Assignment 1 (Individual Part) - UCD Problem Framing
Instructor: Qian Yang (qy242)

In the previous assignment, you have learned to analyze the design decisions of technology products that surround you every day. You have learned that whether a design decision is good or bad depends on its *target user group* (whom it is designed for) and *use scenarios* (in what contexts it is intended to be used).

For this assignment, you will embark on your own user-centered design journey, exploring different user groups and situations you might design for. This will prepare you for your first group assignment, in which your group will choose a user group/situation as the focus of your semester-long project.

Assignment release: Feb 15th, 2021 noon EST (Monday)
Assignment due: **Feb 22th, 2021 noon EST** (Monday)

Learning goals

- Identifying and framing good user-centered design projects

Grading rubric

- **Evidence of understanding - user-centered design (6 pts)**
  The student takes a user-centered perspective throughout the assignment. Students will lose all 6 pts if at any point taking a solution-centered perspective (taking a technology as a given and looking for potential users) or a personal perspective ("I have experienced such and such problem").
- **Completeness and novelty - discovering user needs (6 pts)**
  In Q1, the student identified 20 user needs that are all distinctive from each other. They included needs of different user populations; different use scenarios and different definitions of eating "better".
- **Evidence of understanding - clear problem framing (6 pts)**
  In Q2, the revised problem statements focus on clearly defined user needs (e.g. rather than based on hazzily assumed user groups).

- **Evidence of understanding - problem framing specificity (6 pts)**
  In Q2, the revised problem statements are at an appropriate level of specificity. It's specific enough to address. It's also broad enough to allow multiple technology solutions.
- **Evidence of understanding and justification - problem impact (6 pts)**
  In Q3, the student gave reasonable scores to the problem statements, identified meaningful and significant user problems, and provided convincing justifications.
- **Length penalty**
  The completed file should have no more than 11 pages, 11pt fonts. Submissions longer than 11 pages will receive a 6-point penalty.

Submission instructions

Follow the instructions and edit this file. After you have completed all the tasks, save the file as a **pdf** and submit it to Canvas.
Do not include your name or netID in the assignment to allow for anonymous grading.

Lead TA of the Assignment: Cynthia Shen (cxs2). If there is a math error in your grades, please contact the lead TA. For all other questions, please post on Piazza.

Instruction: Identifying, Framing, and Selecting User-Centered Design Problems

Recall that user-centered design (UCD) is an iterative design process that focuses on understanding users and addressing their unmet needs. Think about the world surrounding you: so many different types of people, their heterogeneous needs, and the various problems they might encounter in different situations. As a user-centered designer, you virtually can choose to design for any of those people and any of those unmet needs. But which one to start with? Which users and which of their unmet needs should a designer prioritize and solve? Answers to these questions are crucial for the success of your design. They determine whether your design will be solving the right problem. In this assignment, you will learn and practice making these choices; You will learn to discover and prioritize user-centered design problems.

Step 1. Brainstorm many user needs

For HCI designers in the industry, design projects typically start with a pre-identified range of users and/or user needs. For example, if you are a designer at the Tesla software team, your design projects are likely to revolve around improving people's driving experiences. If you work for TurboTax, then you are likely to be innovating ways to improve tax-filing experiences. These are broad goals; too broad to inform any particular technology designs.

To narrow down their focus, **designers first brainstorm many different user needs related to this broad goal.** Take "improving driving experience" as an example. Designers approach this broad goal by considering many different kinds of *users* (e.g. truck drivers, electric car drivers, experienced drivers, novice drivers), different driving *contexts* (e.g. with and without passengers, driving in extreme weathers, driving familiar routes vs. unfamiliar routes), as well as many different definitions of "better" driving experience (e.g. safer, more energy-efficient, more relaxing, more accessible, more social, etc.). These considerations help designers identify a wide range of user needs, all related to driving experience.

User Needs Related To Driving Experience
To prevent drivers' dangerous driving mistakes
To prevent driving fatigue in long-distance driving
To pick songs to sing-along that fits the trip and time of day
To take phone calls while driving safely
To socialize with passengers in the back seat while driving safely
To drive in an energy-efficient way
...

*** Your Task Q1***

The goal of your semester-long user-centered design project is to improve "eating" experience. Like the aforementioned examples, this is a broad goal; too broad to inform any concrete technology designs.

To narrow down this broad goal, you will work to identify at least 20 different user needs that are related to "eating" experience. Consider different kinds of people (beyond people like yourself!), across different eating contexts (e.g. at work/school, at home, eating alone, eating with friends, eating at large parties, etc.), as well as the different definitions of "better" (e.g. healthier, faster, cheaper, safer, more socially engaging, more romantic, etc.).

	User Needs Related To Eating Experience
1	To learn how to cook
2	To sit down in a comfortable place before eating
3	To find something that tastes good
4	To not make a very big mess
5	To feel satisfied after eating
6	To have company to share the meal with, if wanted
7	To prevent food waste
8	To have something to do (i.e. watching a show) while eating alone
9	To get the necessary ingredients/groceries
10	To eat in the right environment
11	To find a good balanced meal
12	To be able to meal prep for the week, if busy
13	To save money on food
14	To have engaging conversation while eating
15	To prevent feeling sick after eating
16	To have enough food for a large group, if applicable (i.e. party)

17	To have snacks that will be satisfying enough between meals
18	To eat quickly enough to return to work/class
19	To find a quiet place to eat when desired
20	To be able to work/multitask while eating

Step 2. Framing good user-centered design problems

Having identified many user needs, you can now formulate many potential user-centered design problems. You can do so using this template: "**How might computational technologies help [THE USER NEEDS YOU IDENTIFIED]**". For example:

User Needs Related To Driving Experience	User-Centered Design Problems Statements
To prevent drivers' dangerous driving mistakes	How might computational technologies help prevent drivers' dangerous driving mistakes?
To prevent driving fatigue in long-distance driving	How might computational technologies help prevent driving fatigue in long-distance driving?
…	…

Let's consider which user-centered design (UCD) problems should we prioritize and address. Good user-centered design problems typically have the following four characteristics:

- **The UCD problem is clearly defined.** A common mistake students make is to frame the problem not based on "needs" but based on user populations. For example, "How might computational technologies make on-campus dining better for Cornell students?". This is not a clear or good problem framing, because it is extremely unlikely that all Cornell students share the same needs for on-campus dining that none of the other population shares. Frame the design problem around user needs, not assumed populations.

- **The user need has not been entirely satisfied**, at least for some user population.

- **The user need is broad enough to invite a range of different technology solutions.** Note: If you have already decided to build a technology product (e.g. a website, an app, a VR application) to address this need, then your design process will be a hammer-looking-for-a-nail process, rather than a user-centered design process.

- **The user need is manageable and not too broad.** If it's too broad, you'll struggle to hone in on a suitable solution. For example, "How might computational technologies help students and corporate employees with tight budgets and limited on-campus dining options to eat healthier" is a lot more specific and manageable than "How might computational technologies help people to eat healthier".

*** Your Task Q2***

First, copy and paste your answers to Q1 to the first column of the table below ("Original"). One user need per row. Then add "How might computational technologies help" to their beginnings.

Next, use the four criteria above to examine the framing of each user-centered design problem ("How might computational technologies help [USER NEED]"). If the original problem framing does not meet all criteria, write down the number of the unmet criteria in the *Assessment* column, and then revise the problem framing in the "revision" column. If the original problem framing meets all the criteria, leave the "assessment" and "revised" columns of that row empty.

	User-Centered "Eating Experience" Design -- Problems Statements		
	Original Problem Statement	**Assessment**	**Revised Problem Statement**
e.g.	How might computational technologies help people to eat healthier?	4	How might computational technologies help students and corporate employees with tight budgets and limited on-campus dining options to eat healthier?
1	How might computational technologies help people to learn how to cook?	4	How might computational technologies help students with access to a kitchen learn how to cook for themselves?

2	How might computational technologies help people to sit down in a comfortable place before eating?	1, 4	How might computational technologies help students in dining halls find a comfortable place to sit during busy meal hours?
3	How might computational technologies help people to find food that will taste good?	4	How might computational technologies help students in dining halls find food that they think will taste good?
4	How might computational technologies help people to not make a very big mess?	1	How might computational technologies help people to keep their area clean when eating foods that are known for being messier than usual?
5	How might computational technologies help people to feel satisfied after eating?	1	How might computational technologies help people to eat a hearty and balanced enough meal that they will not be hungry soon after they eat?
6	How might computational technologies help people to have company to share the meal with, if wanted?	4	How might computational technologies help sociable students who may not know many others to have company to eat meals with?
7	How might computational technologies help people to prevent food waste?	1	How might computational technologies help people to either finish what is on their plate or otherwise recycle (i.e. compost) what they don't finish so that less food is wasted?
8	How might computational technologies help people to have something to do (i.e. watching a show) while eating alone?	4	How might computational technologies help students who eat alone find a way to entertain themselves during a meal?
9	How might computational technologies help people to get the right ingredients and groceries?	4	How might computational technologies help people with access to a kitchen and who are interested in cooking for themselves get all of the necessary ingredients and groceries?
10	How might computational technologies help people to eat in the right environment?	4	How might computational technologies help couples who want to eat a romantic meal set their environment to be intimate and comfortable?
11	How might computational technologies help people to find a good balanced meal?	4	How might computational technologies help people without full on-campus dining plans find manageable ways to eat meals that are healthy and balanced?

12	How might computational technologies help people to be able to meal prep for the week, if busy?	4	How might computational technologies help people with packed schedules be able to effectively meal prep at the beginning of the week so as to make their meals for the week easier to manage?
13	How might computational technologies help people to save money on food?	4	How might computational technologies help students who are living off-campus and without dining plans budget and save money when buying groceries to prepare food with?
14	How might computational technologies help people to have engaging conversation while eating?	4	How might computational technologies help sociable students who are eating with others find intriguing and engaging conversation topics?
15	How might computational technologies help people to prevent feeling sick after eating?	1	How might computational technologies help people to eat the right enough meals so that they won't feel sick or bad about themselves after finishing their food?
16	How might computational technologies help people to have enough food for a large group, if applicable (i.e. party)?	1,4	How might computational technologies help people who are hosting a group meal for many others find a way to get enough food for everyone there to be satisfied?
17	How might computational technologies help people to find a good variety of meals to cook?	4	How might computational technologies help people living off-campus without dining plans who are interested in cooking for themselves find a good variety of meals to cook?
18	How might computational technologies help people to eat quickly enough to return to work/class?	4	How might computational technologies help busy students with full schedules eat a good meal quickly enough so that they can get to their next class on time?
19	How might computational technologies help people to find a quiet place to eat when desired?	4	How might computational technologies help a more introverted person find a quiet place to eat if they are in a place that is more crowded?

20	How might computational technologies help people to discover new recipes?	4	How might computational technologies help students living off-campus without dining plans who are already comfortable cooking for themselves discover new recipes in addition to the ones that they may have already been making quite a lot?

Step 3. Prioritize user needs

You have so far identified many user-centered design problems. Great job! But which one to start with for your course project? To answer this question, you will consider the following:

- **Potential Impact of addressing the problem.** Some UCD problems, if addressed, can yield significant, meaningful improvements to the users' lives and experiences. Others, if addressed, merely bring marginal benefits or minor conveniences. Prioritize significant problems over trivial ones.
- **Potential impact of computational technologies on addressing the problem.** While the focus of this course is on computational technology, we should frequently remind ourselves that technologies do not provide solutions to all problems. Is this user problem better be solved by non-technological interventions such as law and regulations?

<p align="center">***** Your Task Q3*****</p>

Copy and paste your "Revised Problem Statements" from Q2 to the first column of the table below. For each problem statement, assess the potential Impact of addressing it, and assess the potential impact computational technologies can have on addressing it. Rate the impacts on a 7-point scale; 1 meaning little impact; 7 meaning significant impact.

Finally, based on the scores, select your top five problem statements; the user-centered "eating experience" design problems that are most significant and meaningful, and for which technology can make the most difference! Mark them in the very right column, and briefly explain why you gave this problem statement high scores (i.e. why does addressing this problem matter?).

	User-Centered "Eating Experience" Design -- Problems Statements			
	Revised Problem Statements	Potential Impact	Potential Impact of Technology	Best Problem Statements? [YES/NO + justification]
1	How might computational technologies help students with access to a kitchen learn how to cook for themselves?	6	6	**YES (1)** Addressing this problem matters because if students are without dining plans, and they access to a kitchen, it would be wildly beneficial for them to learn how to cook, so that they wouldn't be spending money every time they want to eat. Technology can have a big impact on addressing this, because while cookbooks exist, it is more practical that students, who are younger, would turn to technologies like a mobile app or the Internet to start off with easy recipes and progress to more complicated ones once they are ready.
2	How might computational technologies help students in dining halls find a comfortable place to sit during busy meal hours?	5	2	**NO** While this problem would definitely help students during busy hours in dining halls, this is a problem that occurs close to every day due to the amount of students that choose to eat in dining halls, and every day, students will always end up finding places to sit. Technology would not help much with this, and might even make the situation more complicated, as students can just look around with their eyes.

3	How might computational technologies help students in dining halls find food that they think will taste good?	3	1	**NO** Addressing this problem wouldn't matter much, because even if students didn't like what was being served in the dining hall, they would probably just eat anyways, because it's the only option being offered. Also, dining halls usually always have food like pizza and pasta that would suit most palates. Technology would not help, because even if students could see the menus beforehand using an app, they'd probably still end up going.
4	How might computational technologies help people to keep their area clean when eating foods that are known for being messier than usual?	1	1	**NO** This isn't really a significant issue. While there are sometimes people who will make a mess while eating (i.e. many crumbs), it's not a problem that has to be carefully watched and observed. Technology wouldn't play any role whatsoever, as napkins and other wet wipes exist.

5	How might computational technologies help people to eat a hearty and balanced enough meal that they will not be hungry soon after they eat?	6	5	**YES (2)** Addressing this problem is important, because when people eat meals, they should be full enough so that they aren't just constantly snacking until their next meal. If they eat and are satisfied, they will be able to concentrate better and not be distracted by hunger and/or snacks. Technology can help with this, as something convenient like a mobile app or a website that lets the users know more nutritional information about the food as well as what their specific body type needs to be satisfied could be very effective.
6	How might computational technologies help sociable students who may not know many others to have company to eat meals with?	3	5	**NO** This is not a very pressing matter, because even if a student is very sociable and wants to talk with someone while they are eating, they can often just use their phones to message someone to come eat with them, or just eat quickly and meet up with someone later. However, technology could be a solution if this was an issue that was very significant, because technology allows users to be connected with others and message them with relative ease.

7	How might computational technologies help people to either finish what is on their plate or otherwise recycle (i.e. compost) what they don't finish so that less food is wasted?	5	5	**NO** It is definitely important not to waste food, but I think that in this current time, people are aware enough that they would not just throw any leftover food away, and would instead pack it up and be able to eat it another day. Technology could potentially have an impact on solving this issue, because people could use the Internet to find out what they could do with any leftover food that may not be able to be saved for another time, such as finding out how to compost.
8	How might computational technologies help students who eat alone find a way to entertain themselves during a meal?	2	4	**NO** Finding a solution for this is something that would have very little impact. While it would benefit students who like to have some kind of entertainment while eating alone, overall, this isn't that important, especially in a time when most students have some kind of technology (a phone or laptop) on which they can always find something to do.

9	How might computational technologies help people with access to a kitchen and who are interested in cooking for themselves get all of the necessary ingredients and groceries?	6	6	**YES (3)** This is something that would be impactful to address, especially for students who may be living off-campus and who don't want to be limited to the local grocery stores around their apartment. It would be impactful for them to have ways to get all the groceries they need to cook whatever they wanted to, and not have to cook recipes only based on whatever is available. Technology can help address this problem, because if other students are having the same issue, technology can be used with things like rideshares, or even for checking a bus schedule or seeing which stores they can easily get to.
10	How might computational technologies help couples who want to eat a romantic meal set their environment to be intimate and comfortable?	2	3	**NO** While this may be important for couples who want a romantic date, such as for Valentine's Day, this issue isn't impactful enough to find a solution for, considering how many restaurants that may specifically have that intimate environment exist already. Technology could potentially help couples find a restaurant that has the elements they want, or help them create that environment at home, but all in all, it wouldn't be very helpful and specifically catered towards their needs.

11	How might computational technologies help people without full on-campus dining plans find manageable ways to eat meals that are healthy and balanced?	5	5	**NO** This is something that may have an impact if addressed, but it is also not that significant, because people without entire on-campus dining plans would still be able to find ways to eat balanced food if they searched for it, such as ordering healthier items if they choose not to took, or by using technology (Internet) to search up meals that they could make. So, while it is important to have ways to eat healthy, the solution may not be as impactful as the question may seem at first.
12	How might computational technologies help people with packed schedules be able to effectively meal prep at the beginning of the week so as to make their meals for the week easier to manage?	3	4	**NO** This is not that impactful to address because if someone was really busy and was unable to meal prep for the week, they would still be able to easily buy/order food from somewhere. Technology would be kind of helpful in situations like this because there may be a way for it to help with labelling previously prepped foods and also with finding foods that could be easily prepped.
13	How might computational technologies help students who are living off-campus and without dining plans budget and save money when buying groceries to prepare food with?	6	6	**YES (4)** Addressing this would be impactful, because not only would it help students save money when buying necessities like food, it would also teach them helpful life skills that would benefit them down the line, as well as give them the opportunity to teach their peers these skills. Technology

14	How might computational technologies help sociable students who are eating with others find intriguing and engaging conversation topics?	2	1	**NO** This is not a very impactful situation, should a solution for it be found. While it is always nice to have engaging conversation with people you are eating with, this isn't really a concern that many people have, because if they are eating with people, especially if they are friends, they will always find something to talk about.
15	How might computational technologies help people to eat balanced enough meals so that they won't feel sick or bad about themselves after finishing their food?	5	4	**NO** Addressing this problem could be pretty important when it comes to people who may not be the best at controlling what they eat as well as eating foods that are healthy. Technology could come into play by potentially being some sort of personalized device that could have specific food-related goals for the user.
16	How might computational technologies help people who are hosting a group meal for many others find a way to get enough food for everyone there to be satisfied?	3	2	**NO** This isn't a very important problem to address, because when someone is hosting an event that will have food, it would just be wise to order more than enough just in case, and the problem would be solved. Even if the host did not order enough food, there would be ways of addressing the issue and solving it completely, such as saying that its just snacks, and won't be a whole meal. Technology wouldn't be able to help much in these cases.

17	How might computational technologies help people living off-campus without dining plans who are interested in cooking for themselves find a good variety of meals to cook?	5	6	**YES (5)** This would be impactful to address, because if students are interested in learning to cook for themselves, they would also want recipes that they can easily follow. These easy recipes could then be improved upon by the students, and might even make them interested in learning even more recipes, which would only be beneficial for them. Technology could potentially be used as a way for them to spread easy recipes to each other, as well as give recommendations based on the skills they have learned.
18	How might computational technologies help busy students with full schedules eat a good meal quickly enough so that they can get to their next class on time?	3	1	**NO** This may be important to the students that don't have time to eat between classes, but solutions already exist, such as just eating at another time, eating a bigger breakfast, or even eating during class.
19	How might computational technologies help a more introverted person find a quiet place to eat if they are in a place that is more crowded?	3	2	**NO** Introverted people may have more trouble finding quiet places to eat in crowded areas such as dining halls, but at the end of the day, they'd be able to either scope out some half-quiet area good enough for the duration of their meal, or they'd just eat fast and leave the crowded area. Technology could potentially help by acting as a buffer between them and the crowd, but I don't think that this problem is impactful enough to solve.

| 20 | How might computational technologies help students living off-campus without dining plans who are already comfortable cooking for themselves discover new recipes in addition to the ones that they may have already been making quite a lot? | 4 | 6 | **YES**
Addressing this problem seems impactful because this could be a step that comes after students have already become comfortable with cooking for themselves. They'd want to learn more diverse recipes now that they have the necessary skills, so it might be helpful for them to learn more in addition to the easy meals they already know how to prepare. However, if a student knows how to make easy recipes, they may not even want to learn more because they have what they need to get by, and there may not be a desire to make things more complicated. Technology could be impactful in this situation, such a possibly providing a way for students to learn a new recipe every week, for example. |