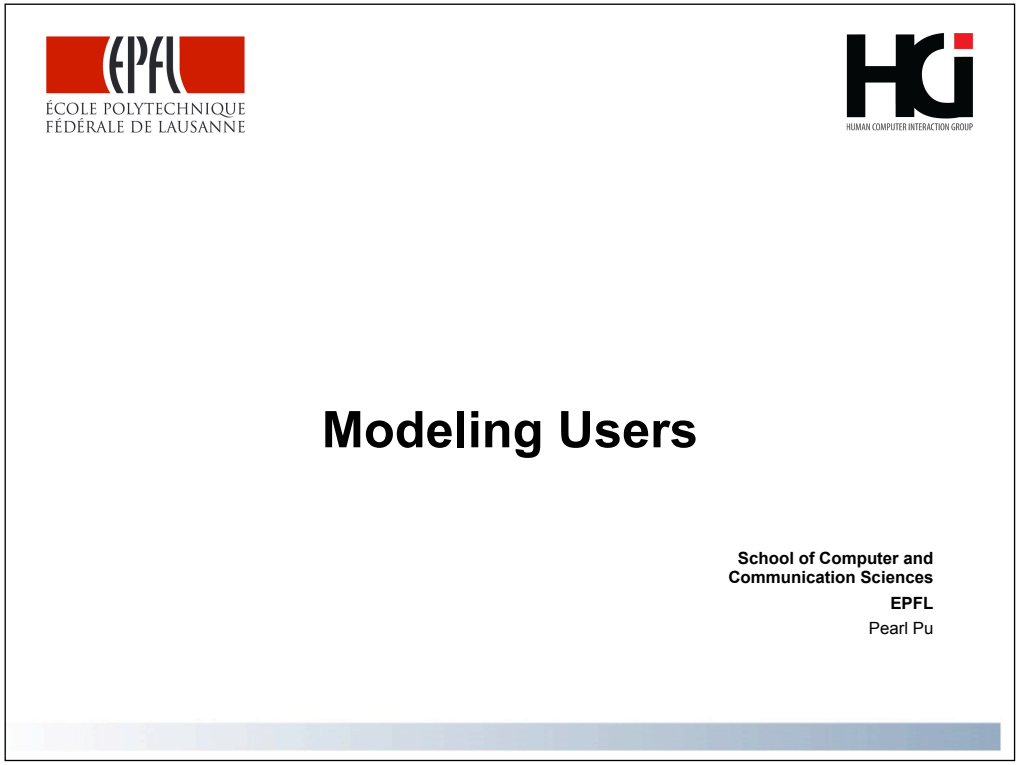
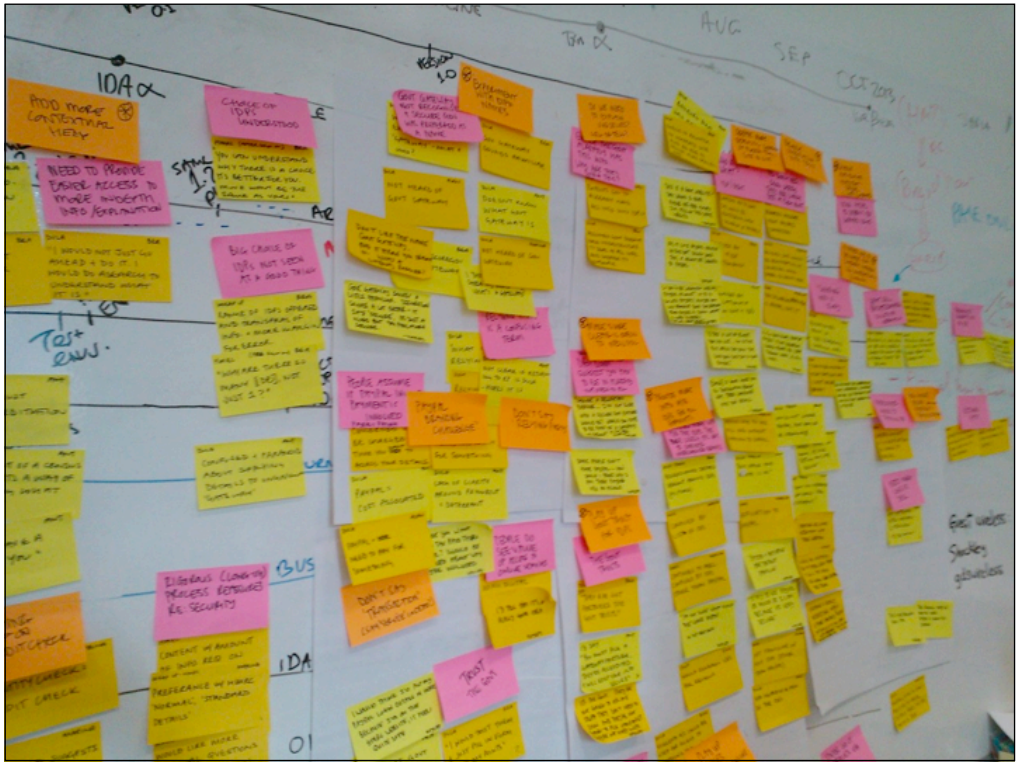


Pearl Pu, welcome back to HCI. This is one of the modules on user modeling.

The need for a model

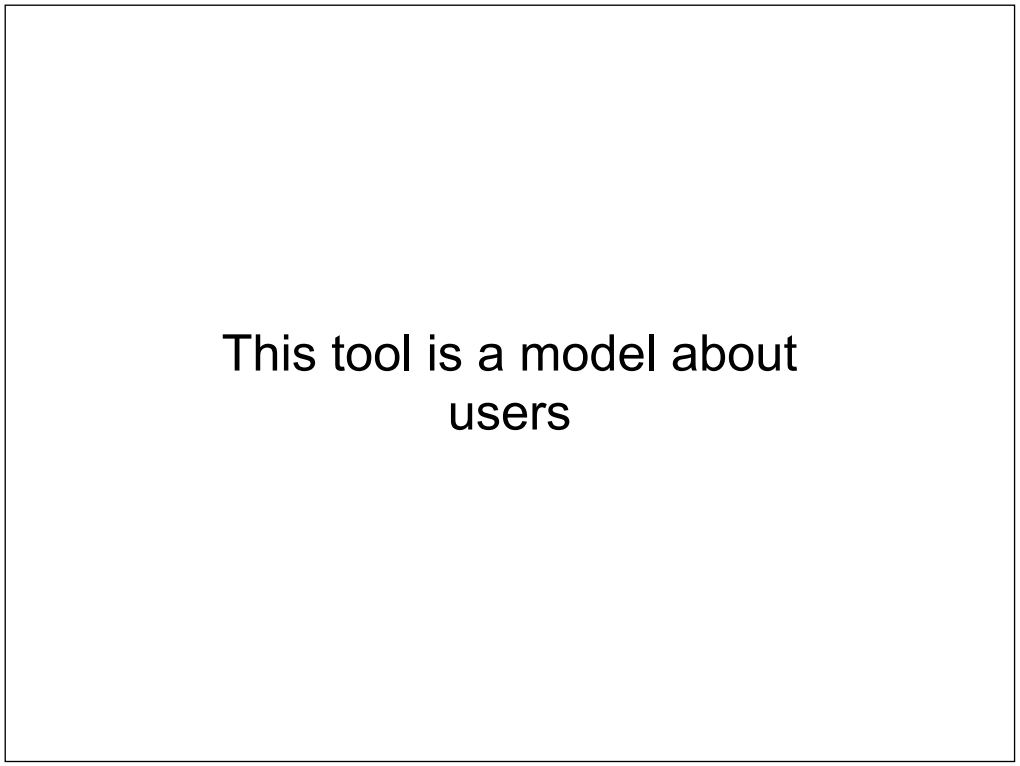
By now, you must have pages of notes from your domain research, competitive analysis, conversations with potential users and your observations about them.

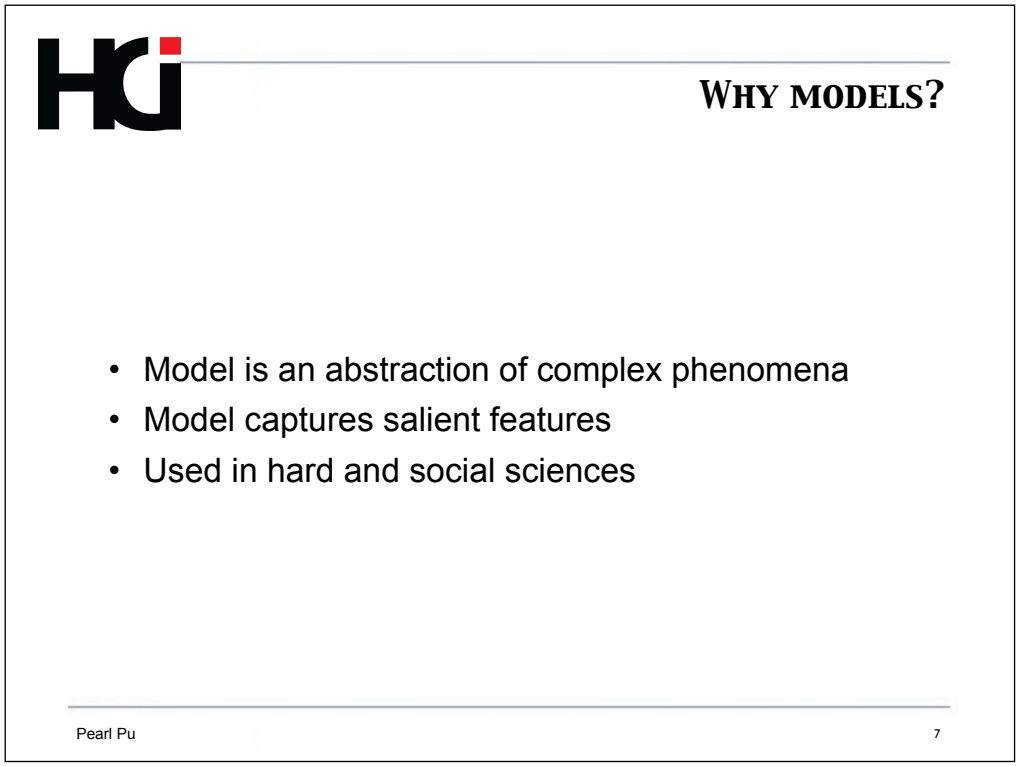


As you leaf through them, you may get an overwhelming feeling.

How do I go from these findings to a successful design? how to design a product that satisfies users' needs and meets their expectations? how do I find design drivers based on qualitative research? Some steps seem to be missing.

No worries. We show you a tool that can serve as a bridge linking between the qualitative study and design. This tool is a model about the users. And the process to come up with this model is called user modeling.

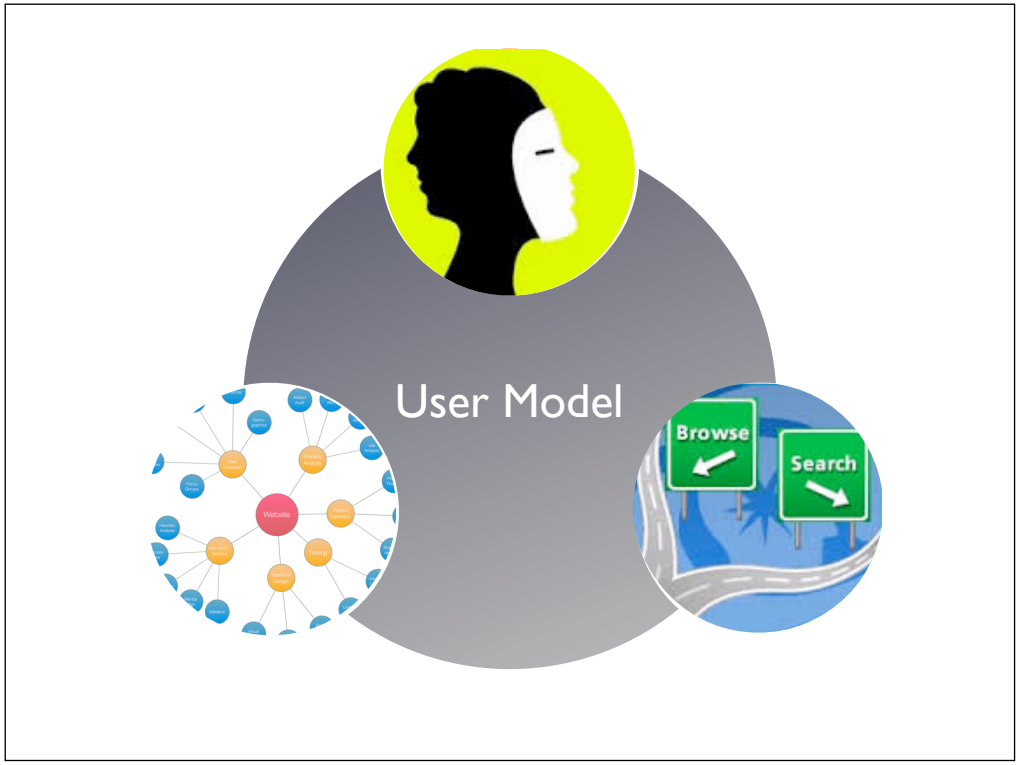

This tool is a model about
users



Why models? Traditionally, a model is an abstraction of complex phenomena at different levels of details. A good model captures the salient features of the underlying structure and relationships. We use models in physics, chemistry, and mathematics. We also use models in psychology and cognitive science.

The user model we are about to build is none other than the designer model that I talked about in Chapter 2. I said that if the designer model is closer to users' mental model rather than the implementation model, the design is likely to succeed.

If you follow the method I teach you here, you are more likely to build a successful designer model. This model then serves as the basis for the prototyping step.



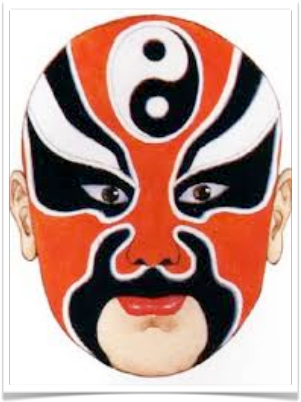
A user model consists of 1) a persona, 2) a set of behavioral variables, and 3) a goal-directed task tree.

1. Persona as a model

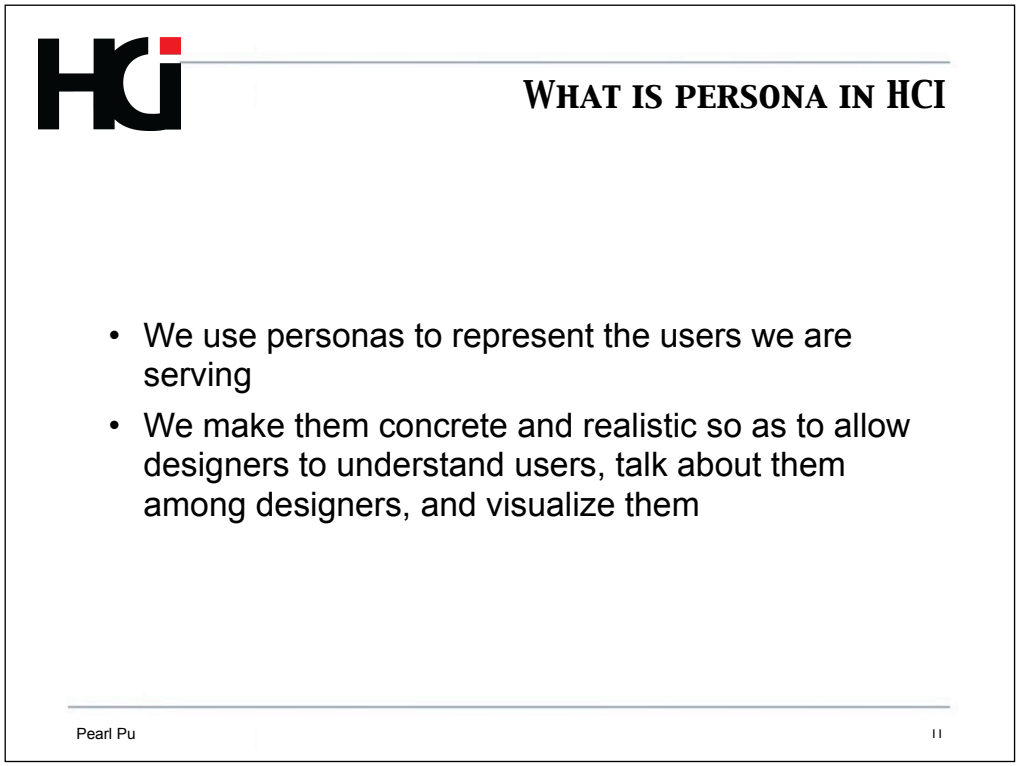
Why do we use persona to model our users?

WHY PERSONA?

- Persona means a theatrical mask in Latin
- Persona refers to the social role or character played by an actor
- Beijing opera mask on the right
- Persona communicates to the audience the benevolence or malevolence of a character
- These masks are called the painting of the “heart and soul”

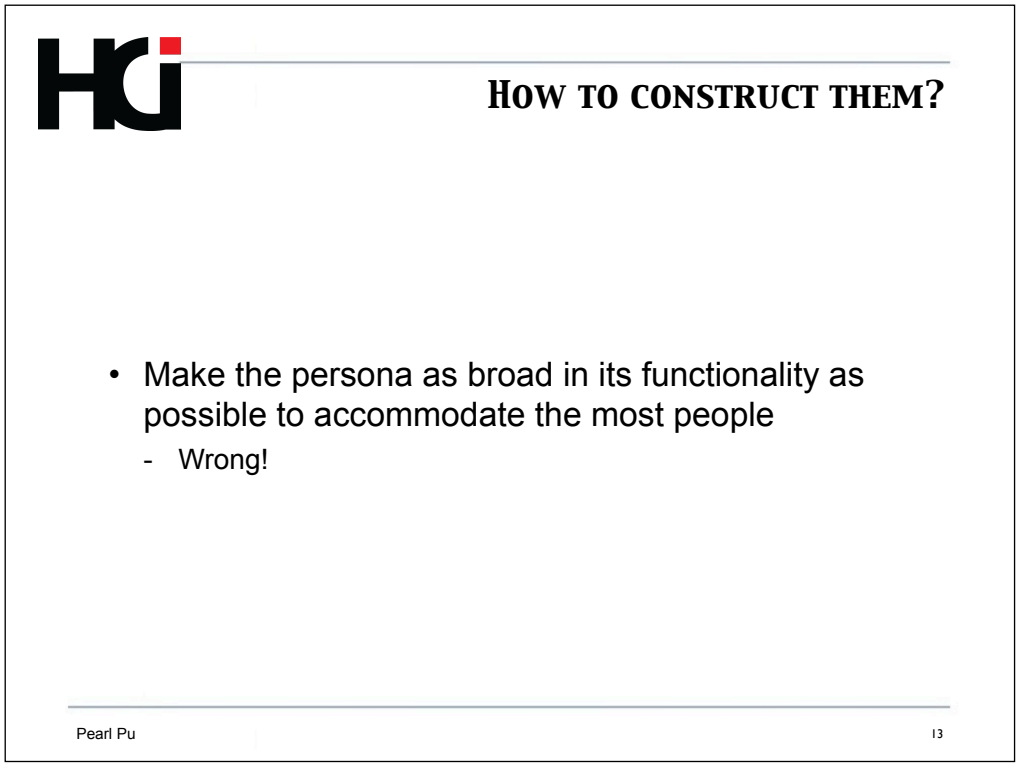


The word persona refers to a theatrical mask in Latin. This is a Beijing Opera mask, used by performers to portray a character on stage. These masks originated from ancient times and later developed into facial paintings. One of the reasons for using these masks is to communicate to the audience the benevolence or malevolence of a character, enabling the audience to get a glimpse of the inner world of the characters the actors are playing. These masks are called the painting of the heart and soul.

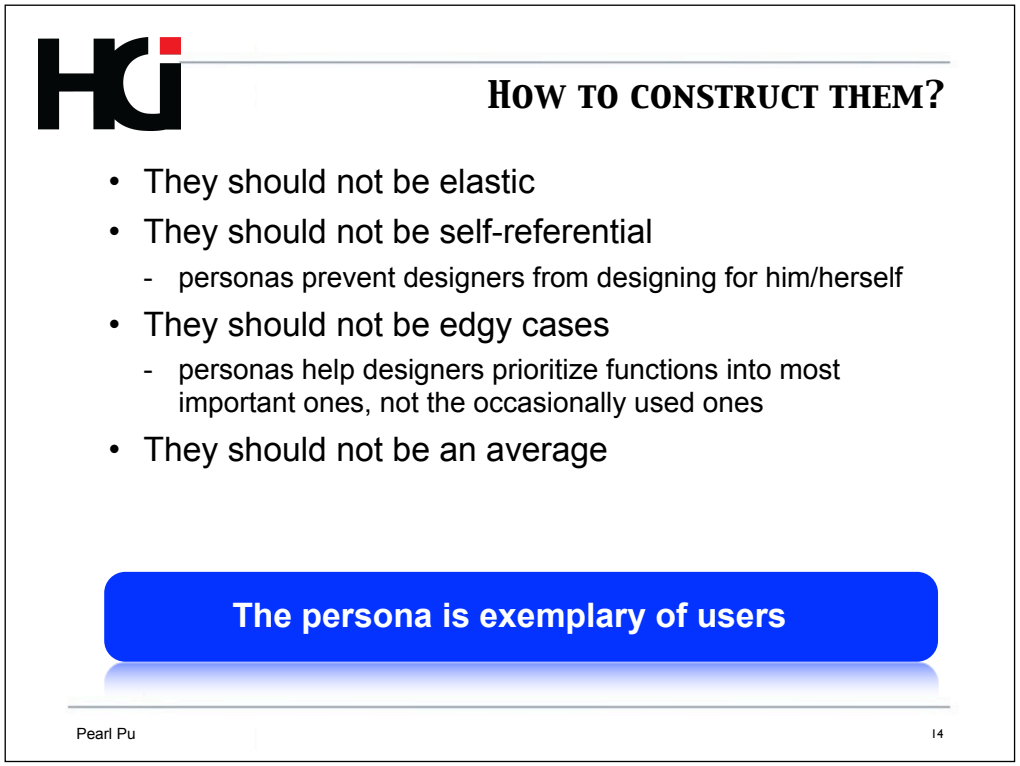


Obviously we are not in a theater class. In HCI, we borrow the concept and use personas to represent the users we are serving. We make them concrete and realistic enough so as to allow designers to understand users, talk about personas among designers, and visualize them.

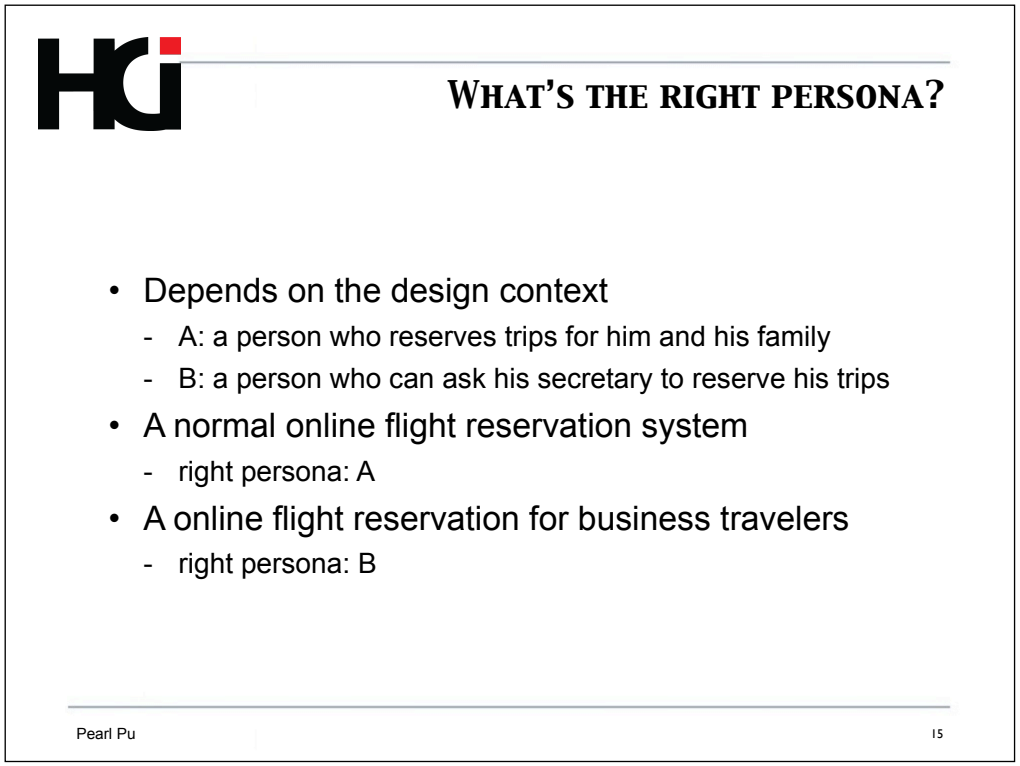
So who are personas in design? Personas are archetypes based on the real users you have interviewed and observed. If carefully constructed, they embody the goals, values, behaviors, and needs of the population your product is to serve and satisfy.



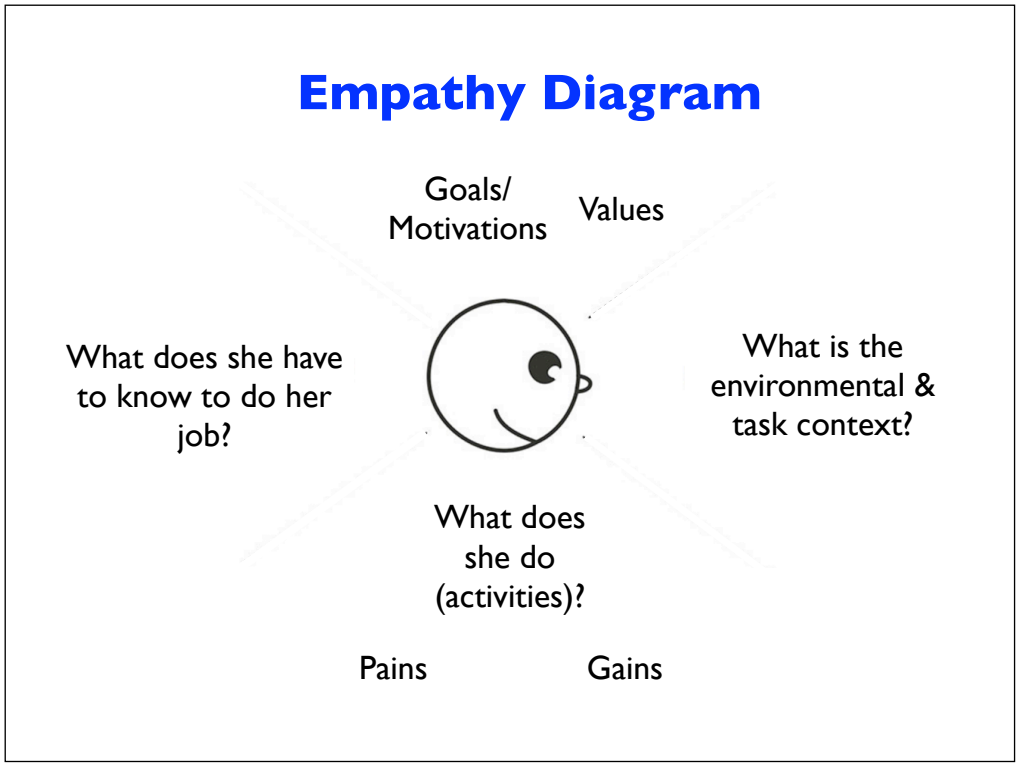
How to construct them? When you want to create a product that satisfy a large population (think about facebook and google), logic might tell you to make the persona as broad in its functionality as possible to accommodate the most people. Unfortunately this logic is flawed. This logic is responsible for interfaces that look as though the UI designers added a feature every time they think of a new type of users. Interfaces designed in this haphazard way are likely to overwhelm users with cognitive overload and cause confusions.



So personas should not be elastic. Nor should they be self-referential. They prevent designers from designing for herself. Personas shouldn't be edgy case either. This means they help designers prioritize functions into most important ones. Finally they should not be just an average of the users you interviewed. What he needs to be is exemplary. He is an exemplary of the specific types of people with specific needs.



Consider the case of a flight reservation system. What's the right persona? A person who reserves trips for him and his family? or someone who can ask his secretary to reserve his trips? If we interview enough users, we'd realize that the former is likely to be a persona for an online flight reservation system whereas the latter is an edgy case. However, if we change the context from a normal online flight reservation system to a business trip reservation system, then the latter may become an archetype. These two personas are likely to have different goals, attitudes, skill competencies, context, and pains and gains. In the leisure traveler case, he is likely to want to save money, whereas in the later, he wants to save time and hassle because every minute he can save from his travel, he can use it for other productive activities.



To build a concrete persona, you can use my tool of an empathy diagram (map) where in the middle, you will draw your persona or put a picture there. On the top, you put down her goals/motivations, and values. On the left, you write down what she has to know to do her job. On the right, you describe environmental and task context, for example, where she is likely to be when interacting with your product? what else she may be doing at the same time (working with excel sheet, researching information on the internet). Finally at the bottom, you write down how currently she does this job and what are the pain points at the moment, and what she expects to gain from using your product.

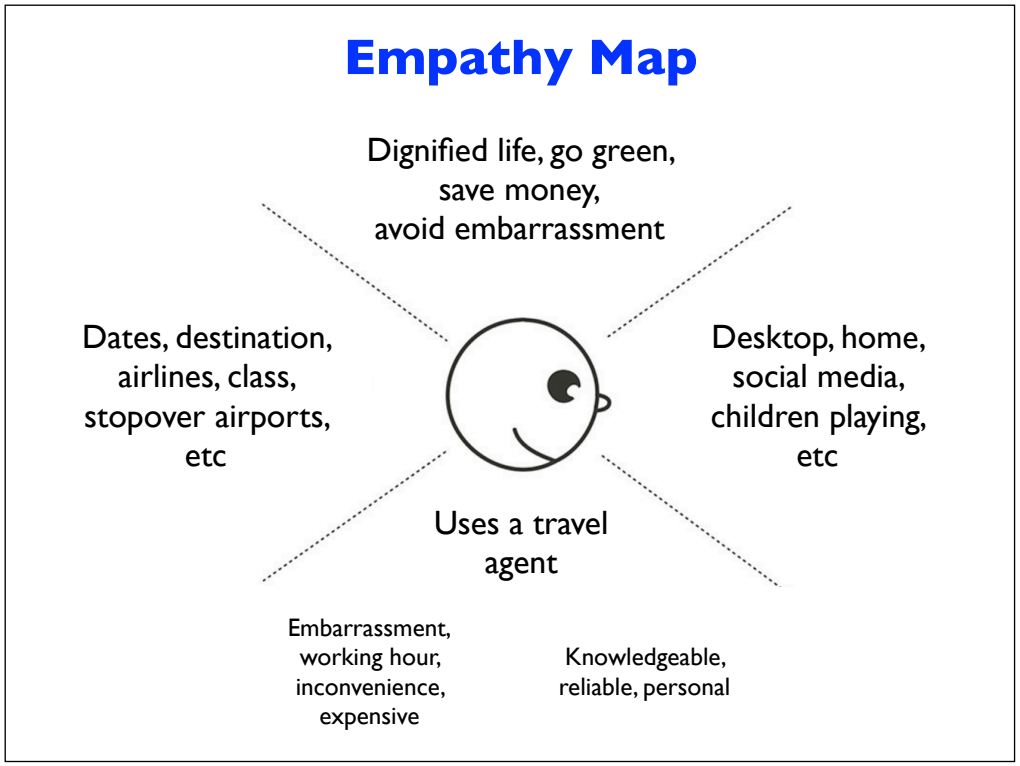
Let me show you an example of such an empathy map for an online flight reservation system.

Lisa is a 41 year-old dentist and a chief partner of a group dental practice. She is married with two children, 12 and 15.

Lisa’s hobbies include reading books, practicing yoga, ski diving, and traveling with her family. She likes discoveries, whether it’s new places or new information. You can say she is a novelty seeker.

Being the youngest of three from a simple farming family, she is a nature lover from a young age. She actively participates in events that promote sustainable environment.

Overall speaking, she wants to live a dignified and fulfilling life.

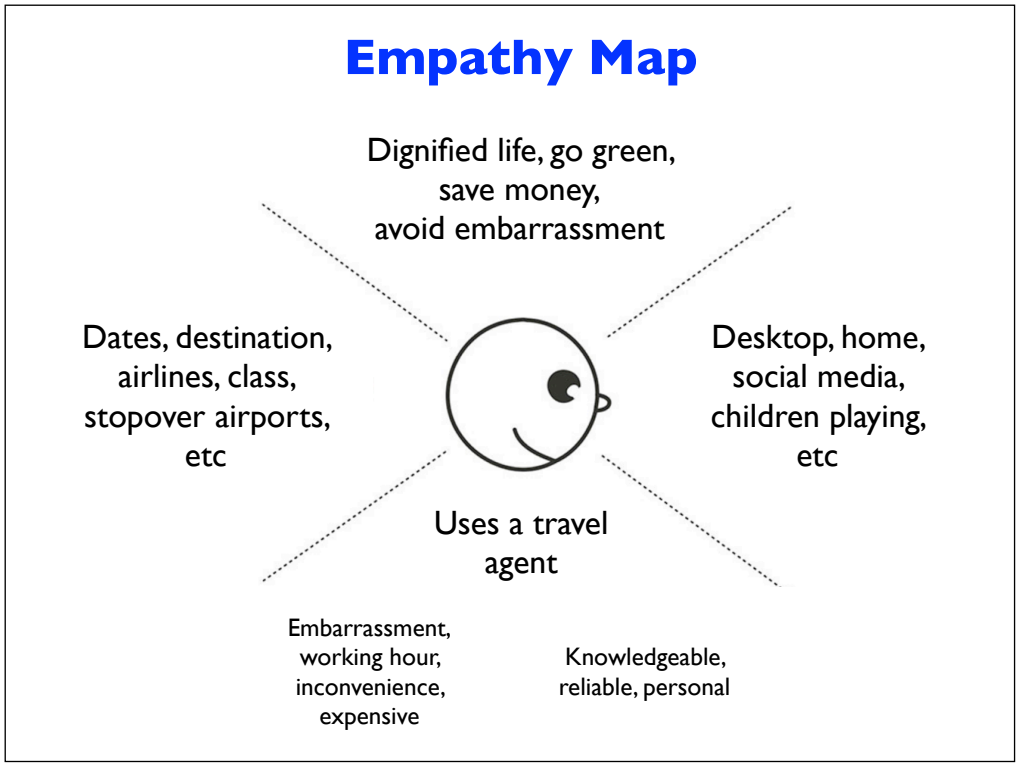


What does she have to know to book her trips? She needs to know, or rather decide which dates she and her family want to leave and return, what destination they are flying to, what airlines, and whether they want to buy economy or business class fares, and how many passengers are traveling together. She doesn't know the three letter airport codes, nor should she know them. She probably knows that flight schedules are retrieved out of a database, thus she will be expecting some delays before the system displays the results and before that she expects to find some kind of a search button.

She doesn't know that for some flights, stop overs are necessary. So let's just keep her out of the loop. But wait a minute, should she be told about the stop overs? maybe knowing that will help her decide whether she'd prefer stopping in Zurich more than stopping in London Heathrow, maybe she prefers not stopping at all.

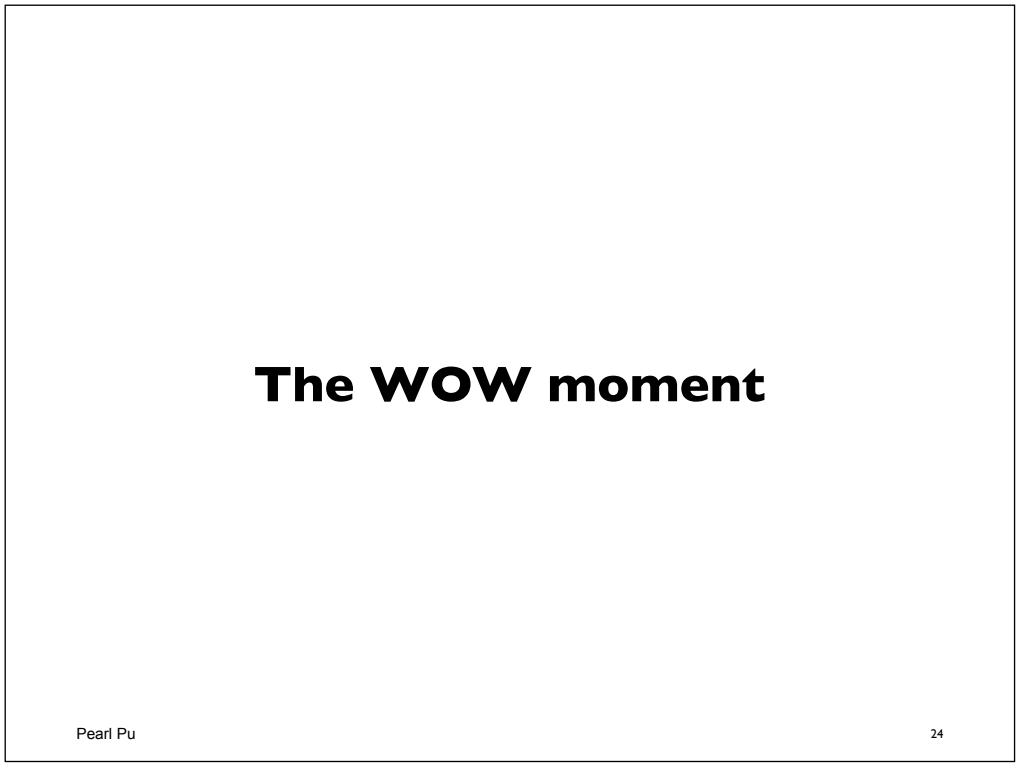
What's the environmental and task context? well Lisa is likely to book her flights on her desktop at home. At the same time, she is maybe reading news and/or posting something on the social network. While doing that, she is constantly called away to play with her children.

Finally at the bottom of the empathy map, we need to fill in what does she do now? That means, how does she book her trips now. She books most of her trips with a travel agent, Melanie, who has an office very close to her dental practice. Melanie is very experienced so she usually knows Lisa's needs and books very suitable trips for Lisa. However, in few occasions, especially recently, Melanie started doing hard selling. She has booked few very expensive trips for Lisa.

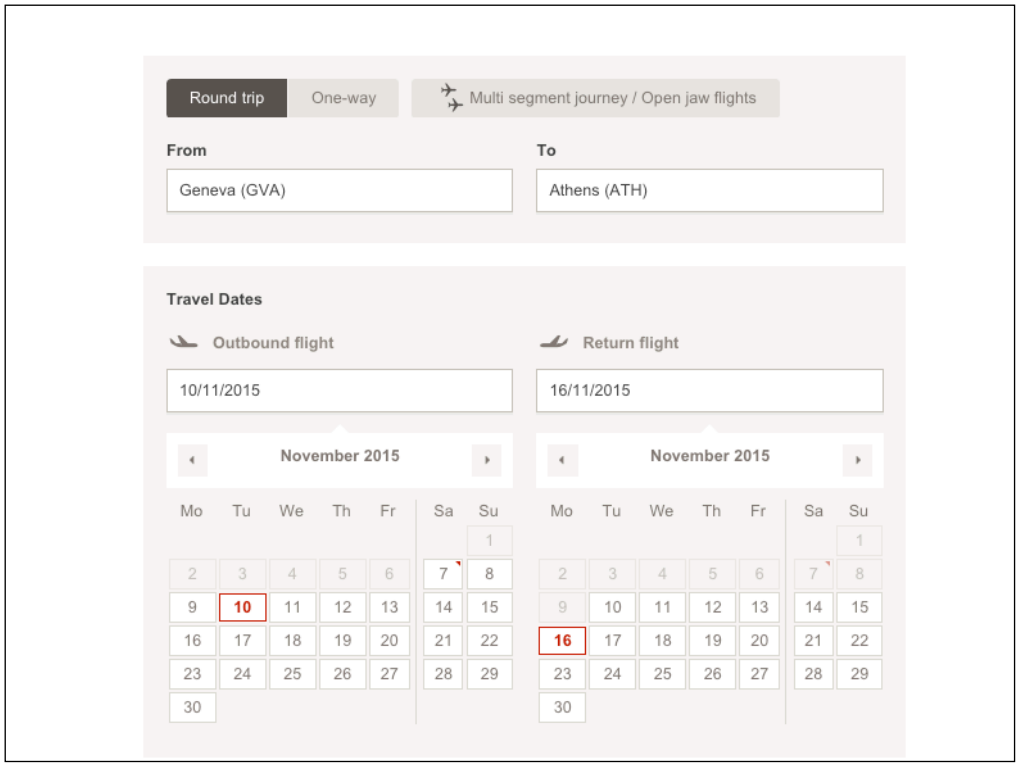


Let's now take a look at the pains and gains. Let's do the gains first. Melanie is knowledgeable, reliable, and most importantly personal. After one or two trips, she knows Lisa's preferences like she knows the back of her hands. Lisa is basically really happy with the services provided by Melanie and her travel agency. The only pain points are the embarrassing situations of refusing expensive flights and holiday packages. Another even more important pain point is that Lisa really doesn't have time to reserve flights outside of her working hours. And if she wants to frequently change some flight details, Melanie can become impatient. Equally embarrassing is when Lisa wants to compare prices proposed by Melanie with other agents. Lisa believes that the online system can overcome these paint points.

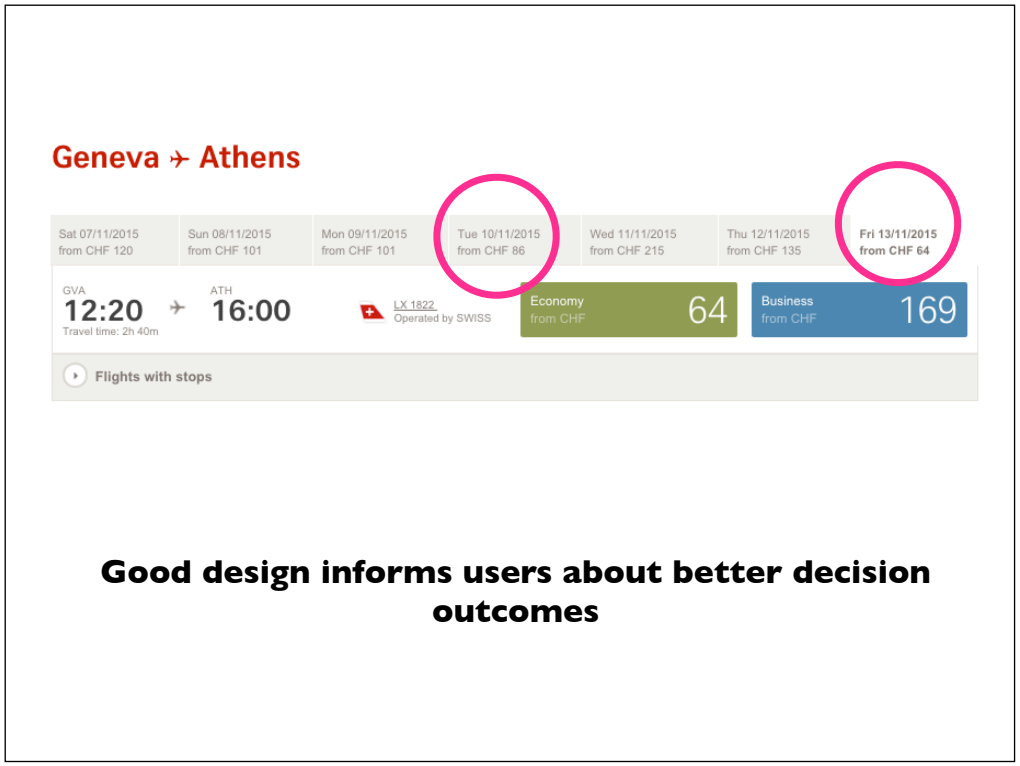
One more important detail: in this empathy map, we didn't talk about how she expects to interact with the system. This is because in the first interview, you haven't really made up your mind what and how your product is going to be like. This is something you will add to the empathy map as you iterate on the interview and ideation loop.



As you are ideating about the new product, you should aim at what we designers called the wow moment. What is a WOW moment? it's the design feature that will surprise your users. How do you get an idea for this feature? Partially it's your imagination and your gift as a designer. Even if you think you are not a gifted designer, you can learn and acquire this ability. The key is through empathy. If you have established empathy with your users and you really want to design something for them, you will find an inspiration for this moment.

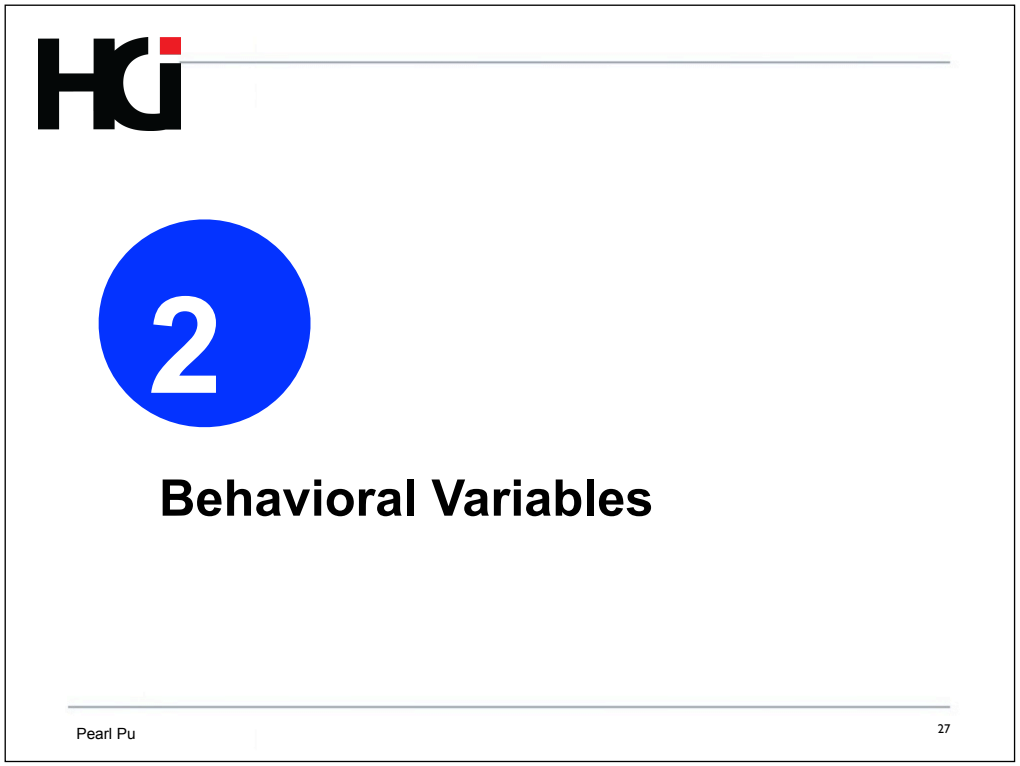


Here is an example for travel planning. In this example, the user has entered the outbound and inbound dates as November 10th and November 16th respectively. On the next page, she expects to see fares for this round trip between Geneva and Athens.

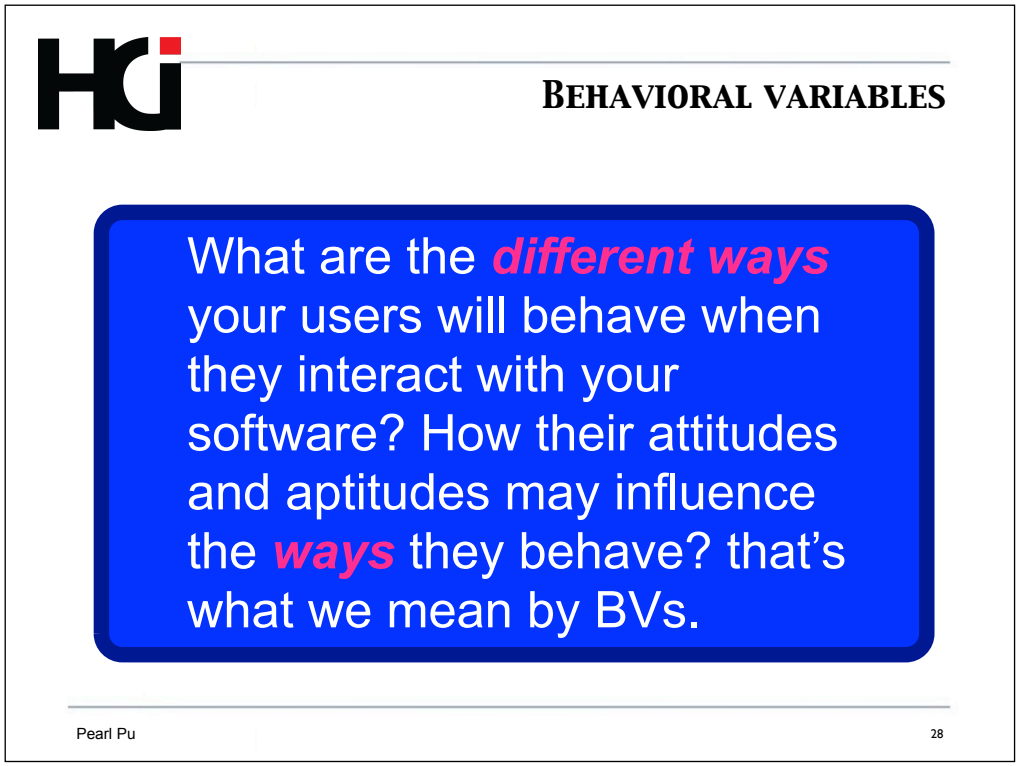


Here is a nice surprise. Not only the flights that she was asking for were displayed, but also flights with slightly different outbound dates were displayed along with their respective prices. At this point, she gets a perspective of her decision context: leaving on Tuesday is not a bad idea after all, because the fare is cheaper than Sat, Sunday, Monday, and especially Tuesday. Secondly, it seems leaving on Friday is even cheaper. If her family is going with her, that is four times the saving. Why would this feature positively surprise our users? well let's recall our persona, Lisa. She is someone who likes to discover new information and as for a bargain, who doesn't like it?

Here we arrive at the conclusion of the persona part of the user modeling. If a software is well designed, the user's mental model is smoothly supported by the designer's model. If a software is compelling, the designer's model not only supports but also informs users about better decision outcomes.

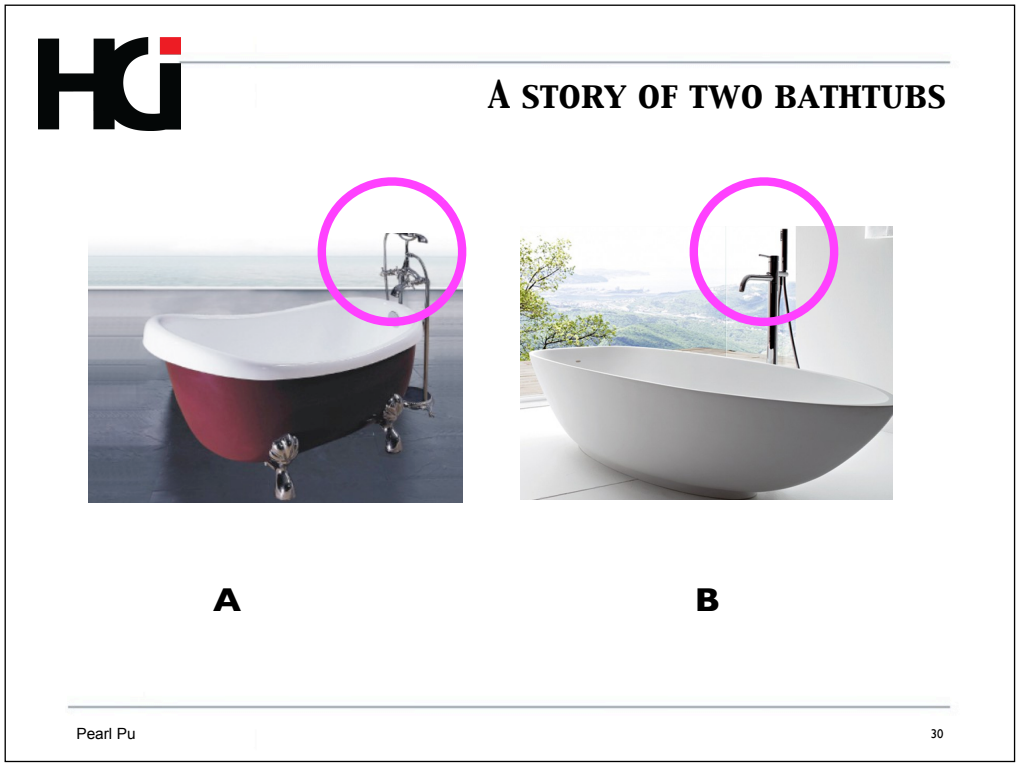


Behavioral variables: this is a rather shorter section compared with the previous one.

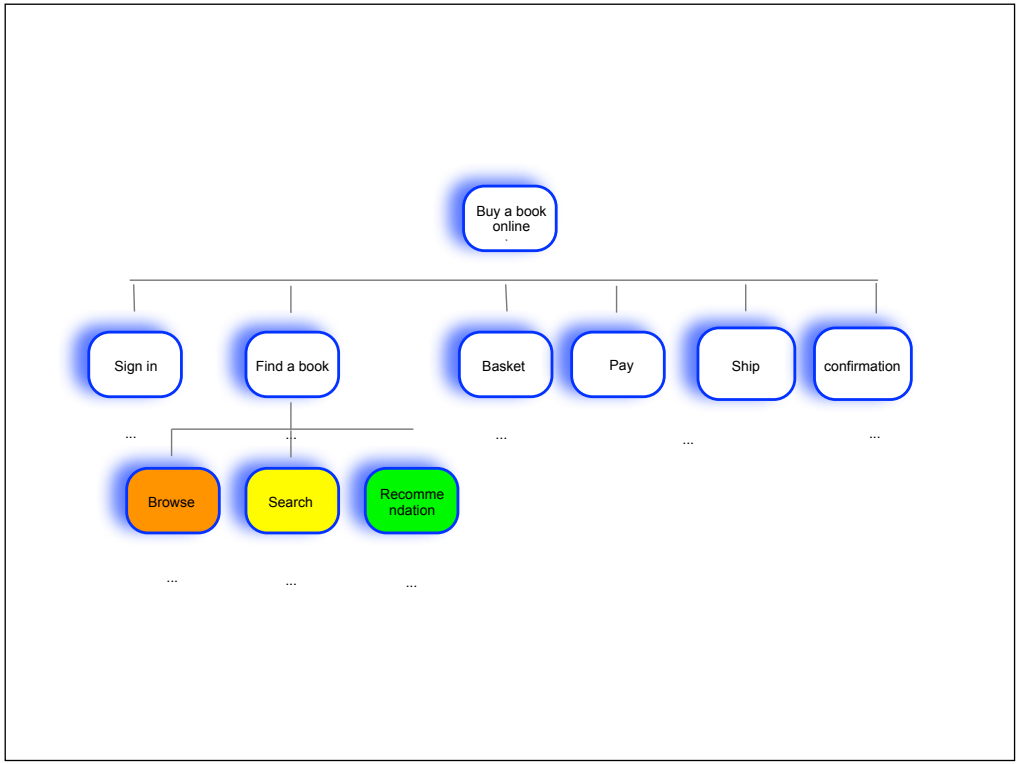


What are the ***different*** ways will the users behave as they interact with your software? how their attitudes an aptitudes may influence the ways they behave? that's what I mean by behavioral variables, BV, in short. In the context of buying a book in an online bookstore, are users likely to use ***search*** or ***browse*** to find the book she wants to buy.

How do we identify and construct them? A good tip to think about behavioral variables is to think about buttons and knobs of a radio on this slide. The behavior variables of a software are like the control units of a physical system. These are what users want to use to operate the device. As this photo suggests, it's not the amount that matters. It's the "what" that matters. You need to identify the right ones.



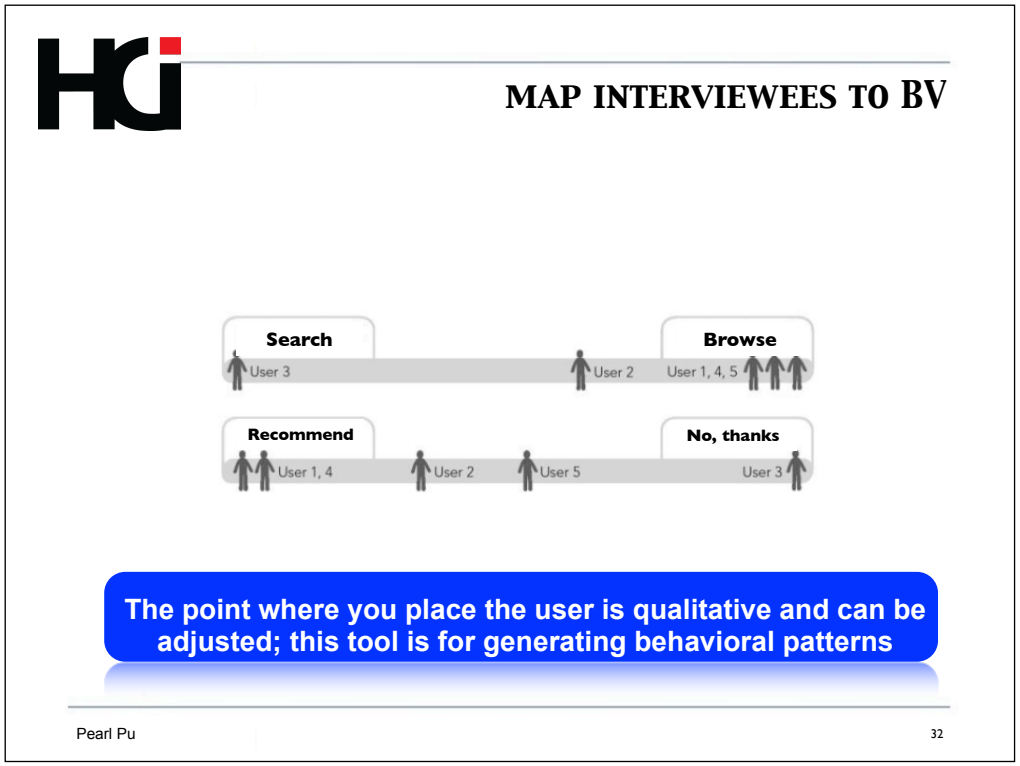
Let me tell you a story about two bathtubs as shown in this slide. In design A, the one on the left, there are two controls, one for regulating the flow of the hot and cold water. In design B, there are also two controls, but this time one control regulates the flow of the combined hot and cold water, and the other for setting the temperature. Now the question is which design is likely to succeed? In design A, a user needs to translate his goal (flow of water at a certain temperature) into a combination of two variables, the temperature being the difference between hot and cold, and the flow rate being the sum of the two. The worst part is that to know if he has gotten it right, he needs to wait for a while, then test the temperature of the water accumulated in the tub, and then translate his next-stage goal (temperature between desired and the current) into another combination of hot and cold water flow rates. As you can see, this involves a lot of guessing and waiting. In design B, he can set the temperature to the desired degree and then set the desired flow rate. Thus in this design the users' behavioral variables are directly mapped to the physical control units. Once we ask the question "how a user draws a bath", the answer to "which design is better" is quite obvious. The design whose model approximates the user's mental model rather than the implementation model is likely to succeed. This is why design B is better.



Back to the design case of buying a book in an online shop, what would be the behavior variables? Well, the users have to first find the book, specify the payment method and give payment method information, followed by the shipping info, and the final confirmation. Here the difficulty is not the variable that determines the logical flow. The difficulty is the second part. What are the different sorts of ways a user finds the book he wants to buy?

It may look trivial to you all three behavioral variables are now available at online market places like Amazon, Netflix, eBay, etc. But in the earlier days, some of the key websites, many of them went out of business by now, only provided the search function, assuming that users know the tile, the author, or the ISBN number of the book. However, as we interview more users, we realize that in many occasions users do not know how to find the book using the search feature. A typical user end goal is “I want to read a good science fiction for my next vacation.” To satisfy this need, online sites started adopting the browsing function. It turns out most people are still not satisfied with search and browsing. They want to be surprised. That is, they want to find a book without the fuss of putting in a query.

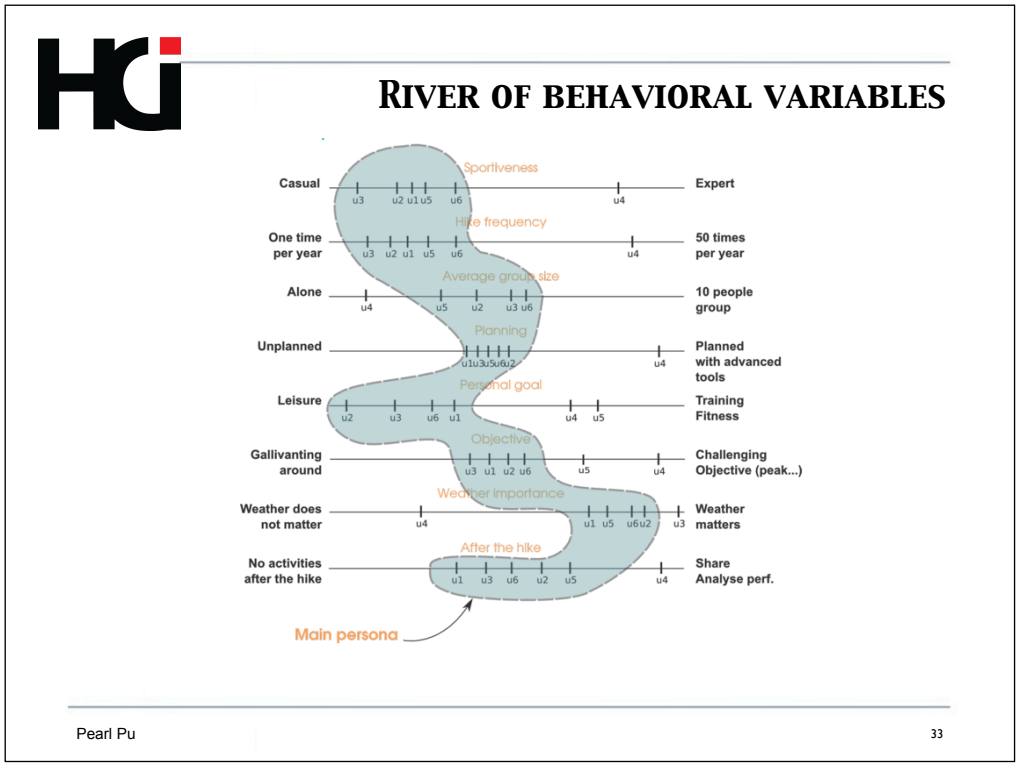
This led to the third important insight about the way people find books and products, which is the recommendation function. Once this function rolled out, it became an instant success. This is because most people want to find things serendipitously. But realizing that users need browsing and then recommendation in addition to search took many years and comprised the most important experience design case study in the online marketplace websites.



To produce a concrete set of behavioral variables, you can use the following visual tool. Draw a line with the two opposing variables, for example, search or browsing. Then map the users you have interviewed onto that variable line. John is a search person, while Marry, Alice, and Ed are browsing users. Carl does both, more often with browsing. So you put him in the middle, slightly shifted towards the right.

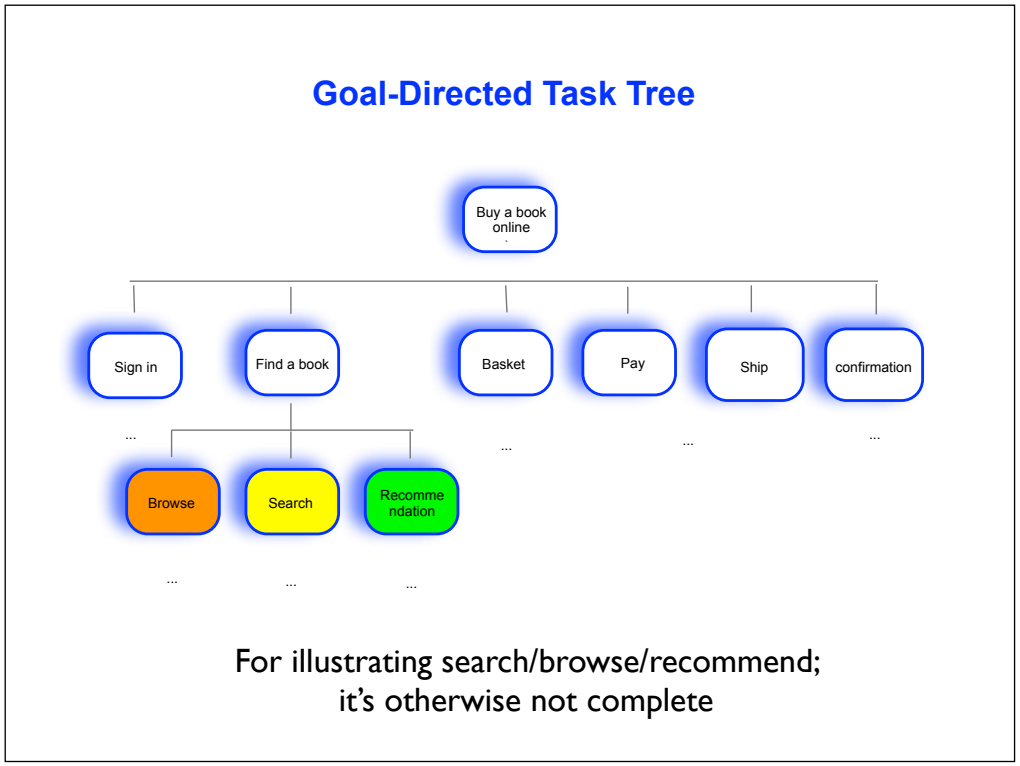
In many cases, the variable line doesn't have to represent opposing variables. Consider the recommendation variable. You can draw a line with recommendation vs. no recommendation. Now you can map your users on that line. Mary and Alice are hot about receiving recommendations, while John is indifferent. Karl and Ed use this function at a varying degree of frequency. So you put them in the middle.

The point where you place the user is qualitative and can be adjusted; the importance is placed on how to use this visual tool to generate behavioral patterns.



As you are developing more behavioral variables and mapping your users, your diagram will soon look like this. At this point, you should draw a river of mainstream users on that diagram, and use this river to determine the key behavioral variables for the main persona.

The last method is called the goal-directed task tree.



This is what it looks like for an online marketplace like Amazon.com.

At the top of the task tree, you list the user's end goal. Remember you have three types of goals, life goal, experience goal, and end goal. What's concerned here is the end goal, that is, what it is that the user is trying to accomplish with this system. What is the end condition? In this case, the goal is to buy a book and have it delivered to home. Since this goal is often too big of a step to accomplish, we are going to break it down to several subgoals. These small steps can be done independently of each other (search, browse), done repeatedly and iteratively (put desired books in the basket), or in a sequential manner. This tree should be relatively easy to build once you have defined your behavioral variables. For illustration purposes, this task tree only emphasizes the breakdown of the "find a book" behavioral variable in terms of browse/search/recommendations. How much detail this tree should include? well it should include enough details to enable the prototyping method called key path scenario. Another tip for knowing when you have enough details is to check if you have enough behavioral variables on this tree for you to tell how a test user walks through this tree as if she were ***interacting*** with the system on a given day, or during a given session.

What	To do	Outcome
empathize	interview dig deeper observe	notes; recordings
organize	sort ideas, make models	empathy map; persona
ideate	brainstorm	POV
iterate	interview to elicit mental model	complete empathy map; find behavioral variables; construct task tree
add magic	brainstorm on "WoW"	add that to the task tree

To conclude the relatively heavy but really important material on user interview and observation, and user modeling, let me summarize the steps for you.

1. You begin this process by establishing empathy with your users through interviewing and observing techniques; make sure you visit and observe them in their natural habitat; don't forget to dig deeper. Your notes and recording are very important
2. Before you exhaust all of your recruited users, you organize your thoughts and notes by sorting your ideas and making models; you should start drawing a partial empathy diagram with a persona
3. Ideate your design by filling out the sentences: [persona's first name] needs [your product name] to [do something based on goal and motivation analysis] because [design insight based on pain points analysis]
4. Based on this design vision, you go through another iteration of I/O, this time eliciting users' mental model of how they expect to interact with your product; now complete the empathy graph, finish identifying behavioral variables, and finish the goal-direct task tree
5. Now put a conscious effort to add magic to your design by reasoning what would be the "wow" moments for your users based on his/her values and goals. If you don't yet find your "wow" very compelling, don't worry. Ideation for this part is the hardest and we will continue working on that during the prototyping stage.

I'll end my lecture today with one note. My approach to user modeling is complementary to the method described in the Cooper book. This means you still need to read his chapter in order to understand my method. But my method is easier to follow and gives a more concrete final outcome.

Avoid designing elastic interfaces

- Design the product to satisfy as broad in its functionality as possible to accommodate most people you interviewed.

Incorrect

Is it correct to design the product to satisfy as broad in its functionality as possible to accommodate most people you interviewed?

Incorrect. Why? because we want to avoid designing elastic interfaces

WHAT IS A PERSONA?

- A persona includes the following
  - Fictional name
  - Job title and major responsibilities
  - Demographics such as age, education, ethnicity, and family status
  - A quote that sums up what matters most to the persona as it relates to your products and services
  - Casual pictures representing that user group
  - empathy diagram representing goals, values, knowledge, attitudes, activities, etc.

QUESTION SLIDES

- Are personas real people?
  - no. But they are composite archetypes based on the behaviors and motivations of real people we have encountered in the ethnographic interviews
- Are they necessarily based on demographic segmentations?
  - no, although the DS is the starting point
  - They represent different behavioral patterns; how they different in ways they may interact with the system

QUESTION SLIDES

- Are personas stereotypical people?
  - what's the difference between archetypes and stereotypes?
  - stereotypes are based on assumptions and biases
  - personas are based on research
  - no, personas are not stereotypical people
- What are the critical points in constructing behavioral variables?
  - meaningful patterns in user behavior
- Is it sufficient to use the photo of a movie star and attach a job title to construct your persona?
  - no.
  - Is it fun to do so? yes.
  - Pay attention to the behavioral patterns; that's what matters

QUESTIONS?