

by Team Booming Babies

## Collaboration Analysis

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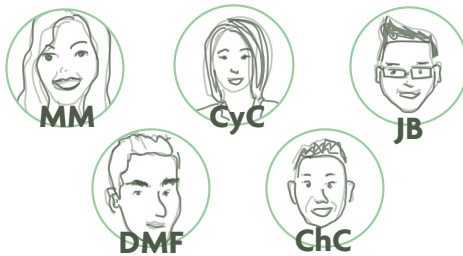
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Hand Me Up (HMU) is working with popular Massachusetts children's consignment boutique Merry Go Rounds to experiment with a mixed online and brick-and-mortar subscription service for gently used children's clothing. Merry Go Rounds has been profitable since 1989, and offers a steady stream of loyal customers and consignors. Our goal is to build on their success with customers and scale their operations with technology, then invest in textile re-manufacture to create a closed-loop apparel economy.



### Advisors

**Vincent Stanley** (Patagonia Director of Philosophy)

**Tracy Gardner** (Gap Board, Former President of J. Crew)

**Hope Connolly** (Former Global Strategy & Supply Chain, Gap)

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- Our proposal:
- 1) NOW: online secondhand children's clothing subscription service that builds a community while scaling adoption..
  - 2) LATER: end of life clothing aggregation and re-manufacture via partnerships with fabric dissolving/melting firms to create new fabric durable enough for extended use and soft enough for babies.

### Solution Summary



**The textile industry is incredibly resource-intensive and a major source of the world's pollution**



- In 2015, the industry emitted **more greenhouse gases than the emissions of the entire international aviation industry and the entire maritime shipping industry combined**, totaling 1.2 billion tonnes of CO2 equivalent. [1]
- The industry uses predominantly non-renewable resources (oil in synthetics, fertilizers in cotton farming, chemicals in textile production, dyeing, and finishing). These resources amount to **98 million tonnes** per year. It also uses around **93 billion cubic meters of water** per year, enough to fill Lake Erie in five years. [1]
- If current trends continue, the fashion industry will use up **a quarter of the world's carbon budget by 2050**. Today, it is 2%. [1]

**The apparel industry creates a massive amount of waste**



- **Every second, one garbage truck's worth of textiles is sent to landfills or burned**. That's **31,536,000** garbage trucks per year. [1]
- Much of the clothing collected for recycling in "developed" countries is exported to "developing" countries with little or no recycling infrastructure of their own. Even when these clothes are reworn, most of them still ultimately end up in landfills.
- The average American throws away **70 pounds** of clothing a year.

**Enormous economic value is destroyed when usable clothing is discarded**

- **Every year, the value of discarded clothing is estimated to be USD 500 billion (huge opportunity for reuse, recycling, and upcycling)**.
- **Fewer than 1%** of garments are recycled into new clothing, representing a loss of more than **USD 100 billion** worth of materials each year. Only 15% of clothing is donated or secondhanded.

**The market for secondhand and upcycled clothing is growing rapidly**



**Our market opportunity**



- **Apparel resale is an USD 18 billion industry and is expected to grow to USD 33 billion by 2021.** [2]
- Resale customers, and consumers overall, are increasingly choosing **access over ownership**. There is a cultural shift away from the accumulation of possessions and towards the "rental economy."
- A service offering access to a rotation of high-quality, secondhand or upcycled clothing would tap into this trend.
- In a survey of new parents (a child born within the last five years), 55% said that either none or less than 25% of their child's clothing was secondhand, but many said that they would be interested.
- **4 million babies are born each year in the US and parents spend an estimated \$60/month in clothing for the first year. That totals almost \$3 billion spent annually countrywide and roughly 28 million pounds of clothing produced per year - just for children in their first year.**

## A Disconnected Ecosystem of Innovation

Solutions exist for many of the pain points addressed in the previous section: secondhand retailers to extend the life of clothing, companies that use re-manufactured fabric, and companies that do the re-manufacturing. However, there is little coordination. What's more, fabric re-manufacture technology is still nascent, and therefore costly. We plan to partner with firms developing this tech to help them pilot their innovations, hopefully saving us money and providing value to them.

### Secondhand Solutions



#### Brick and Mortar

Ex: Plato's Closet, Buffalo Exchange, Goodwill

**Pros:** inexpensive, can try on

**Limitations:** difficult to scale (esp. given need for storefronts); in many cases, perception of "dirty" or "poor"; difficult and time-consuming for consumers to find what they want



#### Online Secondhand

Ex: thredUP, The RealReal, PoshMark, eBay, FB, CL

**Pros:** easier to search for what you want

**Limitations:** with peer-to-peer like Posh and eBay, trust is an issue. With in-network peer-to-peer like Facebook and Craigslist, availability for children's clothes is hit/miss and searching (while easier than driving to store) is still not without hassle.



#### Informal Exchanges

Ex: Clothing from family, church networks, friends

**Pros:** less stigma from known people, free

**Limitations:** not guaranteed, grandparents sometimes buy things that parents hate (eg. "Baby Slugger" shirt, per one interviewee).

### Fabric Innovations

#### Evrnu (patent pending)

Evrnu breaks down cotton garment waste into its molecular components before reconstructing new cotton fibers.

Limitations are around scale and cost, which are likely correlated.

#### Wear2

A thread that can come apart when exposed to specific controlled microwave radiation. The thread is sewn into garments as a way to easily disassemble used clothing.

Limitations are the cost of acquiring the required microwave equipment to safely break down Wear2 threads.

#### RFID - radio frequency ID technology

an automatic and easy-to-program method for sorting returns and shipping deliveries. Limitations are around building robust data management systems to handle the flood of data that RFID tagging brings and building around the different country standards for RFID frequencies.

#### Worn Again (in development)

Textile-to-textile recycling technology that breaks down pure and blended polyester and cotton clothing to create polyester and cellulosic raw materials.

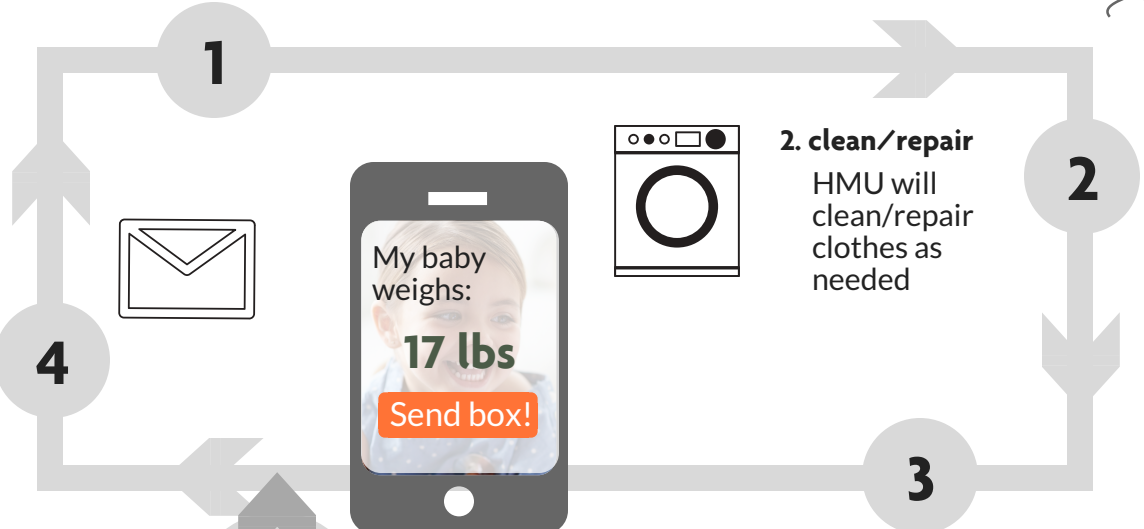
## 1. acquire/sort

HMU will acquire inventory from Merry Go Rounds, as well as from parenting networks (FB, Peanut). All articles are cleaned, sorted, and graded, and receive an HMU tag sewn with an RFID-embedded thread (Adetex) or RF-printed code (HP). Tags specify age and gender for apparel, and will automate delivery logistics, as well as takeback and future sorting and fulfillment.



## 4. collect

When children outgrow the clothing, customer ships the pieces back to HMU in the original box, or drops off at an HMU fulfillment center.



## 2. clean/repair

HMU will clean/repair clothes as needed

## 3. manage subscriptions

Apparel is sold to customers through a mobile-online subscription service. Customers indicate size and general aesthetic to receive a full season's worth of clothes. While customers cannot choose each item, sample pieces that could come in a box of a certain style will be shown on the platform.

### Branding:

Customer research from Merry Go Rounds notes that most parents look for a few basic styles (especially for boys: blue pants, primary color shirts...), which suggested to us that we can offer 5 "styles": Traditional Boy, Traditional Girl, Quirky Boy, Quirky Girl, and Gender Neutral Neutrals.

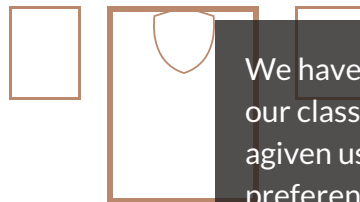
"Traditional" boxes are filled with articles that sell well, like reds and blues, while "Quirky" boxes can be priced lower by selling pieces in less popular colors (orange, purple) that don't move as well in the brick-and-mortar shop.

## create

When clothing is worn out beyond future use in the secondhand cycle, it will be set aside and stored. At this point, HMU's partnership with Evrnu will use their proprietary technology to convert the aggregated cotton garment waste into new, durable and clean fabric.

## upcycle

HMU will use this fabric to construct new staple garments such as baby onesies - items that suffer the highest wear in the subscription box. The HMU line of upcycled apparel will be assembled with Wear2 threads, which come apart when exposed to certain controlled microwaves for easy disassembly, repair, and future remanufacture.



We have delivered prototype boxes to some of our classmates with young children. Parents have given us helpful feedback on packaging, style preferences, the option to return items, and more.

## 1. acquire/sort

Initial inventory will come from excess clothing at Merry Go Rounds. As much as possible, we will source clothing made from "biological nutrients," natural materials such as 100% organic cotton, wool, linen, etc. Technical nutrients must remain in the closed-loop technical metabolism of manufacture, reuse, and recovery. These would primarily be polyester for Hand Me Up, and we would create this loop after the biological loop.

## 4. collect

**Shipping boxes:** HMU will bale and sell a clean stream of old corrugated cardboard (OCC) at the highest possible commodity prices, directly to pulping mills where it can be turned into cardboard again.

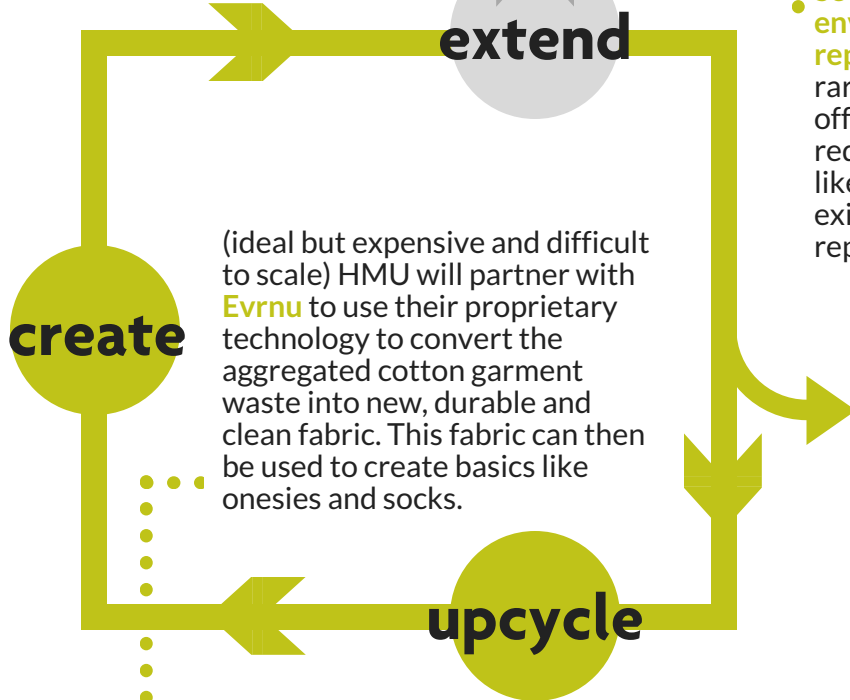
## 2. clean/repair

As much as possible, Hand Me Up will re-use grey water from our washing process, e.g. piping it into toilet bowls in brick and mortar facilities. watering lawns, and more.

## 3. manage subscriptions

We must ensure that the purchase of HMU boxes **actually deters people from buying new clothes:**

• **Secondhand clothing only reduces environmental impact when it actually replaces new clothing purchases**, which is rarely a guarantee. Part of why we want to offer a full season's wardrobe is to make this reduction in new clothing purchases more likely: individual pieces simply supplement existing buying habits, whereas bulk replacement changes behavior.



(ideal but expensive and difficult to scale) HMU will partner with **Evrnu** to use their proprietary technology to convert the aggregated cotton garment waste into new, durable and clean fabric. This fabric can then be used to create basics like onesies and socks.

## What about synthetics and blends?

We see two options:

1. (better but more expensive) Warehouse synthetics and blends and partner with organizations like the Biorefineries Dept at Aalto University (Herbert Sixta), Patagonia, and Worn Again on R&D to solve the re-manufacture problem for these fabrics
2. (less ideal) Downcycle end-of-life synthetic and blended articles to mattress filling, dish rags, etc.

## Alternative solution:

(Cheaper) HMU could partner with other companies to use this fabric as source material for them to develop pilot versions of remanufactured clothing, demonstrating what is possible.

## Possible short term solution

(Less ideal) If the Evrnu process is too costly for the time being, we will consider a larger circular loop via dissolving the cotton into fertilizer to grow new fibers (potentially watered with our grey water)..

**Notes on pricing, risks, and profitability: (refer to Resources for link to full financial model with drivers and assumptions)**

## STRENGTHS

Established storefront and community  
Bootstrap model (cheap way of growth)  
Convenience: all clothes in one go without leaving the house  
Progressive growth in clothing sizes  
Low inventory costs  
Sustainability as a brand and ethos

## WEAKNESSES

Scale of bootstrap model (slow way of growing)  
Logistics - shipping and personalizing  
Cost of Phase II - technology for textile re-manufacture is costly still in development


## OPPORTUNITIES

Wide open market - opportunity for small piece of very large pie  
Growth of sustainable, progressive conscious customers and investors  
Opportunity to chip away at the huge issue with clothing waste  
Fragmented market power in industry

## THREATS

Competition (thrift shops, Facebook marketplace, grandparents)  
Substitutes: non-recycled clothing

- HMU will initially be “housed” in Merry Go Rounds, a children’s consignment boutique owned by Melissa’s mother in Easton, MA. We anticipate using 30% of the store space in the year 1, 60% in year 2, before getting an independent storefront by year 3. In years 1 and 2, we would pay a proportion of Merry Go Rounds’ \$12,000 annual rent.
- **Merry Go Rounds currently generates \$150,000 in sales with near 25% EBIT margins (even with 50% consignment fees).** Those margins are far higher than the ~11% margins in the apparel industry and ~6% margins in the retail industry.[3]
- While consignment gives downside protection, it also costs much more than upfront procurement. Market rates for consignment are 50% of sales, vs. expected 35% of sale price for upfront procurement.
- While there will be five different box styles (traditional boys, traditional girls, quirky boys, quirky girls, and gender neutral), each box will contain 15-20 items (including booties, caps, shirts, jerseys, rompers, pants, jackets) that will match the end user’s size.
- We expect the average cost of those boxes to be around \$40 and we expect to price them around \$125. The \$500 annual cost to parents compares favorably to the \$670 spent on average on clothing for 0-2 year olds in the U.S. by married couples with incomes less than \$59,200 and \$1,110 spent on average by couples earning more than \$107,400. We will also offer lower-priced boxes containing fewer outfits or less popular styles.
- The boxes will be marketed as containing all the outfits needed for a season which is **consistent with customer purchasing behavior at Merry Go Rounds.** Shipping costs of \$10 per box will be absorbed by HMU or customers can come to the store to pick up boxes.
- In our base case, we expect 250 customers in year 1, 1,250 in year 2 and 7,500 in year 3, ordering 4 boxes per year. HMU can reuse each piece of clothing only once more before wear & tear becomes too significant.
- In our base-case scenario, HMU will have a cash shortfall of \$170k in year 1 but will become profitable by year 2 (please see **financial model in References** for details).
- Despite partnering with large companies like Levi Strauss, Evrnu remains a small-scale player in textile reconstruction high costs. In our model, we envision stockpiling inventory until it makes financial sense to partner with our outsource the re-manufacturing.



One opportunity to curtail the threat of competition would be to partner with baby shower registries, so that friends and grandparents can purchase whole seasons of basic clothing for the new baby.



## Customer Challenges

**Need to build: willingness to pay for used clothing (overcome stigma), familiarity with the subscription mail-order retail model, competition**

Many people are familiar with the traditional flow of hand-me-down baby clothing, usually offered freely through informal networks (a large source of competition, however haphazard). Others pay for secondhand apparel, either online through eBay or consignment websites, or in physical thrift stores. The struggle will be pricing the service high enough to signal comparable value with new clothing services like Gap Outfit Box, to address the stigma some have towards secondhand clothing, and low enough to pull customers away from the informal exchanges of friends and family, as well as Facebook and Craigslist. HMU will also have to train users to use the mail-return system.

## Quality & Brand Concerns

**Need to fight: skepticism that recycled fabric is as safe or as comfortable as virgin cotton (especially for babies)**

Tencel, for example, degrades over time. HMU will address these concerns by associating safety and quality with low environmental impact and a sense of honesty and transparency. Sterilization will be done to ensure the upcycled fabrics are safe, but without the associated agriculture and processing impacts of virgin cotton.

## Technology Limitations

**Fabrics are expensive or impossible to re-manufacture.**

Cotton fiber remanufacture has been proven possible (if potentially expensive) by firms such as Evrnu, and will be the basis around HMU's upcycled line. Other materials will be more difficult to process. Patagonia determined recently that synthetic fiber remanufacture, whereby garments are melted down and respun into polyester thread, has become too expensive to be continued. Worn Again is developing technology to re-manufacture synthetic and blended fabric (mixes of natural and synthetic fibers), but the technology is not currently commercially available. Until that changes, HMU would have to warehouse (waiting game) or downcycle blended apparel. Fortunately, the baby clothes market is largely 100% cotton.

## General Business Concerns

**Financial: capital expenditures on warehouse space, labor, and initial customer acquisition; Operational: coordination**

The idea for Hand Me Up's closed loop system with a subscription service has several moving parts and partnerships that require significant coordination. While the intent of having one company do everything is to prevent potential process loss, the operational challenges are daunting: especially shipping.

## Overview

- [1] **A New Textiles Economy report, Ellen MacArthur Foundation:** [https://www.ellenmacarthurfoundation.org/assets/downloads/A-New-Textiles-Economy\\_Full-Report\\_Updated\\_1-12-17.pdf](https://www.ellenmacarthurfoundation.org/assets/downloads/A-New-Textiles-Economy_Full-Report_Updated_1-12-17.pdf)
- [2] <https://www.brookings.edu/research/the-current-and-future-state-of-the-sharing-economy/>
- [3] [http://pages.stern.nyu.edu/~adamodar/New\\_Home\\_Page/datafile/margin.html](http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/margin.html)
- **2017 Annual Resale Report, thredUP:** <https://www.thredup.com/resale>
- **Sustainable Apparel Coalition - Higg Index:** <https://apparelcoalition.org/the-higg-%20index/>
- "Is Owning Overrated? The Rental Economy Rises", New York Times, August 2014 [https://www.nytimes.com/2014/08/30/upshot/is-owning-overrated-the-rental-economy-rises.html?\\_r=0](https://www.nytimes.com/2014/08/30/upshot/is-owning-overrated-the-rental-economy-rises.html?_r=0)
- Circular Design Guide: <https://www.circulardesignguide.com/>
- "Sustainable Apparel: Production, Processing and Recycling" by Richard Blackburn on pages 194-196 - <https://goo.gl/TLJx2K>
- "Circular economy offers a new vision for the fashion industry", Circulate News, November 2017 <http://circulatenews.org/2017/11/circular-model-fashion-industry/>
- "Two Entrepreneurs Turn Waste Into A Business", Forbes, July 2016 <https://www.forbes.com/sites/eshachhabra/2016/07/28/two-entrepreneurs-turn-waste-into-a-business/#67af30e43827>
- "H&M, Kering, and innovation company Worn Again join forces to make the continual recycling of textiles a sustainable reality", March 2015 press release, [http://www.kering.com/en/press-releases/hm\\_kering\\_and\\_innovation\\_company\\_worn\\_again\\_join\\_forces\\_to\\_make\\_the\\_continual](http://www.kering.com/en/press-releases/hm_kering_and_innovation_company_worn_again_join_forces_to_make_the_continual)
- "For Dignity and Development, East Africa Curbs Used Clothes Imports", New York Times, October 2017 <https://www.nytimes.com/2017/10/12/world/africa/east-africa-rwanda-used-clothing.html>
- "The Facts about Textile Waste", Council for Textile Recycling, <http://www.wearonaterecycle.org/about/issue.html>
- "Where Does Discarded Clothing Go?", The Atlantic, July 2014 <https://www.theatlantic.com/business/archive/2014/07/where-does-discarded-clothing-go/374613/>
- "What Really Happens to Your Clothing Donations?", Fashionista, January 2016 <https://fashionista.com/2016/01/clothing-donation>

## Companies we looked at

- |  |   |
|--|---|
| • Wear2: <a href="http://wear2.com/">http://wear2.com/</a>   | Wee Blessing: <a href="https://weeblessing.com/">https://weeblessing.com/</a>                                   |
| • Evrnu: <a href="https://www.evrnu.com/">https://www.evrnu.com/</a>                               | Rockets of Awesome: <a href="https://www.rocketsofawesome.com/">https://www.rocketsofawesome.com/</a>           |
| • Vigga: <a href="https://vigga.us/">https://vigga.us/</a>   | Gap Outfit Box: <a href="https://www.babygapoutfitbox.com/buyflow">https://www.babygapoutfitbox.com/buyflow</a> |
| • Reformation: <a href="https://www.thereformation.com/">https://www.thereformation.com/</a>       | BanaBean: <a href="https://banabean.com">https://banabean.com</a>   |
| • The Real Real: <a href="https://www.therealreal.com/">https://www.therealreal.com/</a>           | FabKids: <a href="https://www.fabkids.com/">https://www.fabkids.com/</a>  |
| • thredUP: <a href="https://www.thredup.com/">https://www.thredup.com/</a>                         | KidBox: <a href="https://www.kidbox.com/">https://www.kidbox.com/</a>   |
| • Plato's Closet: <a href="https://www.platoscloset.com/">https://www.platoscloset.com/</a>        | Mac and Mia: <a href="https://www.macandmia.com/">https://www.macandmia.com/</a>                                |
| • Once Upon a Child: <a href="https://www.onceuponachild.com/">https://www.onceuponachild.com/</a> | Kidpik: <a href="https://www.kidpik.com/">https://www.kidpik.com/</a>   |
| • StitchFix: <a href="https://www.stitchfix.com/">https://www.stitchfix.com/</a>                   | Pure Waste Textiles: <a href="http://www.purewaste.org/">http://www.purewaste.org/</a>                          |
| • TrunkClub: <a href="https://www.trunkclub.com">https://www.trunkclub.com</a>                     | Worn Again: <a href="http://wornagain.info/">http://wornagain.info/</a>   |
| • Goodwill: <a href="http://www.goodwill.org/">http://www.goodwill.org/</a>                        | Easy Kicks: <a href="https://www.easykicks.com">https://www.easykicks.com</a>                                   |
| • Salvation Army: <a href="http://www.salvationarmy.org/">http://www.salvationarmy.org/</a>        | Everlasting Wardrobe: <a href="https://www.everlastingwardrobe.com/">https://www.everlastingwardrobe.com/</a>   |
| • Pley: <a href="http://www.pley.com/">http://www.pley.com/</a>                                    | (most similar to our concept)   |

## Interviews and Surveys

### Problem research:

- Interview with Hope Connolly: <https://goo.gl/FU4DD7>
- Interview with Tracy Gardner: <https://goo.gl/F4aE66>
- Interview with Vincent Stanley: <https://goo.gl/eUG6sV>
- Presentation by Lukas Hoex: <https://goo.gl/pYSB7w>

### Parent research:

- Secondhand shopping perceptions survey: (Screenshot: <https://goo.gl/GvWSBw> ; Results: <https://goo.gl/WUu1Hg>)
- Interview with Laura Ackerman: <https://goo.gl/FVKaMK>
- Interview with Henry Tseng: <https://goo.gl/n4PkBR>
- (and many thanks to the handful of SOM student parents we talked to between classes)

## Miscellaneous

Peanut (app for new mothers to connect with one another): <https://www.peanut-app.io>

Chris Chen's Notes on Blockchain: <https://goo.gl/H8vGBk>

Chris Chen's Notes on Machine Learning: <https://goo.gl/D2EAJe>

### Blockchain Research:

Blockchain Overview: <https://goo.gl/43bx4U>

HBR - Supply Chain Transparency: <https://goo.gl/fdg7ph>

TechCrunch - Supply Chain Transparency: <https://goo.gl/Aoyjq9>

TechCrunch - Supply Chain: <https://goo.gl/Vf4xwa>

IBM: <https://goo.gl/oHp1Fv>

### Machine Learning Research

Machine Learning in E-Commerce: <https://goo.gl/UisnMW>

Machine Learning in E-Commerce: <https://goo.gl/H8vGBk>

TechCrunch - Utilizing Facebook in E-Commerce: <https://goo.gl/j5rAeK>

- **FULL FINANCIAL MODEL**
- [https://drive.google.com/open?id=1bAybVpXmNq-fF\\_LcMoD\\_53X0FRtqgRK7](https://drive.google.com/open?id=1bAybVpXmNq-fF_LcMoD_53X0FRtqgRK7)
- Drivers/assumptions included: calendar, personnel, Sources and uses, depreciation, SG&A, shipment, income statement, inventory, tax, pricing, PPE, and marketing