* Everything in engineering is trade off
* Our greatest fear should be investing resources in things that don’t matter
* 17 UN sustainability goals
* Human wellbeing goes up as people stack paper
* Steel stocks level out ~10 tons of steel per person
* By 2100 well get like 11B people and ~1B people rise to middle class
* Massive industrial booms that will happen
* Goals
  + Minimize: energy use, CO2 emission, resource depletion, environmental impact, investment cost
  + Maximize: convenience, personal image, profit, ability to recycle, job creation
* We’re just a bunch of monkeys with a special little helmet called the neocortex
* Proposals need:
  + Problem definition
  + Objectives
  + Constraints
  + Life Cycle Assessment
  + Optimization Methods
  + Boundaries
* Cost per unit decreases until a value called the “learned out cost”
* 95% of what materials we use are from the ground
* Copper destroys steel integrity
* Input output analysis defined first at UIUC
* Airplane has and insane amount of use, so they have insane energy output
  + Airplanes are fuel tanks that happen to carry people and cargo
  + Dominated by fuel use, so any improvement in efficiency is massive even at the expense of higher manufacturing costs
* ANSYS have ecodata for 4000 materials
* The most CO2 intensive part of making a water bottle is the production of polymer
* Stakeholders are people that are interested in the product
* Human capital, natural capital, manufacturing capital
* Reflect on issues you had with the product before throwing the idea out