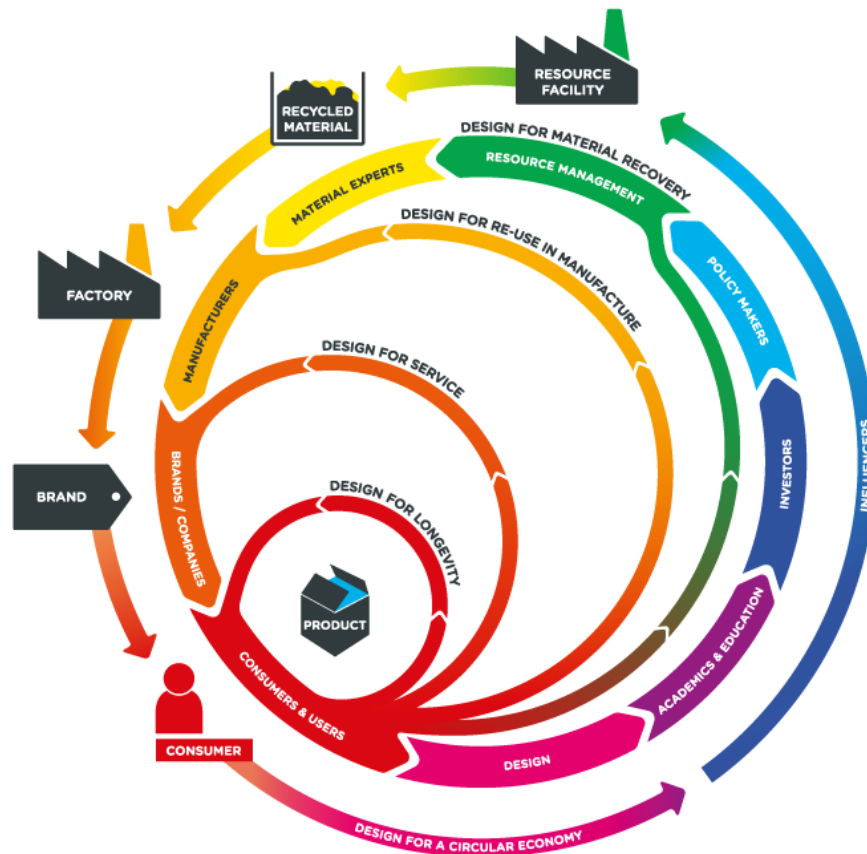# R-Rating Research
Choosing Predictors For Green Design

Introduction

Our project relies entirely on the utility of the rating system that we develop and the rating system can only be developed using public data points as predictors for E-Waste responsible laptop designs. The public marketplace Amazon can serve as a platform where we derive all laptops to compare. The most available data will be consumer-focused data. The next most available data will be environmental marketing-focused data. Understanding these two things, it will be almost impossible to find an expansive source of data that tells

us about the faults in a laptop's design. Other issues also include finding relevant predictors but unhelpful ones (e.g. most laptops have SSD). These predictors can remain in the algorithm but we will end up relying on other predictors in many cases.

Two types of predictors seem to be present in this calculation: manufacturer-specific and laptop specific. Manufacturer-specific predictors are mostly derived from yearly sustainability reports and describe the use of recycled materials and other developments in their laptops. Laptop specific will be mostly derived from consumer-available, marketplace data.

The most logical course of action seems to be judging the total environmental benefits a laptop design provides and the laptop with the higher amount of benefits will be ranked higher in green design.

Manufacturers

Using the year 2019, we can choose the six largest PC manufacturers that together make up approximately 81.3% of PC market share.[1] These six providers are in order of market share: Lenovo, HP, Dell, Apple, Asus, and Acer. Due to project constraints, all other manufacturers will be excluded. We will also take a look at manufacturer-specific practices in an effort to help create better predictors. Data that we seek includes the percentage of the production cycle that is circular[1].

Housing Material

The housing material of laptops is generally either ABS plastic or a type of metal alloy such as tin, aluminum, zinc, magnesium, etc. Metal alloys are generally acknowledged to be easier to recycle than plastics but both Apple and Dell used recyclable plastics in their laptop designs.[2] Metal alloy ranks higher than plastic and both are moderated by the manufacturer-specific MCE Factor[2].

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[1] A production cycle that uses recycled materials and subsequently extends the lifespan of materials used.
[2] Manufacturer Circular Economy Factor; every year provides a different MCEF.

SSD vs HDD

This is the easiest but also least helpful predictor we can find. This is readily available for every laptop. It is a simple fact that SSDs are better for the environment than HHDs.[3]

More Predictors

Other predictors for good environmentally friendly design include: type of display, the type of battery, and the physical size of the laptop itself.

Concluding Remark (April 8)

For the predictors that we have laid out, we must collect data and test it. For the predictors we aren't sure about, we need to conduct more research as to how to find and extract meaningful information from yet untouched data sets.

Citations

1. "Gartner Says Worldwide PC Shipments Grew 2.3% in 4Q19 and 0.6% for the Year." *Gartner*, www.gartner.com/en/newsroom/press-releases/2020-01-13-gartner-says-worldwide-pc-shipments-grew-2-point-3-percent-in-4q19-and-point-6-percent-for-the-year.
2. McGee, Patrick. "Tech Companies on Front Foot in Push to Recycle." *Financial Times*, Financial Times, 7 Oct. 2019, www.ft.com/content/e65816e0-be70-11e9-9381-78bab8a70848.
3. Kim, Se-Hee, et al. "Environmental Effects of the Technology Transformation from Hard-Disk to Solid-State Drives from Resource Depletion and Toxicity Management Perspectives." *Setac*, John Wiley & Sons, Ltd, 19 Feb. 2019, setac.onlinelibrary.wiley.com/doi/abs/10.1002/ieam.4127.

Resources

1. Manufacturer Yearly Sustainability Report [source]