CoCoTaps: Tapomatic Requirements Document 0.0

CocoTaps is using a modified US government design review process to design, fabricate, and distribute the Tapomatic product. This will aid in keeping the product within budget, on time, and limit requirement creep. All tasks will be tracked using Asana, time tracked using Harvest (via Asana integration), and data store in an organized CocoTaps OneDrive folder.

Last Updated: 03/16/2020
Authors: Blair Gordon & Blaze Sanders

1.0 Mission Concept Review (MCR)

Objectives:

1. Launch prototype by 7/4/20 in a small Las Vegas business for less than $1.2K per unit.
2. Create product with an easy to learn User Interface and great 1st time User Experience.
3. Build a product that delivers ready to eat and drink coconuts in less than 30 seconds.
4. Build hardware that is easy and fast to repair in the field by non-engineering personnel.
5. Build a *drilling, tapping, and topping off module* that can be placed into three different environments (Small Production, Retail, Large Production) for a variety of business use cases (see Figure 1 below)
6. Build 30,000 units by July 2021 to take over coconut commodity space.

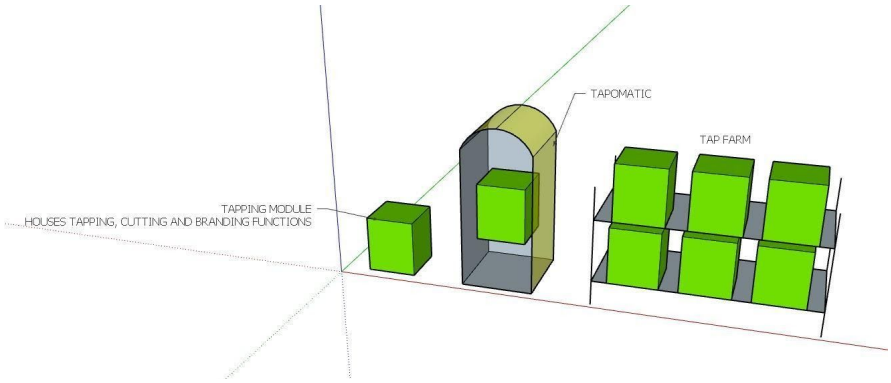

Figure 1 - Modular drilling, tapping, and topping off module

Concepts to meet Objectives:

1. Submit v2020.0 BOM to CocoTaps/Vincent Zaldivar by March 12, 2020
2. All design choices must focus on machine adaptability to profitably cater to user demands in the machines' demographic.
3. All actuator movements should be in parallel with GUI selection to lower the total vend time. This means that the ordering process is NOT reversible after a GUI selection, by design.
4. Make all hardware subsystems snap and fit modules that are replaceable in less than 10 mins for a repairperson, and allow coconut drop shippers to refill food subsystem via current cardboard boxes in less than 5 mins.

5. Use modular design to increase the flexibility, reliability, and ease of programming. Thus enabling footprint adjustment, increases & decreases in functionality, and repair at optimal cost.
6. Building 98% (or more) of all metal parts in-house using Tormach 1100 CNC will make this scale reachable fastest and for an average price.

	Vinny (CEO)	
Joe (Operations Lead)	Rob (Sales)	Blair (R&D)
Gerry (Convention Verticals)	Sergio (Miami Sales)	Blaze (Engineer)
Laura Hawkins (NSF Account Manager)	Cody (Sales & Customer Management)	Rick (Delivery Driver)
Table 2 - CoCoTaps Org Chart as of March 1, 2020		

1.1 User Research

Insert Dr Phil research here on May 1, 2020

Survey Monkey: https://www.surveymonkey.com/r/PKQT8Y7

Base engineering questions:

1. How many on screen flavor infusions would start to feel overwhelming?
2. Please select 3+ flavors you would like to drink:
3. How long are you willing to wait at a bar for a freshly tapped coconut?
4. Does the idea of LASER etched coconuts sound awesome or stupid?
5. Do the touchscreen button clicks feel good?
6. Which button highlight system do you like best?
    a. None
    b. Green button background flash
    c. Blue glow ring around button
    d. Green shadow under button

Google Forms:

1. ROBO BEV EXAMPLES: User Design Feedback and Coffee Feedback

2. Tapomatic User Experience Feedback

Twitter Polls: https://twitter.com/cocotapsforyou

1. ROBO BEV EXAMPLES: Twitter Poll #1 & Tweet #2
2. Tapomatic Speed of vending poll

In-Person Interviews with 20 people:

1. www.usertesting.com?

1.2 SWOT Analysis

Competition SWOT Analysis in order of concern:

1. **KoolCoCo – The worlds first coconut vending machine. Drills but does not tap. Large for factor**
2. **Assorted random coconut vending machines. Drill but does not tap. Slow and large form factor. Limited numbers**
3. **Bottled coconut water Bottled and shelf stable but no where near as fresh or ocean friendly**
4. **Zumoval, Vevor and other countertop fresh Makes other fresh drink options but currently no Coconut.**

Table 3 - Tapomatic Internal SWOT Analysis	
Strengths 1. The only machine that can drill, tap top off, and infuse flavor. 2. Modular and highly serviceable 3. Great loving team with 20 years / strong hardware and food industry experience. 4. Issued Patent on Tap	**Weakness** 1. Needs to be loaded by an employee in Retail operations 2. Needs accompanying cooler in Retail operations 3. Only sells 270 coconuts per day
Opportunities 1. Vacation Verticals 2. Brand on Demand 3. Festivals and Seasonal Venue	Threats 1. Acts of God (pests, weather) affecting the coconut crop 2. Supply Chain Issues 3. USDA 4. NSF

2.0 Mission Definition Review (MDR)

All food requirements must be described in imperial units (oz, lbs, feet)
All hardware and software requirements must be described in metric units (mL, kg, cm)

2.1.A Tapomatic App / Wifi Access v2020.0 Functional Requirements:

No app is currently being designed for launch. But Progressive Web App (PWA) team hire could make that possible.

2.1.B Tapomatic Kiosk v2020.1 Functional Requirements:

In order of priority for v2020.1 releasing July 4, 2020.

1. **User Interface / User Experience (UI/UX):**
    a. Tapomatic shall be movable by a single person without a dolly.
        i. Design Note: Less than 40 lbs without fluids
    b. Tapomatic shall self-center the coconut in the X and Y axis so that branding is consistent and for drilling and tapping process.
        i. Design Note: Via funnel?
    c. Tapomatic shall interface with users on a 55 cm or larger touch screen with a resolution of at least 1824 x 980.
        i. Design Spec: Touch latency must be less than 65 ms.
        ii. Design Note: Screen must-have color and B&W mode to test grayscale for colorblind users (like Instagram filters).
        iii. Design Note: Used for visual advertising and future use cases
    d. Tapomatic shall not allow users to cancel an order (or get refund) after selecting tap or cut.
        i. Design Spec: The following text shall be displayed in small red text on the tap or cut screen, “ Warnings: There is no back / cancel button after this screen. We are performing irreversible actions in parallel with your selections to speed up the vending process.”
    e. Tapomatic shall show tapping operation in 720p resolution or greater.

   i. Design Note: It's important that the customers witness the tapping operation as part of the marketing “show”. It's important that social media branding is near the video window for those times when they take a picture or video of the process and upload it to their social media.

f. Tapomatic shall serve one coconut at a time on the same side as the touchscreen.
   i. Design Note: User will need to remove coco before next user can vend.
g. Tapomatic shall be no larger then 586 x 566 x 945 mm.
h. Tapomatic shall use the following HTML tags ONLY to keep system performance.
   i. Elements: <Button> and <Image>
   ii. White Space: <TR> <TD>
 <???>
i. Tapomatic shall use only Dark Green (0x086D38), Light Green (0x86C042), Apple White (0xFDFDFD), White (0xFFFFFF), Apple Black (0x010306), Logo Black (0x2A3627) branding colors on all hardware and software.
j. Tapomatic touch screens shall be readable in direct sunlight.
   i. Design Spec: A true sunlight-readable display is normally considered to be an LCD with at least 1000 nits of screen brightness and a contrast ratio greater than 5 to 1.
k. Tapomatic v2020.0 shall NOT use audio input or output but must contain both microphone and speaker hardware.
   i. Design Note: Microphone must work as well as the Amazon Echo.
l. Tapomatic v2020.0 shall NOT use video input but must contain at least two cameras (one internal and one external).
   i. Design Specs: At least 720p, 30 FPS, HDR, USB 3.0, Global Shutter, Color
m. Tapomatic shall have external LED illumination to aid in the marketing and customer attraction to the machine.

2. Back End Support of UI/UX:

a. ALL SYSTEMS SHALL BE BUILT WITH USER PRIVACY IN MIND
b. Tapomatic shall service all internal modules via a 45 x 45 cm wide sliding doors.
   i. Design Note: Swinging doors make servicing close to a wall very difficult.
c. Tapomatic shall have two exhaust fans; one to cool electronics and one to vent food smells.
   i. Design Spec: Air flows should NOT be allowed to cross contaminate.

3. Food Subsystems:

a. Tapmotic shall use Certified Stainless Steel 316 from McMster-Carr for all internal parts touching or near food items.

    i. Design Note: Certification for Corrosion-Resistant 316/316L Stainless Steel Rod with Certification, 2" Diameter https://www.mcmaster.com/mv1583954239/WebParts/Activity/PDFRetriever/Certificate%20for%200311BSANDERS%20line%201.pdf?orderId=5e69a261e2dba91dc463b5a4&orderLineSequence=1000&docType=Certificate&action=1&loaded=1&retryCount=1

b. Tapmotic shall serve 270 (or less) coconuts per 24 hour day using 15 trays, each containing 18 taps.
    i. Design Spec: Tap trays are circular and self loading internally like vinny record players (drop down from above when bottom tray is empty).
    ii. Design Note: This is limited by the cooler size and effects tap tray sizing!
    iii. Operation Note: Every time cooler is refilled with coconuts 1 of 15 tap trays is also refilled.
c. Tapomatic shall infuse coconuts with 3 or fewer flavors.
    i. Design Spec: Pineapple, Rum, and Original Red Bull (as of 2020-27-02).
    ii. Design Spec: Rum, Pina Colada, Cold Brew (as of 2020-03-05).
    iii. Design Spec: injector should clean itself after each and every flavor injection with sanitizing water.
d. Tapomatic shall use two-sided knives to increase the time between the servicing of dull blades.
e. Tapomatic shall have an interchangeable module that can tap and drill a coconut in 20 seconds, and top off a coconut in 15 seconds.
    i. It should not exceed 510mm x 510mm x 510mm
f. Tapomatic shall have a combined drilling and tapping module that exchanges tool on the same Z-axis arm.
g. Tapomatic shall have an interchangeable cardboard tray to hold 18 taps.
    i. Design Note: Defined by requirement **2.1.B.3.A** above.
    ii. Design Spec: It should not exceed 300 x 300 x 20 mm.
h. Tapomatic shall torque taps to ??? Nm to stop “strippers” from forming.
    i. Design Spec: Current Ikea Model #001.961.01 drill uses setting 5
    ii. Design Spec: Current Harbor Freight Model #60238 drill uses 2080 RPM
i. Tapomatic shall brand logo on to the front of a coconut with the following specs:
    i. Max Resolution: 720p
    ii. Max Size: 90 x 90 mm
    iii. Depth into coconut: 5 mm
    iv. Squareness of Image: 98% (Correction for coconut curvator via software)
j. Tapomatic shall allow one or none of six branded logos to be selected.
    i. Design Note: JPEG images are uploaded via Over The Air (OTA) updates dependent on kiosk location.
k. Tapmotic shall vend only one coconut size (4 x 4 x 5.33 inches ±0.2 inches) at a time.

   i. Design Note: Verify with computer vision statistical analysis.
l. Tapomatic shall use only electric food preparation equipment.
   i. Design Note: No propane or natural gas.
m. Tapomatic shall spill less than 1% of the coconuts it vends.
   i. Design Note: Eliminates the need for employees to clean kiosk.
   ii. Design Concern: Customer human error may increase this to 10% :)
n. Tapomatic shall self clean every 6 hours (or 720 vends whatever comes first) with 20 oz of hot water.
   i. Design Note: A single 2.5-gallon freshwater and another separate 2.5-gallon grey water tank is needed to hold all this water.
   ii. Design Note: Grey tank drains via standard ½" drain fitting.
o. Tapomatic shall have ½" water IN fitting and 1.5" water OUT fitting.
   i. Design Note: Outlet is larger than inlet to reduce clogging from coconut debris.
   ii. Design Spec: Both fittings must have covers to make them look better physically.

4. Project Management:

a. Tapomatic v2020.0 shall only source parts that can be shipped in 2 days or less.
   i. Design Note: Amazon Prime, McMaster-Carr are preferred suppliers.
b. Tapomatic shall use Asana with Due Dates & Tags on newly created tasks.
c. Tapomatic shall use InstaGantt for all business and engineering prototype & product planning.

5. Sensor Subsystems:

a. Tapomatic shall track all liquid levels to an accuracy level of 50 ml.
   i. Design Spec: Non-contact / non-contamination method required.
   ii. Design Note: SICK Capacitive Proximity Sensor (as of 2020-03-05).
b. Tapomatic shall have at least two temperature sensors to measure the temperature of fluids right before vending to the user.
c. Tapomatic shall have the ability to monitor the following via the internet:
   i. Cleaning logs (to pass NSF safety requirements)
   ii. Tap count (to enable auto reordering by the vendor)
   iii. Liquid flavor levels (to enable auto reordering by the vendor)
   iv. Force on cutting blades (to enable auto reordering by the vendor)
   v. Operational analytics such as:
      1. Time in Service (hours)
      2. Energy consumed (Wh)
      3. Time-lapse photos of tapping module (1 FPS)

vi. Liquid water and food safe chemical levels (to clean machine)
vii. Other consumables?

6. **CPU Subsystems:**
    a. Tapomatic shall use an embedded Linux Distribution and run ROBO BEV OS.
    b. Tapomtic shall have the following data connection options:
        i. WiFi 5 or higher (2.4 GHz and/or 5 GHz)
        i. Full-sized DVI-I connector
        ii. Locked externally accessible ethernet port.
            1. Design Note: For on-site SSH code debugging
    c. Tapomtic shall NOT have the following data connection options:
        i. User available USB ports, that could cause the computer to crash or get viruses.
    d. Tapomtic shall backup its OS and all files every 7 days
        i. Design Note: Even on low battery power.
        ii. Design Spec: TeamViewer Remote Management
    e. Tapomtic shall perform 8 GB Over The Air (OTA) updates every four weeks.
    f. Tapomtic shall have at least 4 cores and two CPU'sand run at 2400 MIPS
        i. Design Note: One CPU to run GPU and One CPU to run motors so that they can crash independently and provide fast user interaction,
        ii. Design Note: Pi 3 runs at 2441 MIPS (SOURCE)

7. **Power Subsystems:**
    a. Tapomtic shall have the ability to power cycle ALL electronics via the internet.
    b. Tapomtic shall be powered via a single US outlet (120VAC) circuit with **two** plugs.
    c. Tapomatic shall have one hidden outlet built in with one socket.
        i. Design Note: Could be used to power a 120VAC/30A cooler or lights.
    d. Tapomatic shall have a white LED master power switch and power indicator on the rear of the machine.

3.0 Tracked Hardware Bugs

1.0 Internal Bugs:

1. None yet :)

2.0 NSF Food Safety Feedback:

1. None yet :)

4.0 Tracked Software Bugs

See Github Issues at: https://github.com/ROBO-BEV/Tapomatic/issues

5.0 Project Management

See: https://app.instagantt.com/shared/s/1162897629285881/latest