8 ANALYSIS AND MODELS

QUALITATIVE ANALYSIS can seem like a mysterious process. A group of people enters a conference room with interview notes and stickies and emerges with recommendations for creating or changing the functionality or interface of a system.

For us humans, this is actually the most natural thing possible. We're social creatures and pattern-recognition machines. Getting people together to analyze qualitative data is like throwing a party for our brains. Once you start, you'll get hooked.

And this is where design truly starts. You take all this messy data and begin to organize it, and group it, and label the groupings. Through conversation, clarity will start to emerge. Clarity in the data analysis will translate to clarity of concept, content relationships, navigation, and interactive behaviors. And best of all, if you work collaboratively that clarity and deep understanding will be shared.

Any models or maps you create will simply serve as documentation of what everyone already knows.

The process is actually pretty simple:

- Closely review the notes.
- Look for interesting behaviors, emotions, actions, and verbatim quotes.
- Write what you observed on a sticky note (coded to the source, the actual user, so you can trace it back).
- Group the notes on the whiteboard.
- Watch the patterns emerge.
- Rearrange the notes as you continue to assess the patterns.

You will end up with a visual representation of your research that you can apply toward your design work in a few different ways.

AFFINITY DIAGRAM

Your first pass—and if you don't have a lot of time, your only pass—should be to extract general design mandates from your interviews. Then you can prioritize those mandates based on business goals. This also requires the least diagramming skill.

This graphic shows how an affinity diagram starts to take shape (**FIG 8.1**).

The participants in the analysis build clusters of related observations. Once a cluster starts to take shape, you can extract the insights and the overarching mandate or recommendation.

The act of creating an affinity diagram will allow you to distill the patterns and useful insights from the many individual quotes and data points you gather through interviews and observation. If you work collaboratively with your team on identifying and documenting these patterns, the value of that research will be multiplied rather than lost in translation.

The diagram itself can be a handy visual reference or a tool for communicating with a larger team about your research and the principles you've uncovered.

Write down observations

As you review the notes or recordings, write down anything interesting you observed on a sticky note. An observation is a direct quote or objective description of what the user did or said. Pull out all of the particularly interesting quotes. Flag those that

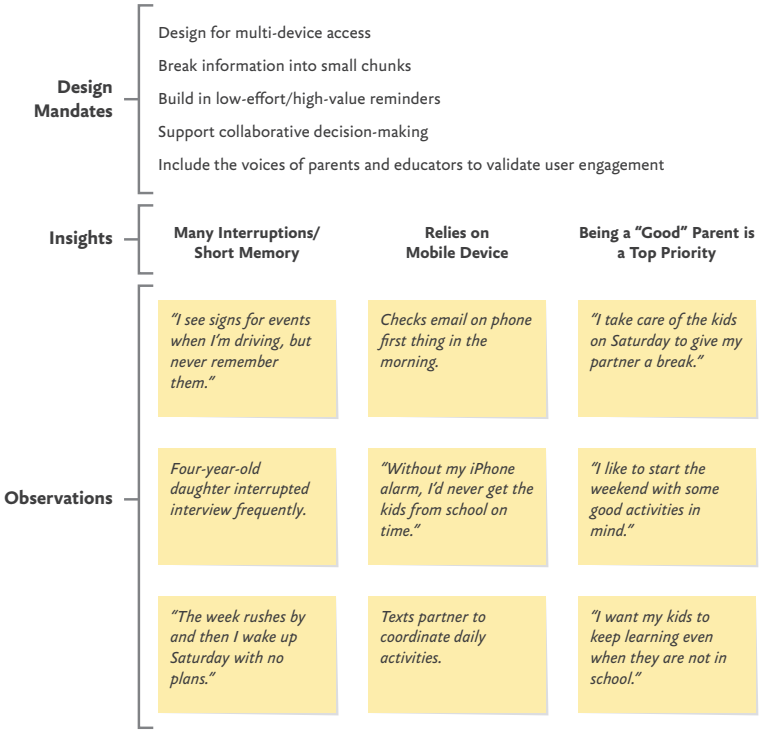

FIG 8.1: An affinity diagram helps turn research into evidence-based recommendations.

seem to represent the particular needs of each user type. These will be useful for your personas. Also note the vocabulary that participants used to describe their goals and the elements of the tasks or systems you are working with, particularly if they differ from those used in your organization.

Note all stated or implicit user goals. Implicit goals can be found in quotes or actions that indicate a particular desire. For example, starting the weekend with some good activities in mind. In particular, flag those you didn't anticipate, but that your product might readily meet.

Example observations:

- "I reset my password every time I visit the website because I never remember it."
- Participant's four-year-old daughter interrupted three times during the thirty-minute interview.
- "I take care of the kids for the whole day every Saturday to give my partner some alone time."
- Participant reports checking email on her phone every morning before getting out of bed.

Example goals:

- "I like to start the weekend with some good activities in mind."
- "I want my kids to keep learning even when they're not in school."

Create groups

Start grouping the notes on a whiteboard. You should start seeing patterns pretty quickly. Name the pattern and identify the user need that emerges from it, such as "Needs reminders for organized activities."

- "I see signs around town for events that look interesting, but I never remember before it's too late."
- "The week rushes by and then I wake up on Saturday morning with no good ideas."

Identify next steps

The final step of the analysis is to identify the actionable design mandate or principle.

- When announcing a new exhibit, offer the ability to sign up for a reminder.
- Allow members the option of digital access to all services (e.g., online member newsletter instead of print, email guest passes to their friends).

- Improve promotion of and navigation to activities and lesson plans.
- Create a stronger voice for the museum based on the quality of its scholarship and expert status (e.g., offer the museum perspective alongside the feed of technology news).

In addition to serving as a useful input to other tools, such as personas, and a nifty visual representation of your research and analysis, the affinity diagram helps you make decisions. You can decide which features and functionality to prioritize based on the patterns of needs you recognize. You can decide to do additional research based on the questions it raises. And it can serve as a common reference point for your team in discussing those decisions.

CREATING PERSONAS

A persona is a fictional user archetype—a composite model you create from the data you've gathered by talking to real people—that represents a group of needs and behaviors.

In the usual course of product development, every interest other than the user has a say: business leaders will provide business goals and requirements, marketers will speak to marketing targets, engineers will speak to the technical constraints and level of effort required to develop particular features. Personas allow designers to advocate for users' needs.

Good personas might be the most useful and durable outcome of user research. Design, business strategy, marketing, and engineering can each benefit in their own way from a single set of personas. If you're following an agile process, you can write your user stories based on a particular persona.

Personas exist to represent the user in user-centered design, because there is no generic user. They embody the behavior patterns and priorities of real people and act as a reference point for decision-making. A persona is a tool for maintaining an empathetic mind-set rather than designing something a certain way just because someone on the team likes it.

Design targets are *not* marketing targets. Stamp that on every persona document you create. Market segments do not

Diane McAvoy

Local parent

"I have so much going on between my job and taking care of the kid, I can't remember a damn thing without my iPhone."

Goals
Find a few places for reliable family outings that don't require a lot of planning.

Entertain her family members when they are out of town.

Keep learning throughout her life.

Stats
33 years old
Married with a 5-year-old child
Lives in Chicago, IL
Account manager for a large health care company

Behaviors and habits
Works from home two days a week. Does most of her shopping online. Weekend routine is one day for "fun" and one day for errands and chores.

Technology and skills
Diane is a multi-device user. Has a work-assigned Windows laptop that she carries between home and the office, as well as an older MacBook and an iPhone for personal use. The family shares an iPad 2. Because she is pressed for time, she has strong habits, no patience, and little motivation to explore.

Relationships
Lives with husband and son. Has large extended family. Sisters often visit and bring their children.

FIG 8.2: A persona document should feel like the profile of a real individual while capturing the characteristics and behaviors most relevant to your design decisions

translate into archetypes. And the user type with the highest value to your business may not be the one with the most value to the design process. Maybe existing Fantastic Science Center members with post-graduate science degrees generate the most revenue through gift shop sales and special event attendance, but they know too much. Their existing level of knowledge and

engagement is likely to be very high. Design for the users with less expertise and you can meet the needs of those with more.

How many personas do you need? As few as possible, while representing all relevant behavior patterns. You can often reduce the number by creating relationships among them and assigning multiple roles to one persona.

For the Fantastic Science Center website you might consider an out-of-town visitor, a local parent, a teacher, and a staff member. Could the out-of-town visitor also be a teacher? Try it.

All fictional user profiles are not created equal. A truly useful persona is the result of collaborative effort following firsthand user research. Otherwise you're just making up a character that might be as relevant to the design process as any given imaginary friend. If you have interviewed some real people and worked collaboratively with your team to identify some patterns, you should be able to create some useful personas.

This doesn't mean that the documentation needs to be lengthy or involved. You can create a vivid individual from a few key details (**FIG 8.2**). It's better for the team to keep a handful of attributes in mind than to have to refer to a lengthy CV with every design decision or switch in situations and scenarios throughout the product development process. Once you've created a set of personas, you can reuse them over time, even for different products.

Capturing the character

A persona description should have just enough detail to capture those aspects of a target user most useful and inspiring for the designers to keep in mind. You can start with the conventional "place mat" layout and go from there. Make a movie or a poster or an animated GIF, as long as the essential information about context of use and patterns of behavior are in a form you can integrate into your workspace and refer to repeatedly. Consider your personas as a set. You don't have to capture all concerns in a single one. And the personas can have relationships to each other, just like people do in real life.

Photo

Use a real photo of a real, relatable person, not a stock photo. Creative Commons-licensed photos from Flickr or other photo-sharing websites are very useful for this. Don't use a photo of anyone who is known to the design team, or that has any distracting elements.

Name

Give the persona a name that fits the demographic information and that everyone on the team can remember and pronounce. LinkedIn is a good source of inspiration for names. The *Game of Thrones* Name Generator is not.

Demographics

Select the set of demographics that fit the role and behavior pattern. Be realistic without stereotyping. The persona must be plausible and representative (no teenage marketing VPs who model and fight crime on the side). Ideally, the gender, age, ethnicity, education, job, marital status, and location are derived from actual users you've interviewed. However, recruiting can be unpredictable and the lack of a complete match needn't stop you from creating a suitable persona. Increase your knowledge by finding people whose online profiles match the criteria you do have. Need more information for the Fantastic Science Center's high school science teacher persona? Try searching for local news stories about teachers to get useful background details, quotes, and even pictures of actual classroom environments. Just remember to create a composite from multiple people and avoid the crime section.

Role

For the most accurate personas, select a role that closely matches that of one of the participants you interviewed and is also one of the identified target user types, such as the aforementioned teacher, parent, or tourist.

Quote

Use an actual quote from a user interview that embodies a core belief or attitude that is essential to keep in mind to meet their needs. The most useful quotes are those that could be answers to questions that reveal both behaviors and mind-set, such as "What's most important to you when you're making plans for the weekend?"

Goals

Goals and behavior patterns are the core of a persona. Identify three to four key goals for that persona based on what you heard in your user research. These will be the goals that the product or website will serve or relate to.

The local parent's goals might include finding weekend activities, keeping kids learning when they aren't in school, and keeping up to date with advances in science.

Behaviors and habits

Note the specific and habitual behaviors that constitute the pattern that defines the persona. Parenting. Teaching. Researching activities online. Switching among multiple devices. Making decisions with another person. Making plans at the last minute. Real life is imperfect and complicated. Capture this. Maybe you spoke with a dad who is torn between wanting to relax on the sofa and wanting to get out and find new things to do on Saturdays. Does he have a habit of checking Facebook over coffee to see what his friends are up to with their kids? This detail could open up a whole conversation about social media.

Skills

Skills include the level of technical expertise and experience this persona has. Be realistic about the level of skill you're targeting with your design. How much experience do you expect them to have based on their profession and educational background? This is a crucial area not to make assumptions. One of your

target personas might be a very successful physician who's a relative technology novice because she is in surgery all day and gets very little time to learn expert features or acquaint herself with the latest applications. She could be a very good proxy for everyone who has a lower skill level, but absolutely doesn't want to be made to feel stupid.

Environment

Note all aspects of the environment that will affect this persona's interaction with the product. Include the relevant hardware, software, and internet access. Do they go online at work or home? Surrounded by people or in private? Is their time online continuous or does it happen in specific chunks? The teacher might have half an hour during the day using the classroom computer. The parent might have an office job with a browser window always open.

Relationships

Note any relationships this persona has that will affect their interaction with your product. Is there a partner who influences decisions? Will children or coworkers be present or otherwise influence the use of your design? Relationships should be based on real-world information, either from your study or demographic information available through surveys or other research. Information from the census or from the Pew Center's Internet & American Life Project is often useful in this regard. You can create some interesting multipurpose scenarios with personas that are related to each other.

Scenarios

If personas are your characters, scenarios are your plots. Each scenario is the story of how a persona interacts with your system to meet one (or more) of their goals. Running a persona through a scenario helps you think through your design from the user's point of view. You can use scenarios at several points in your process:

- To flesh out requirements.
- To explore potential solutions.
- To validate proposed solutions.
- As the basics for a usability test script.

As long as a scenario hews closely to actual data gathered in user research, you have a lot of flexibility in the actual format. You can start from a specific answer to an interview question, such as "I wake up at 8 a.m. on Saturday and read a local news website while the kids run around the house making noise." While personas should remain reasonably constant in their characteristics and priorities, scenarios can evolve and deepen over time and change as your understanding of the system changes. Your personas are the Simpsons, your scenarios are the couch gag.

You can write a scenario as a short text narrative, a step-by-step flow, or even a set of comic panels—whatever is easy for your team to create and use to keep each persona represented in design and technology decision-making. If you find anyone on your team resenting the effort necessary to work with personas and scenarios, you're doing it wrong. Simply drawing out scenarios on a whiteboard can work.

Scenarios are not themselves use cases or user stories, although they can influence each. A use case is a list of interactions between a system and a user, and is typically a way to capture functional requirements. Scenarios are from the perspective of the individual human user represented by the persona, not the perspective of the system or business process.

For example: Diane and her family just moved into the area. Her job as an account manager is very demanding during the week, but weekends are family time.

- Goal: she wants to find local activities that will be entertaining for her son and relaxing for her and her husband.
- Motivation: when she was driving home from the office on Friday evening, she saw banners for the Fantastic Science Center's new exhibit on super storms. Sitting in her driveway, Diane Googles the science center on her iPhone.

- Task: she needs to determine whether visiting the Fantastic Science Center will meet her needs.

Stay on target

Developed with care, personas can be the most useful and lasting output of user research. They are the users in "user-centered" and an incredibly efficient and even fun distillation of your ethnographic work.

You will know your personas are working when they become the first people you want to see any new idea. Rather than asking "Does this work for me?" or "Does this make my boss happy?" you can ask "Does this address Dana's concerns about privacy? Would Neven understand what to do? Would Anna find time for this in her busy schedule?"

MENTAL MODELS

All of us carry around a library of mental models in our heads. Without them, every new experience would be a complete surprise and we would have to painstakingly figure out each situation. Using a term from cognitive science, a mental model is an internal representation of something in the real world—the sum total of what a person believes about the situation or object at hand, how it functions, and how it's organized. This representation is based on a combination of hearsay and accumulated experience. People have mental models of how stoves work, how dogs behave, and what happens at a rock show. (Band plays, band says "Thank you and goodnight," band waits offstage while audience applauds, band returns to play popular favorites.)

Mental models can be real time-savers for deciding how to behave—to the extent they are accurate. Sometimes there's no encore. Sometimes you get burned. The first time I rented a Prius, I spent ten minutes sitting in the parking lot because my mental model of "passenger car" didn't include the hybrid's innovative ignition system.

In design, "intuitive" is a synonym for "matches the user's mental model." The closer an interface fits that image, the easier it will be to learn, use, and navigate. This is a concept with a lot of practical value.

You can use data from user research to diagram the (composite) mental model of each particular user type, and use that diagram to guide the design. This is, strictly speaking, a mental model model. However, particularly following consultant and author Indi Young's work in this area (*Mental Models: Aligning Design Strategy with Human Behavior*; http://bkaprt.com/jer/20/), people in the business tend to use the one term as a catchall. So there are two types of mental models: the type each of us holds in our head to help us deal with the world, and the type designers sketch out to better create that world. For maximum success, be aware of the former and get to work on the latter.

To design an application or a website, think about the mental models of the activities you want to support.

If you're designing a mobile application to help commuters find the best way to get to work on public transit, it's useful to look at the mental model of "getting to work." If you're redesigning buses, you'd want to look at the mental model of "bus."

As a designer, you have your own mental model of what you're designing, and you have a mental model of the users themselves, your set of assumptions about what they know and how they will interact with your design. It's easy to overestimate how well your view matches their reality.

Documenting the user's mental model allows you to not just get inside their head but get the inside of their head out of *your* head for everyone else to see. You can use a mental model diagram to collaborate with your team, prioritize features, better organize information, and identify areas where users have needs that aren't being served.

A mental model diagram can help resolve issues that arise if different user types have widely divergent mental models, or if the actual design of the system is significantly different from the one that was originally proposed.

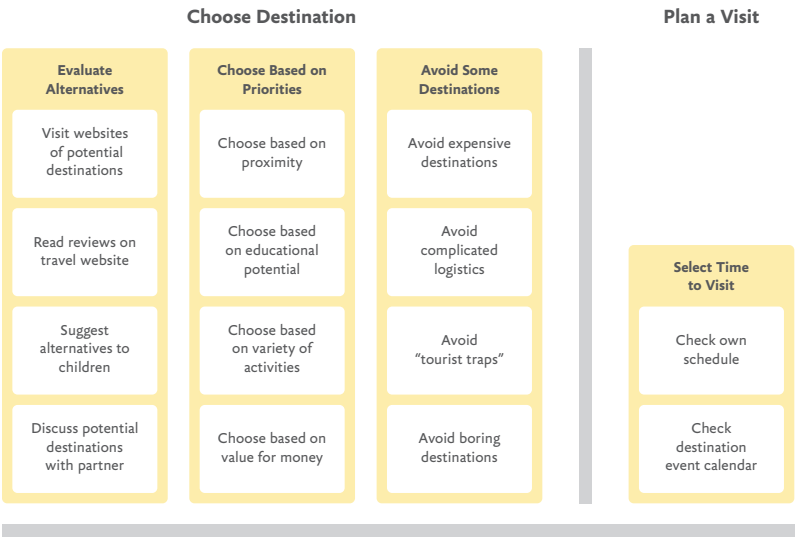

FIG 8.3: Mental model diagrams illustrate your users' thought processes in detail. This information helps you identify relevant and necessary content and functionality.

How to create a mental model

- Do user research.
- Make an affinity diagram (see **FIG 8.1**).
- Place affinity clusters in stacks representing the user's cognitive space to create the model. These groups will include actions, beliefs, and feelings.
- Group the stacks around the tasks or goals they relate to (**FIG 8.3**).

Building on the towers

Conceptual modeling/site mapping

For a new website or service design, you can translate the mental model to a conceptual map that relates content and functionality according to the target user's view (**FIG 8.4**). The model will

FIG 8.4: A conceptual model bridges the gap between mental model and system map.

form the application framework or the basis of the information architecture as you proceed into more detailed design.

Gap analysis

If you have an existing product or service, you can use a mental model to identify gaps, or mismatches between what you offer and what the user needs or expects. This will help you design features that fill those gaps.

For example, when designing the app for urban commuters, you might find that their mental model of getting to and from work includes changing plans suddenly based on contingencies like bad weather, local events, and transit system delays. If your application only offers route suggestions based on optimal rather than actual conditions, you may recommend a route that's influenced by rain or event traffic.

Reviewing the mental model suggests an opportunity to offer additional information and support that allows users to anticipate and evade problems, leading to a more successful commute.

On the other hand, you might find out that features you had considered offering don't fit in the users' mental model at all. Perhaps you were planning to display after-work entertainment suggestions along the route, but find that this is incompatible with the user's desire to quickly locate the most efficient route.

TASK ANALYSIS/WORKFLOW

Task analysis is simply breaking one particular task into the discrete steps required to accomplish it.

Contextual inquiry is the best prelude to task analysis, but you can also use data from user interviews as long as you've collected sufficient detailed information about how the participants work toward their goals step by step. Any given task has both cognitive and physical components that may be more or less important given the domain and the goal of the analysis. For example, making a complex purchase decision such as buying a new car typically has a series of cognitive activities surrounding identifying the need or desire for a car and conducting research online, as well as the physical component of actually going to the dealership and test-driving the car itself.

From simple to complex and back again

If you're designing a site or application that addresses one or many complex tasks in helping users meet their goals, you can use task analysis. This method can be particularly helpful to map what people do in the real world to functionality you can offer on a site or in an application.

For example, "purchasing tickets" sounds simple, but the online process is often a complex and stressful multistep flow with a lot of decision points.

Task analysis can be helpful when designing any system intended to replace a real-world task with an online interface or changing the nature of the physical interaction as with the shift to mobile devices from desktop-based applications.

Break it down

Using the information from user interviews or contextual inquiry, identify each step the participants reported or you observed them taking to complete a given task. Note the initial state, the event prompting the user to begin the task, the information or tools the user needs at each step, and any steps at which the task is likely to be interrupted or resumed. Put all of these steps back together as a workflow.

1. Receive postcard advertising fall event calendar.
2. Go to website.
3. Locate event information on homepage.
4. Click on link to see all available upcoming events.
5. Identify event.
6. Verify ticket availability and price.
7. Enter number of tickets desired.
8. Enter preferred delivery method.
9. Review information and total cost.
10. Select "Buy Now."
11. Enter credit card information.
12. View confirmation page and instructions for receiving tickets.

Make it flow

In addition to informing the feature set and flow of an application, task analysis will help you identify where specific content might support a user along their task path. Users might take very different paths than you anticipated, or be influenced by particular factors in the environment that you'll need to consider in your designs (**FIG 8.5**).

MODEL MANAGEMENT

This is just a sample of a few common ways to work with the research data and incorporate your findings into design decisions. A little exploration of the UX corners of the web will yield many more. Communicating the meaning and value of research is a

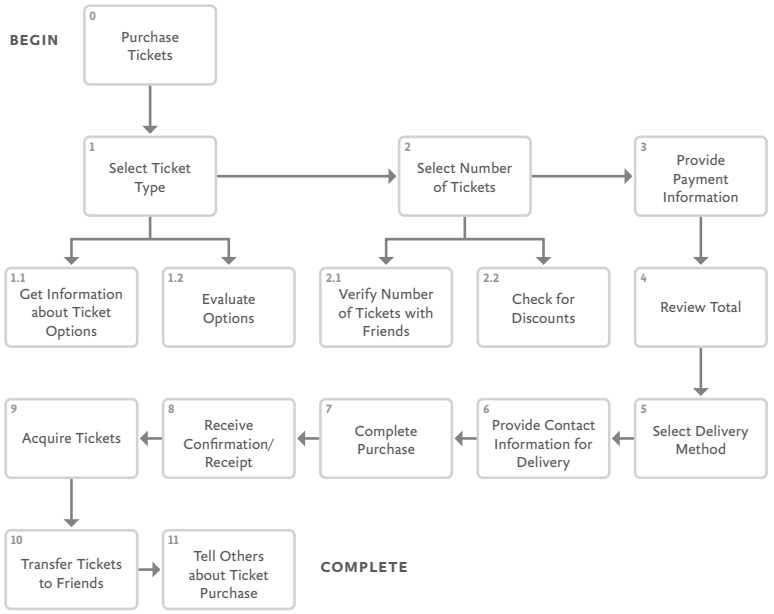

FIG 8.5: This task path for ticket purchase can help identify areas where the user needs specific content and functionality to meet her goal.

design activity itself. And the act of working together to synthesize individual observations will ensure that your team has a better shared understanding than a report could ever deliver.

You may also benefit from the fact that a clear, economical diagram is viscerally appealing. If you're promoting the value of research among skeptics in your organization, don't underestimate the accessibility and appeal of your analysis, visualized.