WEEKLY SPONSOR COMMUNICATION

TO:	VICTOR NUNEZ, AESCULAP
FROM:	CASSIE CHRISTMAN
EDITOR:	ALEXIS HAUPT
TEAM NAME AND NUMBER:	AESCULAP 1
DATES COVERED IN THIS COMMUNICATION:	APRIL 25, 2016 TO MAY 1, 2016
WEEK NUMBER:	11 OF 15

Overview

This week we selected the distraction method which we will use for our final design. We also assigned the remaining components of the distractor (impaction handle, ratchet system, paddle connect system, paddle geometry, cost estimates, handles, and measurement system) amongst our team. The progress each of us made on our assigned tasks is detailed below.

Accomplishments

1. After spirited debate and careful consideration of the information we collected the last few weeks regarding target specifications, we chose our final distraction mechanism to be Pliers-S. The initial sketch of the Pliers-S design can be found in Exhibit 1.

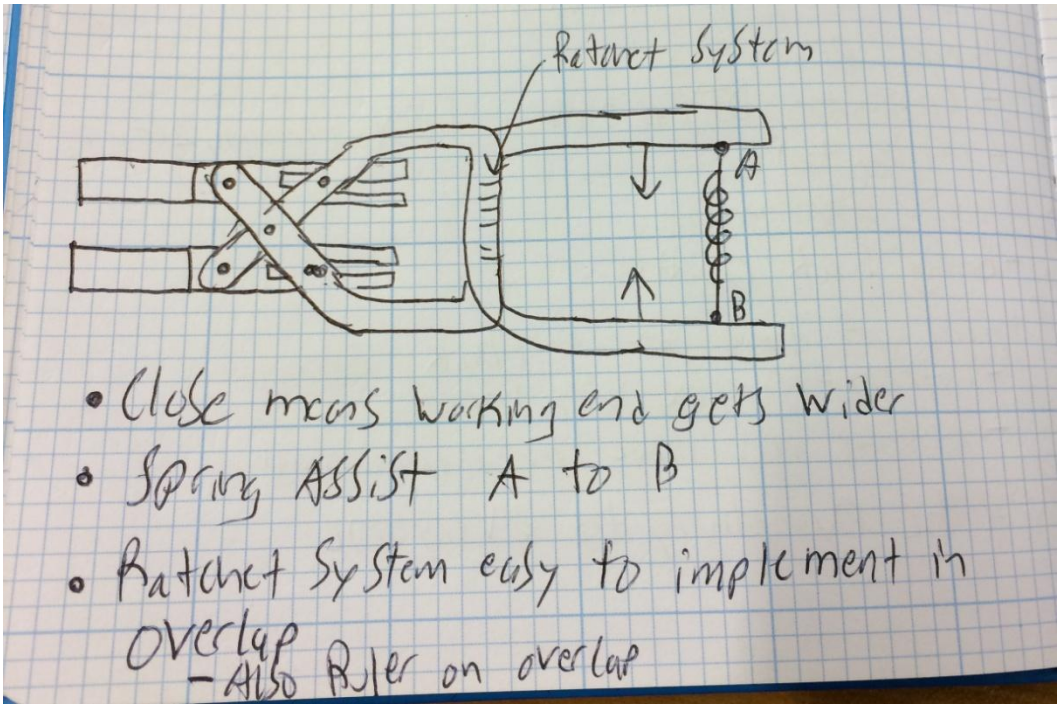

Exhibit 1- Pliers-S Sketch

2. Now that we have determined a distraction mechanism, we began working on the remaining components of the distractor by dividing them up among our team as follows:
    - Impaction handle- Christian
    - Ratchet system- Brian
    - Paddle connect system- Me
    - Paddle geometry- Jadon and me
    - Cost estimates- Cassie O.
    - Handles- Jadon
    - Measurement system- Alexis

3. The ideas Christian generated regarding the removable impaction handle are displayed in the exhibits below. The design in Exhibit 2 consists of a singular piece of material with cutouts in the shape of the distractor handle ends; the impaction handle would slide over the ends of the handles when it is to be used. The impaction handle in Exhibit 3 fits between the distractor handles and has a knob that would be hammered on that is oriented away from the distractor.

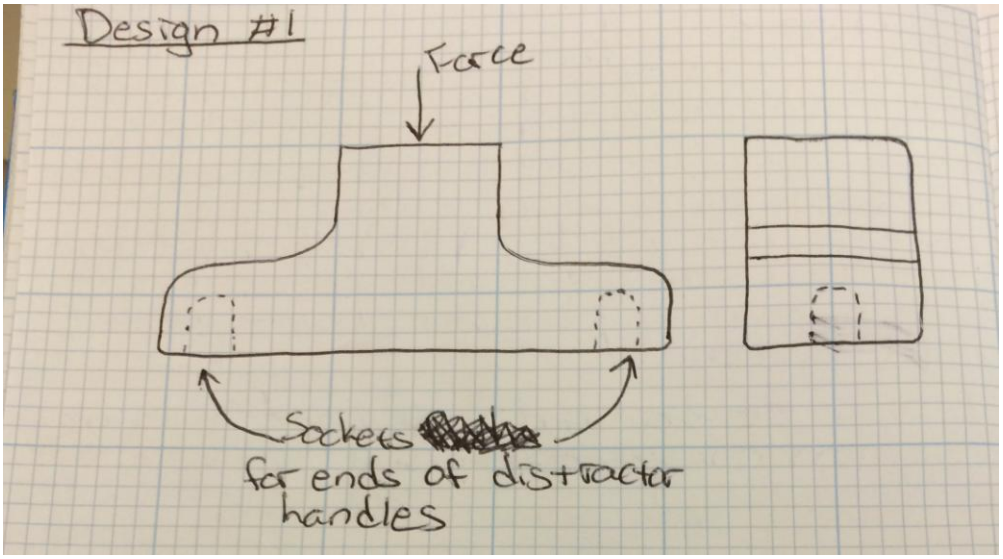

Exhibit 2- Impaction Handle Attachment Idea 1

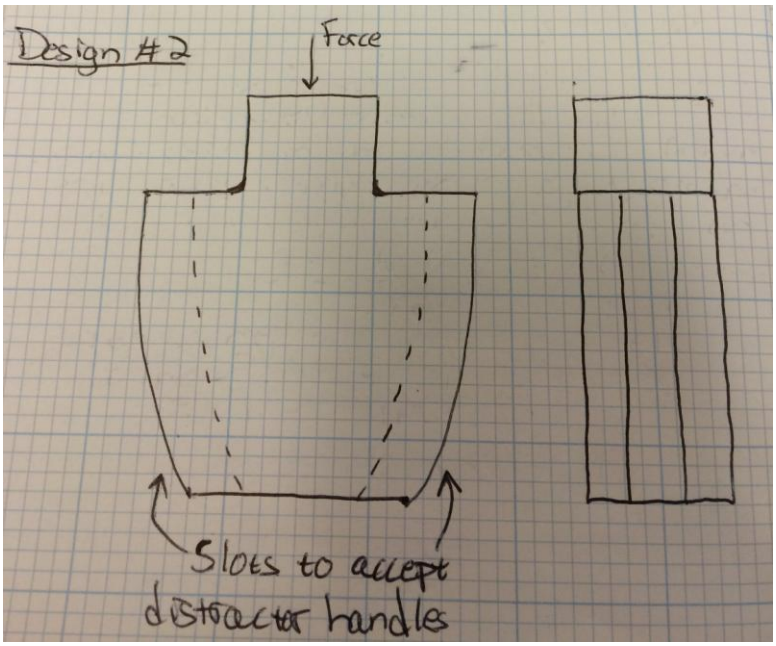

Exhibit 3- Impaction Handle Attachment Idea 2

4. Brian researched various ratchet systems and used those concepts to create the ratchet system design shown in Exhibit 4. This idea is inspired by a classic socket wrench in which there is a gear with teeth on the upper section of the handle. For movement in one direction (counter-clockwise), the teeth are designed to have minimal resistance against the lever as they pass harmlessly across and past the lever. For movement in the clockwise direction, these teeth are designed to catch on the lever (which is attached to the other handle) and prevent relative movement between the distraction paddles. Counter-clockwise movement can be achieved by pulling on an external lever attached to the internal lever that will release the internal lever from the toothed gear.

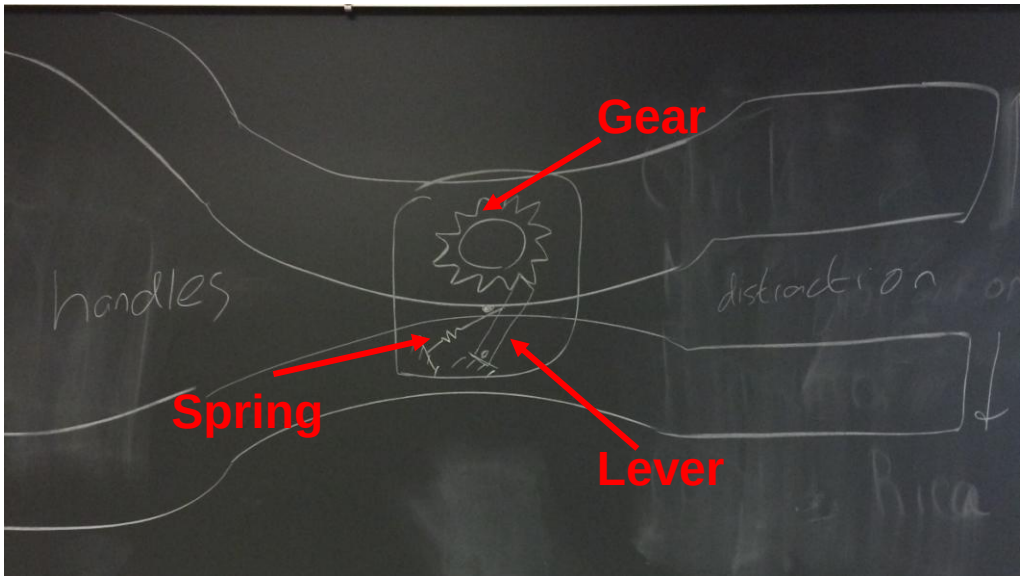

Exhibit 4- Ratchet System Sketch

5. I 3D printed my Slit-and-Lock paddle connect system design, which is pictured in Exhibit 5. The physical model made me realize the impracticality of the design because of its lack of locking. To improve this design, the extruded portion and track should be "T" shape rather than a square, so that the paddles are locked together no matter the paddles orientation. I also thought of an additional paddle connect system that uses a threaded design similar to that of a cap on a bottle to lock the paddle in place.

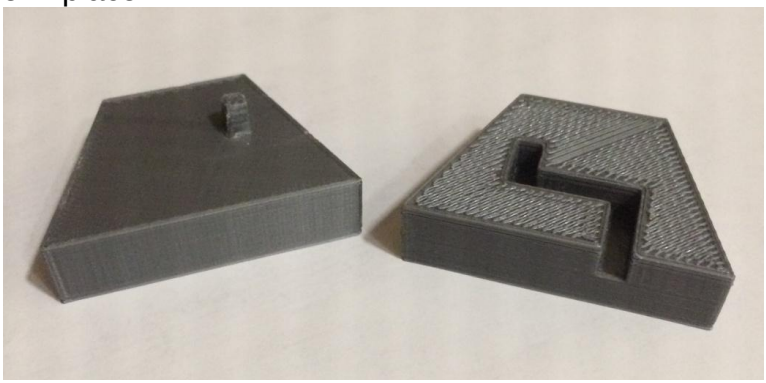

Exhibit 5- 3D Printed "Slit-and-Lock" Paddle Connect System Idea

6. Jadon considered the implications of the handle-joint-arm connection depicted in Exhibit 6. He determined that each side will be constructed out of a single piece of material, which means that the angle between the handle and the arm will not change as the surgeon applies force to the distractor. Jadon calculated the angle for the maximum distraction force to be 135 degrees. This will ensure a 90 degree angle when the paddles are closed. This fixes the separation between the handles for easy attachment of the impaction handle.

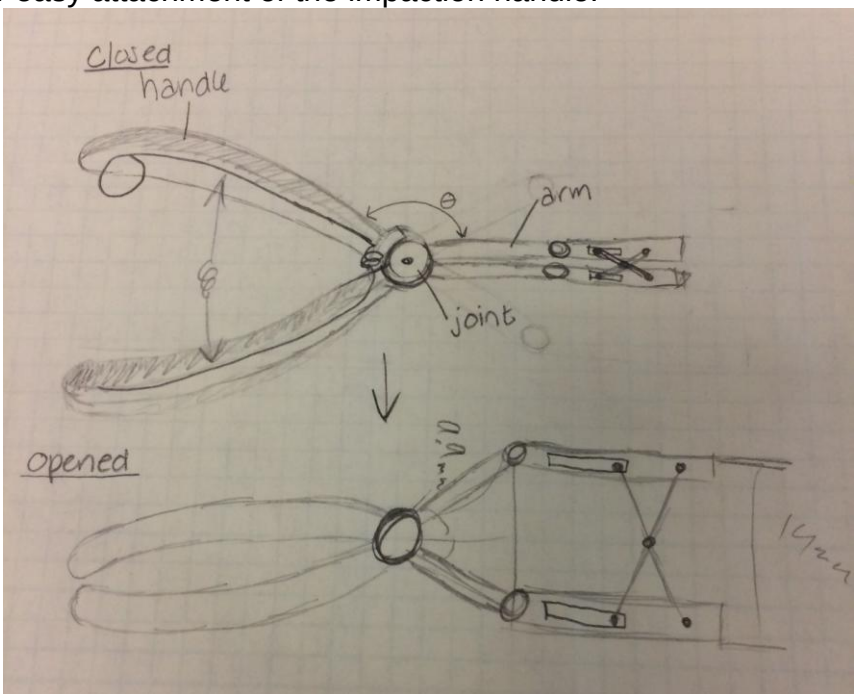

Exhibit 6- Handle-Joint-Arm Mechanics Sketch

7. We also outlined the topics to cover in our final presentation, which helped us further understand the goal of the project and how to best select the designs for the remaining components of the device.

Next Steps

1. We will draw out a complete, final design of the distractor at our meetings next week.
2. We will each make individual progress on our assigned tasks.
3. Brian will begin working on the financial base-case model for our distractor.

Project Related Questions

1. For the paddle quick connect system, what are the justifications of "quick"? For example, must the system be done in one minute or is it more along the lines of a one motion connect system?
2. What is the purpose of multiple paddles and how should these paddle designs vary?