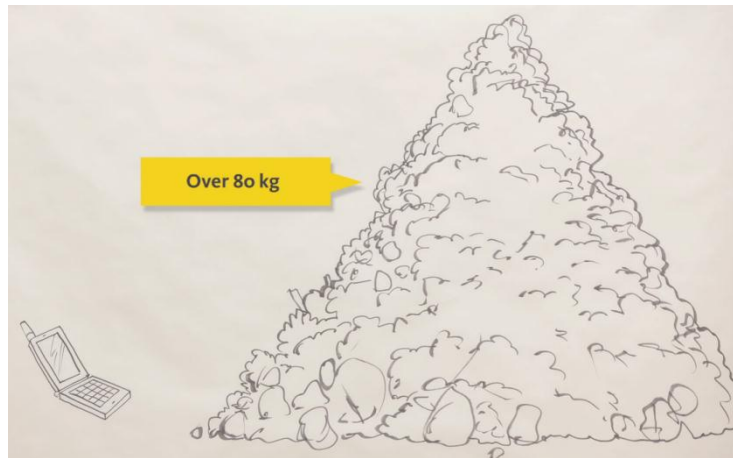


# Introduction to Design for Product Lifetime

## Companion to the video: Script and Illustrations

Designing sustainably means getting the most use out of the materials and energy that go into your product. A great way to do this is by extending its useful life.

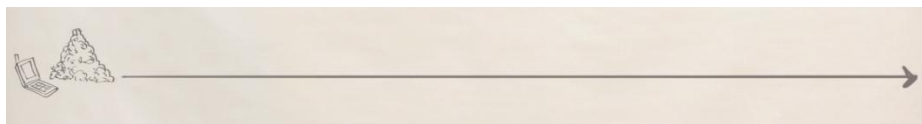
A mobile phone may not weigh much more than a hundred grams, but manufacturing it can cause over 80 kilograms of waste.



If you design a phone that breaks after a year of use, your customers will need to buy a new one every year, and another 80 kilograms of waste is created. Over ten years, that's 800 kilograms per customer.



But if you can extend the phone's life to two years, then half of your manufacturing impact effectively goes away. If the phone lasts 10 years, that's equivalent to 90 percent less material use and waste. A virtual engineering miracle.



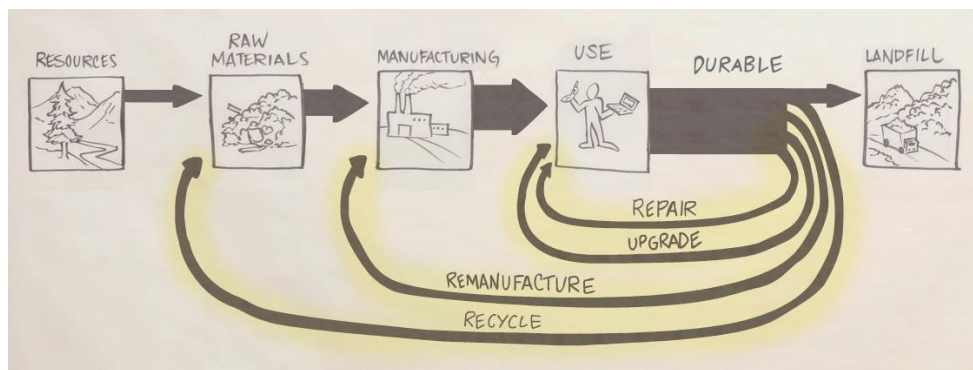
Products go through a basic lifecycle - from raw materials to manufacture to use and eventual disposal.

To maximize your product's lifetime - that is, to extend its "use" phase - you can either make it more durable, so that it's harder to break, or you can make it easier to give the product new life through repair or upgrades.

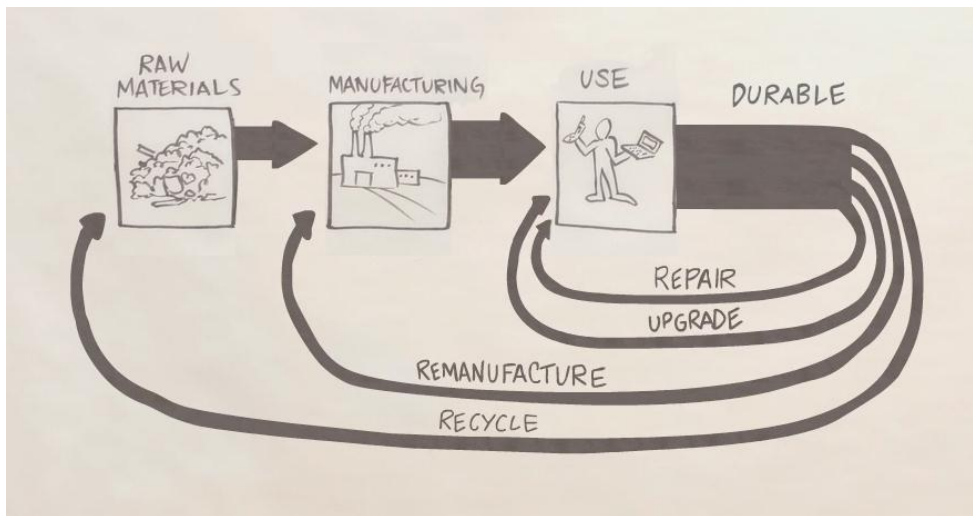
You can also provide an elegant end of life for your product by designing it to be easily recyclable. This skips the disposal phase and helps to ensure that the materials can have a much longer life than the product itself.

Sometimes you can give whole components a longer life than the product - through remanufacturing. This is when companies reclaim used parts and build them into new products.

Most of the time, you'll want to use a combination of these strategies.



The ideal is to have a product lifecycle that's entirely closed-loop, never needing any virgin materials or causing any landfill.



Companies are starting to care much more about recyclability and reuse because of increasingly strict product stewardship laws. It used to be considered good business to make things that would break quickly and get tossed away. New rules are making designers rethink that strategy.

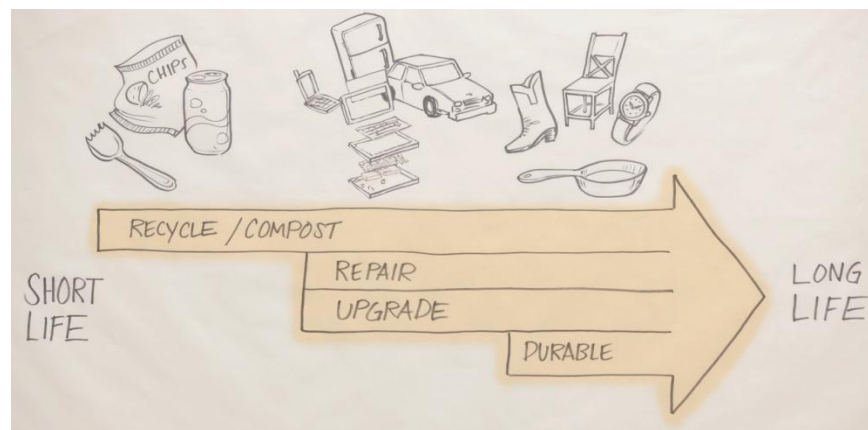
Before we discuss how to design for a long lifetime, let's remember that not everything should be built to last forever.

A take-out food container that will be used for five minutes shouldn't last a thousand years, and it will cause problems if it does. Things like this should be designed to have a good end of life - to recycle easily or to biodegrade quickly and harmlessly.

At the other end of the spectrum, chairs, boots, or other goods that serve long-term recurring needs, still need to be designed for good end of life, but should also be physically and stylistically durable so that they can last a lifetime. Maybe even longer.

These are obvious examples, but most products - from phones and laptops to refrigerators and cars - lie somewhere in between.

These sorts of products, especially technology-heavy ones, tend to become obsolete or break prematurely. So repair and upgrade are key considerations here.



If done right, sales of parts and service can generate a whole new stream of revenue for your company. Maybe even at higher margins than just selling more of the product.

For these strategies to work, the ability to disassemble and access the product components is important.

And the best designs will incorporate all of them.

For instance, when you repair and upgrade, some components will reach their end of life while the rest of the product keeps on living. It's important that these components end their lives well, through recycling or biodegrading.

And durability can be extremely important in medium-lifetime products that get a lot of abuse, like mobile devices.

You'll find the right strategies for your products by keeping the whole system in mind.

Ultimately, your product will be touched by many people. You can enlist all of them to extend its life. Strategies to make a product easy to disassemble can also make it cheaper to produce. This puts manufacturing on your team. Good design will empower your users to repair, upgrade and maintain your products. Choosing good materials and creating takeback programs can bring recyclers on board.

Design for lifetime is the best way to bring together low impact and high quality - and as a designer or engineer, the choices you make can make a big difference. Now let's check out some specific ways to do it.