

# Reorganizing the Senior Section

## Because the Seniors Changed what a Professional Design Firm did in Favor of The Tub

### 1. Define the Problem / Identify User(s) & Their Need(s):

#### Research

Links to possible ideas using CNC router

- <https://www.cgtrader.com/3d-models/furniture/sofa/parametric-bench>
- <http://smartechnodesigns.co.za/product/coffee-table-1/>
- <https://www.instructables.com/id/Piggy-Coffee-Table-CNC-Router/>

Although some of our research consisted of looking at ways in which people organize spaces like with cubbies, shelves and storage spaces, the bulk of our research was done standing in the senior section and talking to our users as well as Sally and Don.

#### Identifying users

Possible Users: Seniors who use senior section, people who walk through the senior section

Form sent to all seniors: <https://forms.gle/HNH3F9UvwnH4RnbS6>

#### Form Input Summary:

From the form we found that of the 26 seniors who added their input, 76% of seniors who answered the survey leave bags in the senior section most of the time while about 50% leave bags in hallways and the MSL when not in the senior section. We also found that very few seniors use the MSL bag pyramid or the cubbies downstairs. Aside from just backpacks, we also discovered that 88% of seniors who answered the survey also bring jackets. When asked specifically about what people like about the senior section the consensus was that it is a central location for bags that is both comfortable and social. When asked about what people didn't like about the senior section seniors in the survey said they disliked how messy and unorganized it can become due to the lack of places to put bags and coats. People also disliked the lack of seating and congestion.

#### Interview Questions- Sally and Don:

What are current problems that you see with the senior section?

- Backpack Problem - messy, could block entrances and exits
- Balancing seating, there's no way we will have seating for every student
- Problems with design: choosing whether to design for high or low people (break or free block)

- Problems with cubbies: who cleans up with stuff left there
- Tried hooks: bags pile up on the wall and its harder to access the hooks
- Aesthetic problem of walling off railing with coats and stuff
- General: no campus center at CA
- The tub, creates outer and inner environment (possible exclusive)

What positives do you see coming from the senior section? (more for sally)

- Accommodate as many students as possible

Is there anything you wish was different about the senior section?

- Upper stu classroom opening up; expensive, takes away classroom space

When you updated/renovated the senior and upper stu what did you change to address organization?

- More Seating (literally 20+ more seats)

What were the key goals you wished to accomplish by redesigning the upper stufact? Do you feel those have been successful?

- Space to work and hang out
- Needs to be durable
- Keep the cost down
- More seating
- Flexibility, being able to move things around
- Update with paint and mood
- Keep in mind lighting
- Maybe think about using student art / how wallspace is taken up

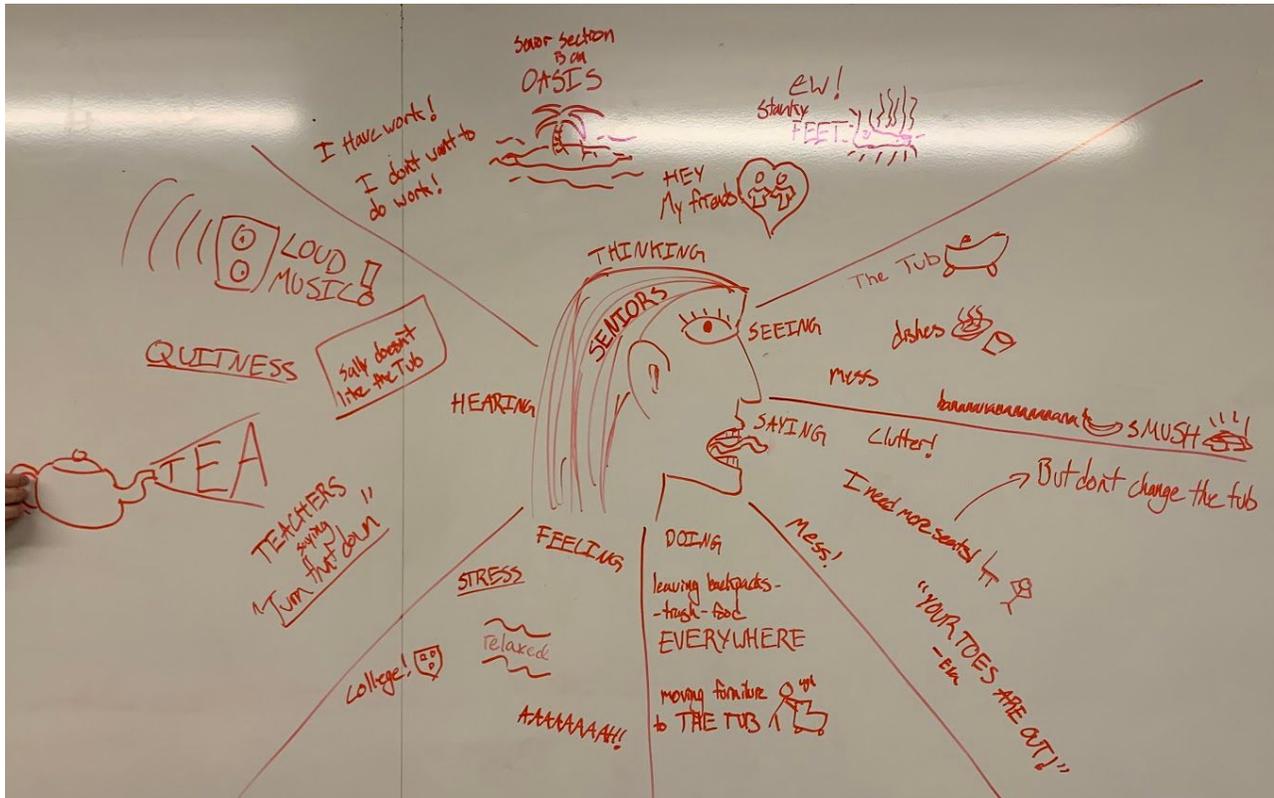
What restriction that students may not be aware of should we pay attention to? ie. Firecodes?

- Sea of backpacks is concerning
- \*Don is more than willing to work with us with prototypes\*

Can we create installments/ things to put on walls for coats?

- Maybe - Work with Don and Ops

## Empathy Map:



In our empathy map we put ourselves in the shoes of the user of the senior section: the senior class. One of the most important things we discovered while creating our empathy map is the versatility of the space. Seniors want the space to act as an organized storage space for belongings, a fun place to hang out with friends and relax, and also a quiet space to study and get work done during free blocks. Because there are so many people going in and out of this space and using it in many different ways, there is often a mess left behind. We found this in our survey, and also know that there have been problems with it in the past. In thinking of one problem to solve, we decided to hone in on the problem of organization.

### POV Statements:

1. CA seniors need a way to efficiently store backpacks between classes.
2. CA seniors need a way to relax in between classes and during break.
3. CA seniors need a way to study effectively during down time.
4. CA seniors need a way to socialize with friends in small groups.
5. CA seniors need a way to conveniently store belongings such as coats, sports bags, and other items without creating mess.
6. CA seniors need an accessible and logical way to dispose of food and clean up after themselves.

### HMW Questions:

1. HMW keep the senior section organized and clean?
2. HMW create a neat place to store backpacks and coats out of walkways?

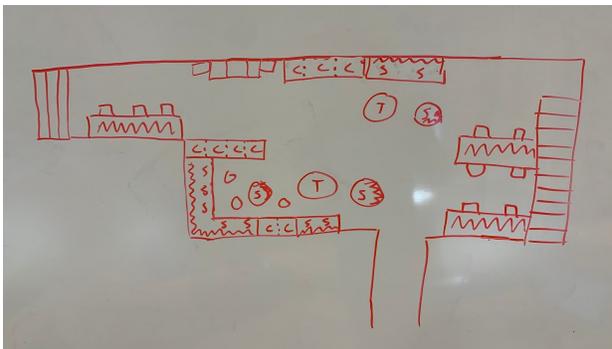
3. HMW reduce congestion in the senior section during high traffic times?
4. HMW create more seating in the senior section without overpacking the area?
5. HMW change furniture layouts in the senior section to maximise space?

## 2. Ideation

### **Brainstorming Process:**

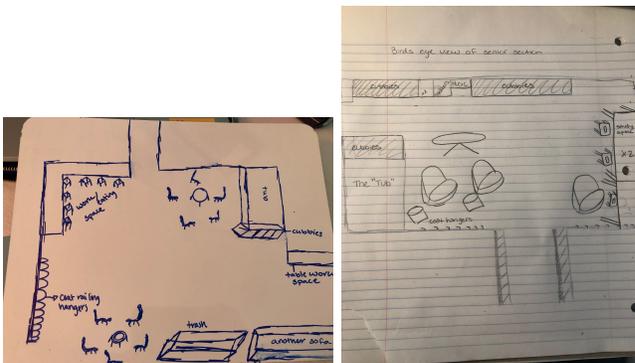
The process of brainstorming will be divided into three parts. Primarily we will have a quick conversation to specify the purpose of our HMW questions. Then we will individually brainstorm some ideas by sketching and coming up with some bullet points. Finally, we will come together as a group and share these sketches and ideas combining them into the idea for our first prototype. By having a 30 minute conversation with both Sally and Don this allowed us to brainstorm more solutions to effectively incorporate organization into the senior section while staying conscious of the new renovations.

### **Brainstorming Round 1:**



#### **Picture:**

Liam: The biggest modification in this sketch was the area near the tub. I moved the couches over to the corner and walked on one side with cubbies to make a cozier feel. To make another social area I added another cubbie and put another couch on the other side. Near the trash receptacles I also put more cubbies and couches. All the couches also have chairs, tables, and stools next to them to create more inclusive seating.

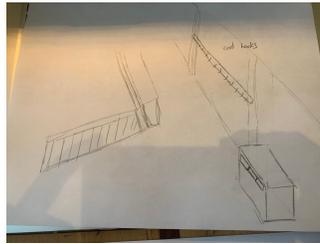
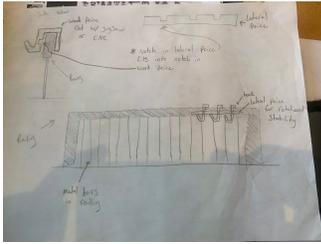


#### **Left Picture:**

Sarah: I was trying to maximize the amount of furniture usage while still having enough open space to use the railings as coat racks and seating.

#### **Right Picture:**

Ella: What I was trying to emulate was a prototype that would move the chair's and tub's location in order to open up more space for coathangers and cubbies along the back wall and the rail facing the Stu-fac.

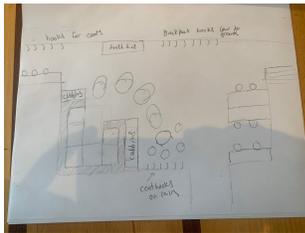


**Left Picture:**

Lucian: Prototype idea of a way to hang coats on the railing. Hooks hook over the railing and latch together with one long connector board

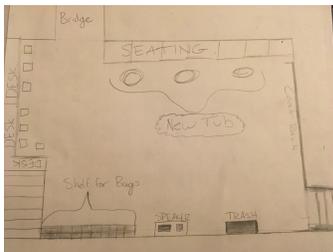
**Right Picture:**

Lucian: A prototype idea of a way to hang coats on the wall on the left side of the trans cans in the senior section. Board with hooks is screwed to wooden supports in the walls for structural stability.



**Top Picture:**

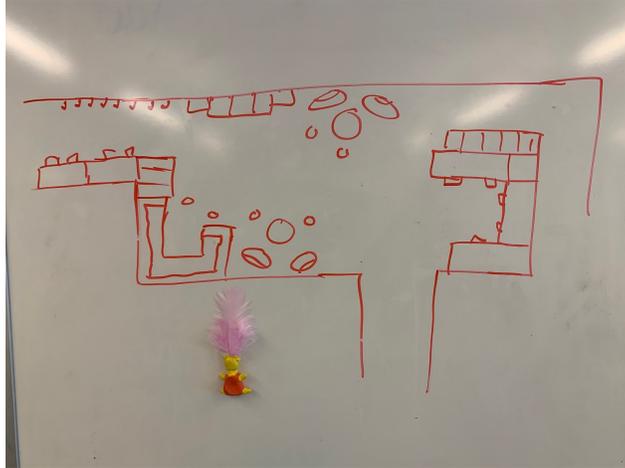
Lucian: A floor plan idea for the senior section with a broken up tub that keeps the warm cozy aspect of it while maximising seating. Added cubbies to the sides of the tub and hooks added to railings and the wall to keep coats off the ground.



**Bottom Picture:**

Josh: Rearranged tub into a couch which adds seating. Added circular chairs across from the couch. Added an IKEA shelf next to the stairs for backpack storage. Rearranged desks and desk chairs next to the stairs for quiet work space. Added coat rack adjacent to the stairs to the PAC. This design utilizes the chairs in the tub to make a couch with more seating, as well as adding space in the middle of the section to hold all the seniors during break.

**Group Brainstorm Sketch:** We decided to come together as a group to do make one final sketch. This combined what we believed were the best ideas so we could base our model off this design.



### **Furniture Count in Renovated Senior Section:**

Tub (6 pieces)

5 wooden long tables

2 smaller wooden round tables

4 blue round chairs

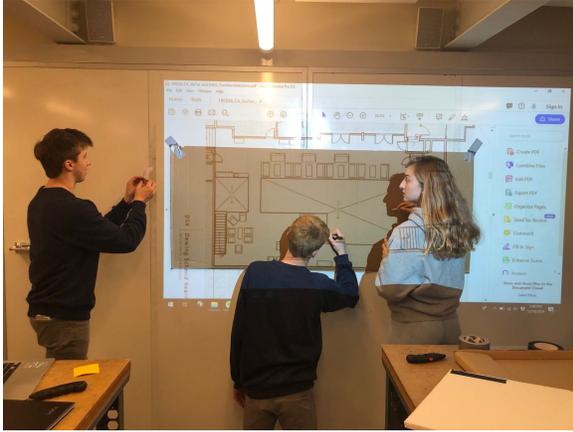
6 smaller grey “footrests”

15 yellow bar stools

### **3. Prototyping Cycle**

After some more ideation on how we wanted to test out our proposed layout for the senior section (as seen above) we came to the conclusion that a scale model of the senior section with the existing furniture would allow us to test out our designs and further prototype solutions. We believed this model would allow us to better visualize our layout designs and allow for rapid prototyping, helping us to solve the clutter and disorganization. We also decided that we would make small additions in furniture, such as cubbies and coat hooks to see how they could fit into the space.

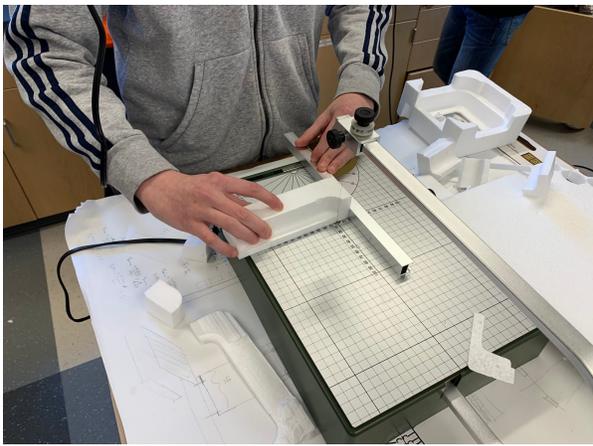
**Progress photos:** Construction of the senior section scale model



**Left Photo:** The gang tracing over the current floor plan in preparation for our 3D prototype.



**Right Photo:** Liam and Sarah cutting out the cardboard base of our 3D model. (don't worry we didn't scratch the floor)



**Left Photo:** Josh using the foam cutter to make the six components of the tub.



**Right Photo:** The initial stages of the 3D model.



**Left Photo:** Lucian using the laser cutter to make pieces of the model.



**Right Photo:** The gang having fun! (fun trumps mono x influenza)

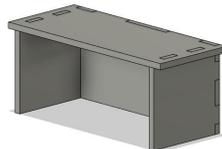
**Prototypes:**

**Prototypes of Laser Cut Furniture Models for Scale Model:**

\*other furniture was created using foam and simple laser cut disks



Small Table Design



Study Desk Design



Study desk Stool Design



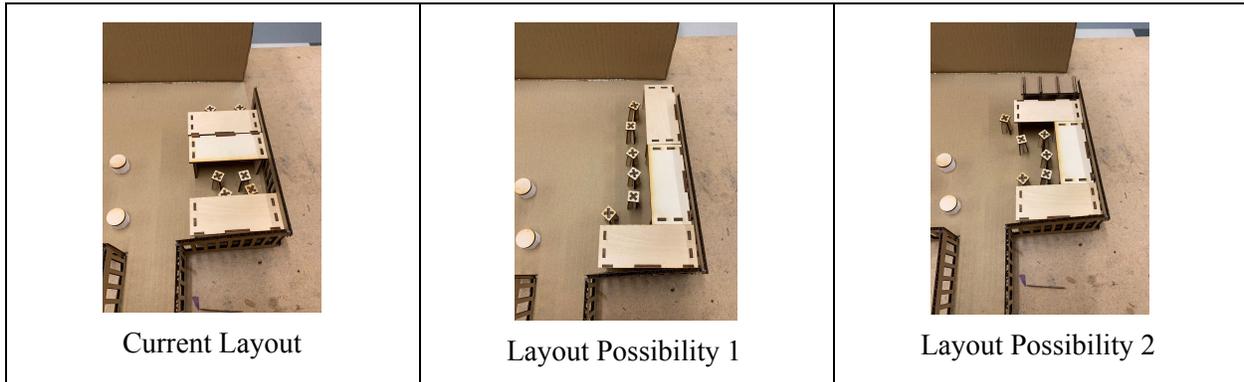
First Stool Design

Improved Stool Design  
(as seen above)

### **Prototyping within the Scale Model:**

To most effectively improve the layout of the senior section we divide it into 3 main parts separated by the type of usage each space caters to. The first was the study area located close to the back stairways, it consists of the 3 desks and stools. The second part was the social area which consisted of the coaches, chairs, low tables, and roly circular seats. The third area was the area where the trash is located that we intended to purpose towards organization. We excluded the 2 desks in the narrow part of the senior section by the stairs that lead to the creeper seats because everyone we talked to agreed that this was the most effective use of that space and didn't need changing.

### **Study Area Layouts:**



### **Social Area Layouts:**



### **Back Wall Area:**



We only created one prototype layout for the trash receptacle area as we didn't plan to move the trash can but wanted to add coats hooks (left of trash can on wall) and 2 sets of cubbies (on each side of trash can).

### **Backpack/ Coat Hook Prototype:**

After creating hooks in the scale model we prototyped and laser cut 2 hooks to test out in the actual senior section. Each hook was 2 layers of wood stuck together with wood glue to provide strength when holding up a backpack. Below are pictures of the two hooks, one holding a backpack, the other a coat.



### **User Feedback:**

To get wider feedback on our various possible layouts, we sent out a second survey to the senior class. It can be found here: <https://forms.gle/7FsMZtXi7R2piKDW8>

In general, the feedback we got from this survey was very mixed, however there were some interesting data points that we learned from. For example, people liked the current social area (the tub) and layout possibility #1 (as seen above) almost equally, with #1 edging out the current layout slightly (layout possibility #2 was not well liked). From this feedback we were able to decide that layout #1 would be the best addition to the senior section as it was well liked and from our perspective was the most technically beneficial. The feedback we received on the study area was very conclusive on the current layout being the most liked. This makes sense from a technical perspective as it has the most seating, although it may not be the most open. For the organizational aspect of the senior section, we asked seniors to rate the cubbies and hooks on a scale of 1-5 since we were not comparing the two. The cubbies, although leaning on the liked side, received a somewhat indifferent reaction with the most common rating being a three. One person even left a comment in the free response section we created that they didn't think the cubbies would be used very much. The idea that the cubbies may not be used had already crossed our minds, so in the final design we opted to not include cubbies as they might only add to the clutter if not used. The hooks on the other hand were very well liked. Many people liked that they were movable and could be placed all around the senior section. Furthermore, when we tested them they were very effective at getting

backpacks and jackets up off the ground. Our group is very excited about these hooks because they are very simple to make and could easily be implemented into the senior section for real use.

### **Issues that Arose while Creating and Testing our Prototypes**

While using the glowforge to create our small furniture we struggled with proportions. We wanted to make our model as precise as possible so that while moving the layout around we would get the best sense of the space. However, when creating virtual designs of furniture we would often have to put files through multiple software. Fusion 360, the Fusion 360 slicer, and illustrator did not always output our designs into the real physical size that we needed on the Glowforge. The Glowforge also sometimes did not manage to completely cut through material. To solve this problem we needed a few attempts to vary the laser power and speed before we got the numbers right. Another problem we ran into with the Glowforge was the material itself. Some of the wood (image below) was warped, making the focus height of the lazer not consistent throughout the whole cut. We tried making a second cut to push the rest of the way through, but we also decided to weight down the wood at the same time which resulted in the second run being offset slightly. Ultimately we had to cut in a different location, this time with the wood flattened down with metal weights..



#### **Left Picture:**

First failed attempt at laser cutting coats hooks with successful attempt below

#### **Right Picture:**

The warping of the material used to cut the coat hooks

## **5. Analyze the Solution & Communicate Your Results:**

One of the greatest strengths of our design process was the format we were able to think in. A 5% scale of the senior section proved to be very useful in coming up with new and different possible solutions. This scale allowed for us to move around furniture and rethink the organization of the senior section without pushing heavy objects around. Because all walls and furniture are exactly to scale, it was easy to get a basic feel of how some layouts might work and some might not. Additionally, the Glowforge laser cutter enabled us to quickly make correctly detailed pieces of furniture that add to the realism of our model. Another one of our strengths was our group personnel. Having four seniors redesigning the senior section proved to be very beneficial, as being both the designer and user allowed for personal approach to the design. Additionally, having one junior as a voice for the new users next year allowed for decisions to be made with the idea that other classes will use the same space. As our group continued to work on the prototype we often were working with other friends or they simply stopped in. The benefit behind our

friends input was that they reconfigured the furniture within the model in ways which they believed were good. This proved to us that our model is a good prototyping way to get many ideas. Maybe in the future we should have open it up to others coming and organizing it in different ways as a way to ideate and prototype different layouts. Finally, getting input from Don and Sally early on was quite valuable, as it enabled us to empathize with administrators and those who will oversee renovations to the senior section. Also having the opportunity to view the old and new blueprints to the senior section was very valuable because it allowed us to be more exact with the scale of our model.

At the beginning of the project our group had hoped to physically re-organized the senior section. Unfortunately we were not able to do this which prevented our group from receiving more realistic feedback on a more permanent change. We also often struggled to put in the correct power to the glowforge which caused us to have to re-make designs. Seeing as how essentially all over are model was cut using the glow forge, when we did not get the power right it wasted our time having to go back and re print. In the future we would have really liked the opportunity to not only move around the actual existing future throughout the senior section, but also design and implement more furniture into the senior section, (ie. the backpack hangers designed and cut by the glowforge). Our final design included separating what many seniors call the “tub”. This “tub” is a very praised area to most of our class and is made from the white styrofoam in our model. The issue with our decision to break up the tub is that many seniors may end up moving it right back to the way it was before. We decided to put them against the railings which is where we had thought we would use the railing space for our hooks. Moving these couches against the railing takes away the railing space making it much less accessible to the students using our hooks.

In the future we hope that this model could be left out for seniors to make any designs they want. The model is a create way to try out new ideas and we know there are many more we haven’t thought of. These designs would then be tested weekly and we could receive feedback on them, which would hopefully lead to the best design to be implemented.

### **Final Design:**



Our final included the current layout of the study area. This area benefits the space because it allows for the most seating and is also a great place to eat lunch as you can sit across from one another. Our final social area breaks up the tub in a J shape. The J shape continues to create a cozy area similar to what is so beloved about the tub while creating more seating. Next to the couches we made a second seating area around a coffee table for another “group” to convene. Lastly we used the adjustable hooks to get backpacks and jackets up off of the floor and create more floor space for people