

SELECTING CITIES FOR USABILITY RESEARCH

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Human factors practitioners are often asked to conduct usability research in multiple cities to obtain a larger, geographically dispersed sample. Instead of selecting cities first and participants second (as is often done in market research), we suggest an approach whereby usability professionals can select cities based on the type of research and attributes that influence product usage. Starting with these factors, we can develop a table of users and subgroups and then identify the regions in which these groups are prominent. The number of users in each subgroup and the final city selection involves other factors such as time constraints, budget limitations, and organizational credibility. By following this approach, we can make user-centered recommendations to the product team when planning usability research.

INTRODUCTION

As human factors consultants we find that our clients often ask us to conduct usability research – such as in-context interviews and usability tests – multiple cities in order to have larger, geographically dispersed samples. In some cases it is appropriate to conduct usability research in multiple cities or regions due to the type of product, the users of the product, or the goals of the project. In other cases, however, visiting several cities may not add enough valuable data to justify the expense. The goal of this paper is to provide practitioners with a systematic way to evaluate individual cases and make an informed decision as to whether or not a geographically diverse sample is warranted, and if so, which cities or regions could be considered as targets.

NEEDS GATHERING VERSUS USABILITY TESTING

Practitioners first should look at the type of research they plan to conduct (needs gathering or usability testing) before deciding whether or not it is appropriate to conduct the study in more than one city or region.

When the purpose of the research is needs-gathering, such as in-context interviews and observations, it is important to consider users' attributes such as lifestyle, environment, and habits, since people differ greatly in these respects (Fulton Suri, 1993). These attributes often vary from region to region, and in cases where they influence the use of a product we try to conduct interviews in more than one region.

In usability testing, on the other hand, attributes such as lifestyle and environment are usually less important, thus geographic location becomes less important. If a product is poorly designed, users will experience usability problems regardless of their location. However, there are some cases in which geographic location does make a

difference in usability testing, such as when climate or culture influences the use of a product (as discussed later).

There are also instances when, as human factors professionals, we can safely predict that geographic location will not influence the results of the usability research, but the client wishes to conduct the study in more than one city regardless of our prediction. For example, the client may have market research activities planned in three cities, and may wish to complement those activities with usability research as the product team will be together already.

In the following sections, we present an approach to determining if geographic sampling is appropriate, and if so, how to select cities or regions.

DETERMINING IF MULTIPLE CITIES ARE WARRANTED

Understand Market Segments

We begin our research by working with the product's marketing manager to understand how the market is segmented. The marketing manager will know who purchases the product and what their motivations are for purchasing it. This usually indicates who is actually using the product, though this is not always the case. For example, if one person in a household is knowledgeable about kitchen appliances, he or she might purchase the appliances but other members of the family may be the ones who use them. In the case of software, a technical specialist may research and purchase the software that other employees will use. Even given this limitation, it is important to include in the analysis the market segment breakdown of the user population.

By understanding the target market, we can identify broad demographics such as age, gender, income, buying habits, and other information by region. In our experience, product manufacturers often vary in their

level of knowledge about their target markets and their actual end users.

When the goal of the research is to uncover areas for innovation, we typically include individuals from the target market but also purposely include “boundary individuals” who have different or unique viewpoints (Loring & Marsh, 1997).

List Relevant User Attributes

Once we understand the target market in broad terms, we ask ourselves what user *attributes* make a difference when using (experiencing) this particular product. For example, does gender make a difference? What about age or occupation? Lifestyle? Climate? Experience level with similar products? Ethnic or cultural background? Level of physical ability? Each individual situation should be considered carefully.

Next we ask, what are the primary goals and/or tasks the user is trying to accomplish with the product? In some cases, all users are trying to accomplish the same task. For example, if the product is a toaster, all users are attempting to make toast. In other cases, different users may have different tasks. For example, if the product is a two-way radio, the dispatcher may have different tasks than the firefighters in the field. In many cases, we divide users into groups based on their primary goals or tasks.

Create an Attribute Map

Once we have identified the attributes affecting product usage, we can create an *attribute map* that shows the attributes and the range of values (and therefore subgroups) for each attribute. Tables 1 and 2 show examples of user attributes and possible subgroups for two different products.

Table 1: Sample Attribute Map for a Database Software Application

Attribute	Subgroups
Computer experience	Novice Intermediate Expert Power User
Familiarity with similar products	Familiar Unfamiliar
Primary tasks	Human resources Financial services Enterprise management

Table 2: Sample Attribute Map for a Kitchen Appliance

Attribute	Subgroups
Gender	Male Female
Type of home	Apartment House
Size of kitchen	Small Medium Large
Meal size	Cooks for one Cooks for two Cooks for a family
Climate	Hot Temperate Cold
Type of cook	Frequent, enjoys cooking Frequent, cooks out of necessity Infrequent, enjoys cooking Infrequent, cooks out of necessity

Select a Subset of Attributes for the Study

Often we end up with a large number of attributes that could potentially affect a user’s experience with a product and we must prioritize the list by selecting only the five to ten attributes that affect product usage most. The number of attributes will suggest the appropriate number of participants to include in the study, so it is important at this point in the research that the entire product team is in agreement. This is where the practitioner’s years of experience, combined with the product manager’s knowledge, become invaluable. For example, we might consider which two subgroups are most similar to each other and combine them or choose only one. In the case of the kitchen appliance, for example, the type of home and the size of the kitchen can be combined as these two attributes are so closely related.

Determine if Geography is Important

At this point in the research we ask ourselves whether or not the mapping of attributes and subgroups suggests that it would be advantageous to have a geographically dispersed sample. This depends on the attribute map, the need for organizational credibility, and the client’s wishes.

For example, if the matrix includes attributes such as climate, lifestyle, type of clothing, primary language, or culture, it is fairly obvious that a dispersed sample is warranted. In other cases, we may not be sure whether location will make a difference, and we may simply want to find this out as part of the study.

Sometimes the need for organizational credibility may dictate a geographically varied sample, even though the user profiles may not (Worthen and Sanders, 1987). For example, conducting a usability test in more than one city may be necessary to gain credibility within the client's organization if some groups firmly believe that additional testing makes the results more valid even though statistically it may make no difference.

Finally, as mentioned above, the client may be planning to conduct market research activities in several cities already, and may wish to complement those activities with usability research. We have encountered many such projects where usability research is "piggy-backed" onto market research or vice versa.

Determine the Number of Participants

Once we decide which user attributes and subgroups to include in the research and whether or not to visit multiple cities, we must decide how many participants to include from each subgroup. While it would be interesting to include a participant representing each cell of the attribute map, this is usually not necessary or even possible. For example, if there are twenty-seven unique combinations of requirements, the appropriate number of participants is not necessarily twenty-seven. In the case of usability tests, it has been well documented that five to eight participants per user group will find 80 percent of the major usability issues (Dumas & Redish, 1994). In the case of in-context interviews and observations, however, we have not found any references with concrete data on the recommended number of participants.

In practice, we determine the final number of participants by discussing:

- the goals of the research,
- the type of study,
- time and budget constraints, and
- project management factors.

We may decide, for example, that it is better to interview one person from every subgroup to allow for representation of a broader range of attributes. Alternatively, we may select fewer subgroups but include several participants in each so that the data are less subject to individual differences. Regardless of which path we choose, we find we must always make trade-offs.

Create a Research Map

Let us return to our first example, the kitchen appliance. Imagine that we are in the early stages of design, so our main goals are to better understand the users and their tasks, usage scenarios, and environments, as well as to uncover areas for innovation. We may determine that the attribute "type of cook" is most important in determining how consumers will use the product because it influences other factors such as level of cooking experience, experience in using a product like this one, and interest in trying new features.

"Kitchen size" is also important because it affects the available counter space and storage space for the product. However, "kitchen size" and "type of home" are closely related so if we visit large homes, small homes, and apartments, we will see the effects of large, medium-sized and small kitchens. Climate influences the types of foods users prepare, and meal size determines the capacity needed for the product. Let us say that we are not sure whether or not gender influences the way the product is used, and therefore we would like to find out. We would then create a *research map* similar to the one in Table 3. The attributes are listed from left to right in order of importance, and "type of home" and "kitchen size" have been combined from the attribute map in Table 2.

In our example, let us also note that our cost and schedule constraints limit us to only two cities, with only three days in each city. We would then select the extremes of the climate range and decide to visit one city in a hot climate and one city in a cold climate.

Table 3: Research Map for Kitchen Appliance

Participant	Type of Cook	Type of Home	Meal Size	Climate	Gender
1	Frequent, enjoys cooking	Large house (large kitchen)	Cooks for one	Hot	Male
2	Frequent, cooks out of necessity	Small house (medium kitchen)	Cooks for two	Hot	Female
3	Infrequent, enjoys cooking	Apartment (small kitchen)	Cooks for a family	Hot	Male
4	Infrequent, cooks out of necessity			Hot	Female
5	Frequent, enjoys cooking	Large house (large kitchen)	Cooks for one	Cold	Male
6	Frequent, cooks out of necessity	Small house (medium kitchen)	Cooks for two	Cold	Female
7	Infrequent, enjoys cooking	Apartment (small kitchen)	Cooks for a family	Cold	Male
8	Infrequent, cooks out of necessity			Cold	Female

Select Appropriate Cities

Given the necessity of conducting the user research in more than one city, we would next review our attribute map and the number of participants we wish to include, and consider the best places to find the appropriate individuals for the study.

Travelling to a city where there is a large pool of potential participants makes it easier to recruit people for the study. In some cases, it is widely known where to find the types of individuals you need (for example, if you wish to include Cuban Americans in your sample, it would be wise to run the test in Miami). In other cases, we need to research the profiles of various cities with respect to the attributes of interest. There are a number of references available, such as the Pardee Reference Tables (Pardee, 1997), textbooks (Shrimp, 2000), and data from CACI Marketing Systems (CACI Systems, 1999), that can help identify the characteristics of different cities and regions. There are also numerous web sites that provide demographic information, such as the U.S. Census Bureau's site, the Forrester Research site, and You Are Where You Live (see URLs in References section). These references include demographic analyses of U.S. consumer spending; statistics on personal and household preferences for apparel, transportation, and entertainment; and characteristics such as age, income, and household type.

Consider Costs and Other Factors

The final aspects we consider when selecting cities for user research are project management issues such as travel costs, labor costs, and expedience. For example, if the research team is located on the East Coast, then the cost of travel in terms of time (days) would be lower if the target cities were also in the east. Among eastern cities, there is great variation in terms of travel expenses such as meals and hotels. Conducting research in Philadelphia is typically cheaper than conducting research in New York City, for example.

Another factor to consider is expedience. If our client's company has an office in Denver that we can use to run the usability test and colleagues there who can help us recruit participants, then we might choose Denver over another western city. Similarly, if we have used a market research facility in Minneapolis and had a good experience with that facility, then we might select Minneapolis over Indianapolis, other factors being equal.

Our final research schedule might resemble the one in Table 4. With this schedule, we have met our goals of better understanding users and their tasks, usage scenarios, and environments. We have also stayed within our time and budget constraints, and set the stage to uncover areas for innovation.

Table 4: Final Research Schedule

City 1 – Miami (Hot Climate)

Part.	Day	Name	Type of Cook	Type of Home	Meal Size	Gender
1	Monday	Susan	Frequent, enjoys cooking	Large house (large kitchen)	Cooks for a family	Female
2	Monday	Maria	Frequent, cooks out of necessity	Small house (medium kitchen)	Cooks for two	Female
3	Tuesday	Paul	Infrequent, enjoys cooking	Small house (medium kitchen)	Cooks for a family	Male
4	Tuesday	Lynn	Infrequent, cooks out of necessity	Apartment (small kitchen)	Cooks for one	Female

City 2 – Chicago (Cold Climate)

Part.	Day	Name	Type of Cook	Type of Home	Meal Size	Gender
5	Thursday	Walter	Frequent, enjoys cooking	Small house (medium kitchen)	Cooks for one	Male
6	Thursday	Diane	Frequent, cooks out of necessity	Large house (large kitchen)	Cooks for two	Female
7	Friday	Sonia	Infrequent, enjoys cooking	Apartment (small kitchen)	Cooks for a family	Female
8	Friday	Betty	Infrequent, cooks out of necessity	Large house (large kitchen)	Cooks for two	Female

CONCLUSION

Selecting cities for usability research is more challenging than it may first appear. Although the characteristics of individual cities are important, the attributes of the users of a particular product are more important to usability research. One should begin by identifying user attributes and determining how many users to include in the study before selecting a city. By following this approach, practitioners can make effective and appropriate user-centered recommendations to the product team when planning usability research.

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