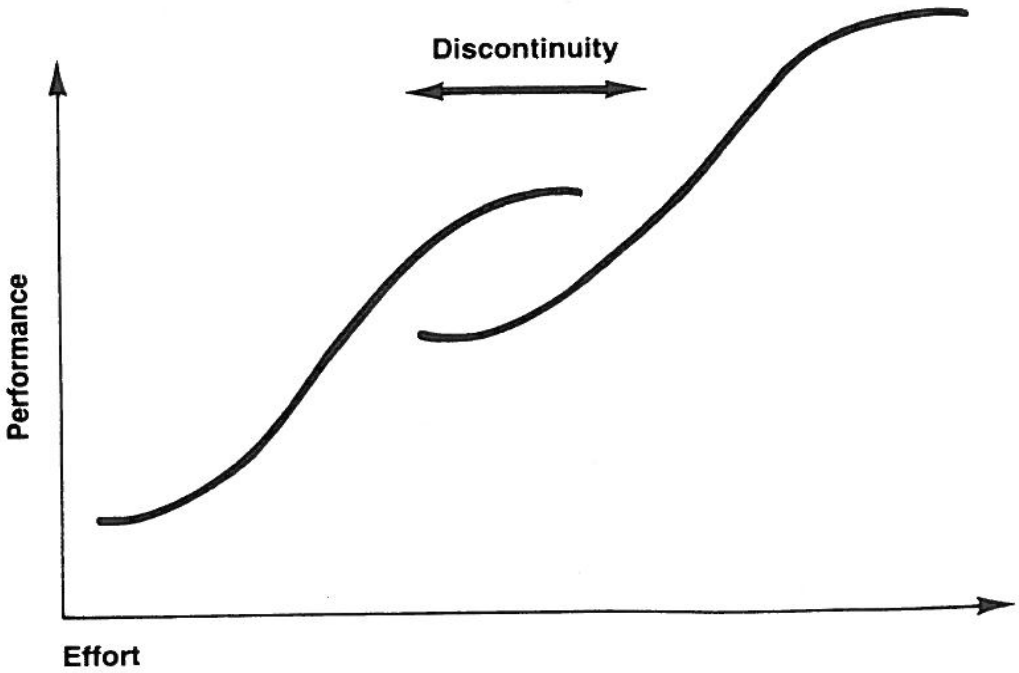


2 The S-Curve.
The infancy, explosion, then gradual maturation of technological progress.

Approaching Perfection. Whoops!

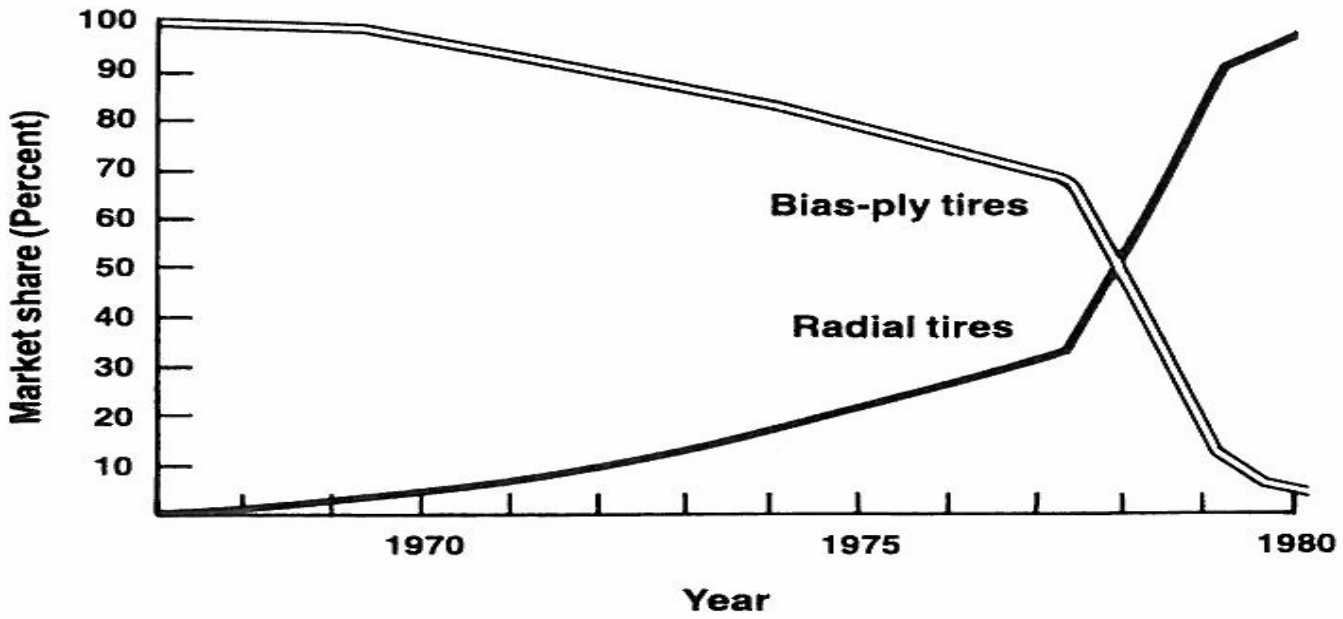


And then it gets supplanted…



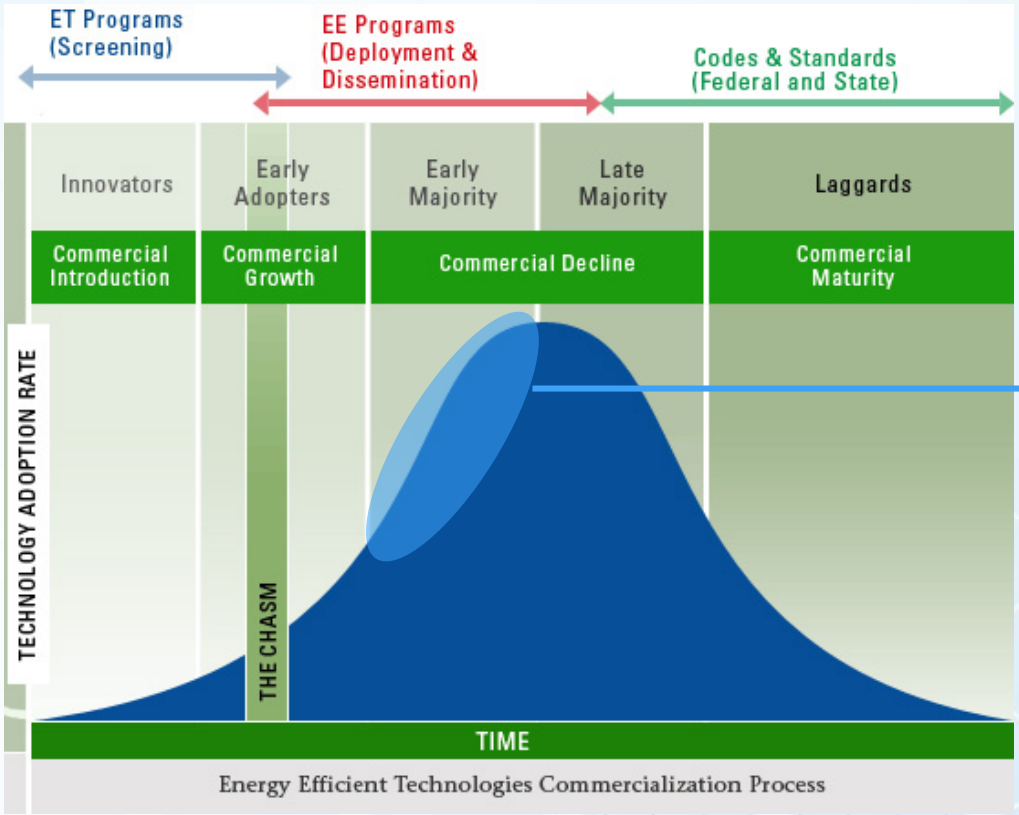
12 S-Curves Almost Always Appear in Pairs.
Together they represent a discontinuity—when one technology replaces another.

18 Months for 50% Market Share Shift



20 Tire Consumption in the United States.
Bias-ply manufacturers lost 50 percent of the tire market to radials *in 18 months*.

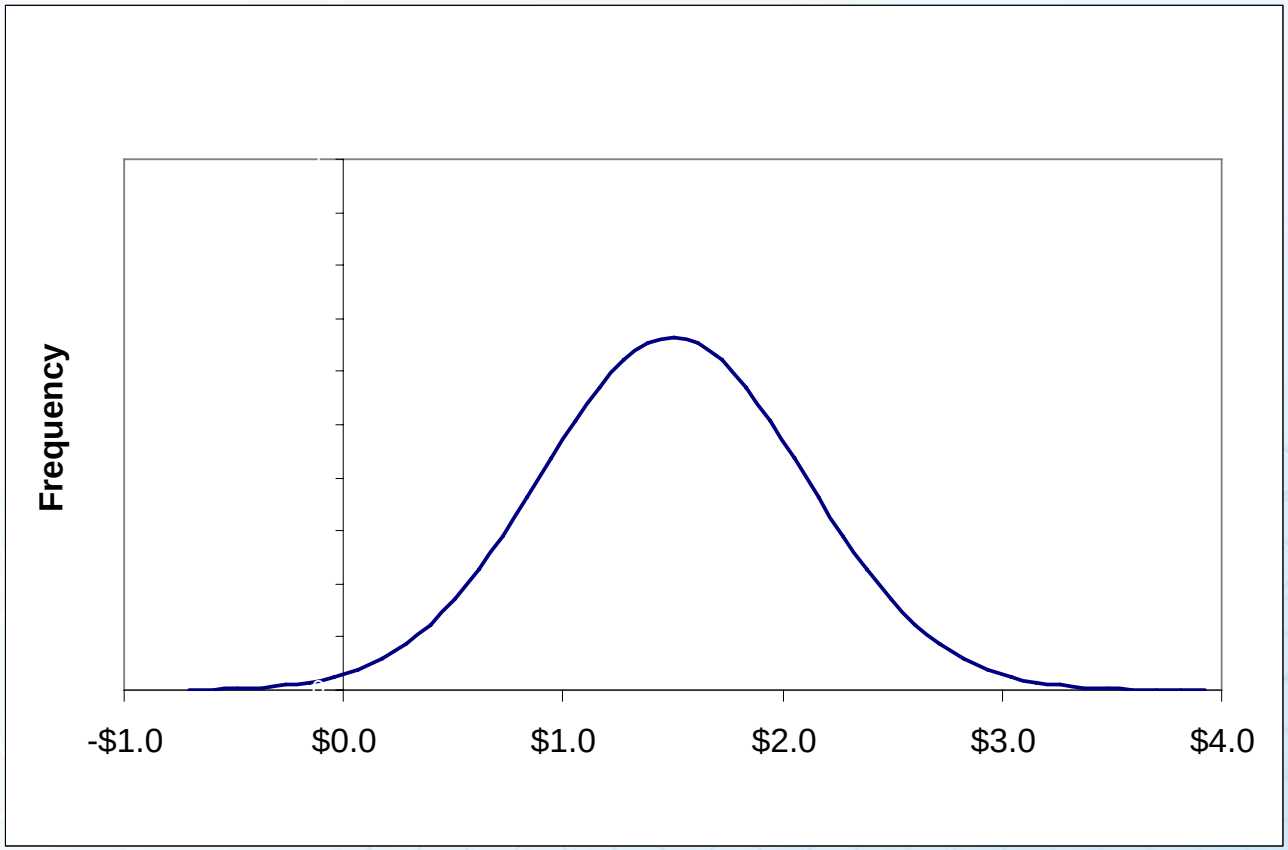
Role of ENERGY STAR



ENERGY STAR

- mass market consumer
- cost-effective (2 to 3 year payback)
- two-thirds of ENERGY STAR products have no incremental cost
- proven technology
- no sacrifice in performance
- reliable savings – easy design, installation, and maintenance

Continuous Frequency Distribution of Appliance Efficiency: Mental Model



Disruptive Innovation: Cases of unmeasured efficiency

- HPWH
  - The value of dehumidification.
- Advanced RTU (integrated economizer and controls, proper housing, etc).
  - Better ventilation control, reduced infiltration
- Adaptive Controls (general)
  - Can’t rate with simulated use test or steady state test.
- E* shingles
- Clothes washer or dryers or electronix

Consider the Commercial “Roof-top Unit” (RTU)

Features of an advanced RTU

- Integrated Economizer*
- Automated Diagnostics*
- Improved air handler
- Low-infiltration, insulated cabinet*
- Great dampers*

*NONE included in energy rating.

Is this really disruptive?

Consider the Commercial “Roof-top Unit” (RTU) (2)

Rated

- EER (full load)
- IEER (part load)

Saves Energy

- Integrated Economizer
- Variable speed fans
- Heat recovery?
- Smart Controls
- Good enclosure to reduce infiltration?

RTU Alternatives may be really disruptive:

- Ground Source Heat Pumps – or Water Loop Heat Pumps in General
- Advanced, low-mass, 2-pipe, boiler-chiller systems, with heat recovery chillers.
- Variable Refrigerant Flow “Multi-Splits”

Consider the Heat Pump Water Heater

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Consider the Heat Pump Water Heater

Advantages

- < ½ as much energy
- Low LCC
- Dehumidifies!
- Filters the air!
- High Tech & Sexy
- Many "flavors"
  - Drop-in
  - Add-on
  - CO2

Disadvantages

- The what?
- High first cost
- What flavor do you want?
- Where to buy?
- Who to install?
- Oh, the noise!
- Cold blast all winter?

Are Equipment Standards Obsolete?

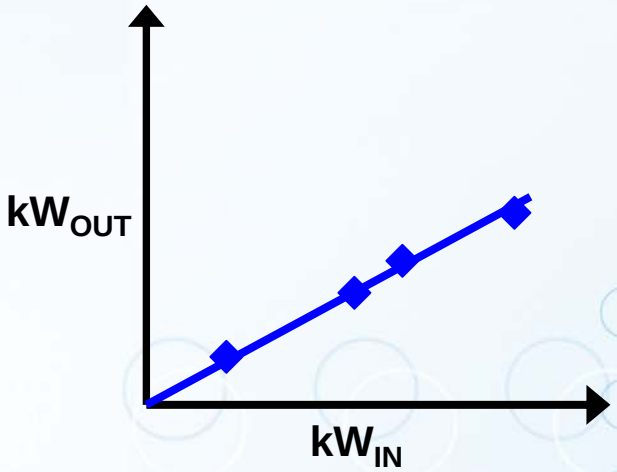
Standards v. energy models

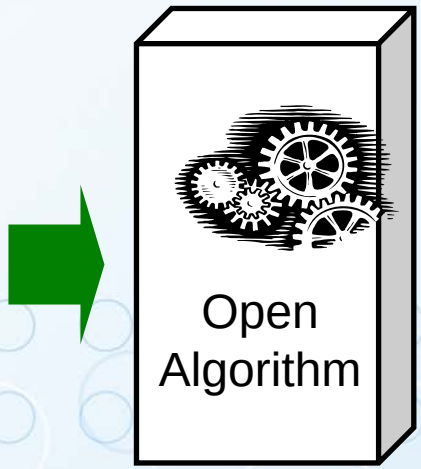
Equipment v. systems

Some Reasons Standards might not capture savings

- Rating method defects
  - Across heterogeneous technologies
  - Smart controls not “seen” in test.
  - Ancillary benefits (like dehumidification) ignored
  - Regional issues
- Standards generally give relative comparisons, not energy use predictions
  - ASHRAE TC 4.7; AHRI Regional Standards offer engineering data prospect.

An Approach to Standards for Consumer Guidance





This Water Heater is Rated:

Climate	Small home	Large home
Cold	0.60	NR
Mixed	0.75	0.75
Hot	0.80	0.70

Measure & Certify

Product Label

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Some Implications

- Are Equipment and Appliance Standards Obsolete?
- How will we set incentives when standards can't measure savings?
- How to capture "non-energy benefits?
- Should we just focus on systems?

Thank You!

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