

A Practitioner's Guide to the Modified-Delphi Card Sort

AUTHOR

Celeste Lyn Paul
Senior Interaction Architect
cpaul@user-centereddesign.com
User-Centered Design, Inc.

ABSTRACT

The Modified-Delphi card sort is a pre-design information architecture method which saves time and money, and increases the quality of results gathered. This paper reviews the research basis of the method and provides a practical guide for practitioners who wish to conduct a Modified-Delphi card sorting study.

INTRODUCTION

Card sorting is a research method for gathering input from users for designing an information architecture [5]. Open card sorting is particularly useful as a pre-design method, as it tries to draw out underlying mental models about a dataset from participants [7,10]. Previously thought to be an inexpensive method, there is debate about the number of participants necessary for an open card sorting study which effect the overall costs for conducting an open card sorting study. Common practice suggests participant numbers on the order of a normal usability test or other user-centered design study six to 10 participants [2,5,8]. However, both McGovern (2002) and Tullis and Wood (2004) have suggested at least 20 to 30 participants are necessary to get meaningful results from open card sorting. This number significantly increases the cost of an open card sorting study by requiring a higher budget for participant stipends, additional days of facility costs, and additional hours for analyzing results. The higher cost makes open card sorting less useful as a pre-design method, because testing budgets are often reserved for testing later in the design process.

The Delphi method [3] is a forecasting technique used to moderate opinion information as it is collected from experts. The interview protocol has been successfully applied in user research in various domains [1], and variations of the method have been adapted to iterative usability testing [4]. More recently, it has been adapted as a card sorting method which aims at finding a solution through moderated collaboration [9]. Paul's study (2007) found that the modified-Delphi card sorting study yielded more high agreement cards than the open card sorting study, and information design experts ranked the results from the modified-Delphi card sorting study better than the results from the open card sorting study.

Very rarely is there a single correct answer in information architecture. There may be several correct information architectures which can serve 80% of the users' needs, and it is a matter of finding the best model and implementing it. Rather than having participants propose individual information models and finding patterns between those models through cluster analysis, participants of a modified-Delphi card sorting study work with a single information model and modify it to fit their individual understanding of the information. Paul summarizes the Modified-Delphi card sort in 4 steps:

1. The seed participant creates the initial structure from a stack of cards and proposes an information structure model
2. The following participants comment on the previous participant's model and make modifications to the proposed model or propose a new model
3. The card structure changes throughout the study, evolving into a model which incorporates input from all of the participants
4. A consensus is reached when the information structure stabilizes and there are no more significant changes, or obvious patterns of conflict and agreement arise

As more participants contribute to the model, it evolves into a model which most of the participants could agree with.

CONDUCTING A MODIFIED-DELPHI CARD STUDY

The Modified-Delphi card sort is a pre-design method and best used early in the design process during user research. Since card sorting is an activity separated from the design and context of information, the results gathered only help understand how participants think about the information, not exactly how the information should be organized in to a website or product.

Planning

At least 50 topics should be selected in order to have enough content to draw out a conceptual model; however, more than 100 cards can significantly lengthen sessions and increase participant fatigue. The number of topics which should be used is also related to the participants' familiarity with the content. Too few cards may not give participants enough data to create or modify an accurate information model, and too many cards may be overwhelming and mentally exhausting which will result in less problem solving and more satisficing. If participants are expected to be familiar with the content or domain, more cards can be used since the task will not be as mentally demanding.

Participant recruitment is similar to other user-centered participatory design methods. Recruiting criteria is designed to recruit participants with certain characteristics you are interested in gathering feedback from, most often the user's of the product. These characteristics are limited to the scope of participants recruited, such as target audience, the primary user group, or a single user group.

The seed participant is the first participant of a study. They experience the method as an open card sort with no influence or base structure to work with. There are several ways a seed participant can be determined:

1. A participant from the recruited pool of participants working alone

2. A pair of participants from the recruited pool of participants working together
3. An information architect assisting a participant from the recruited pool of participants
4. An information architect working alone

The first two scenarios are the most desirable since the purpose of the study is to gather input for a design, and not feedback about a design. A single participant working alone is similar to a participant in an open card sorting study. Groups of participants are also popular in user-centered studies, and a pair of participants may be a good way to begin a study with a dataset that is difficult to organize or contains information new or unknown to the participants. A pair of participants should only be used as the seed participant; although the use of groups of participants in card sorting methods is common, this case in applications of the Delphi method is rare. The use or assistance of an information architect may be useful when information in the dataset is new to participants and the first participant may have a difficult time with organization.

Study Materials

This paper discusses how to conduct the modified-Delphi card sort with low-cost, low-tech materials such as index cards; however, other media or software may be substituted.

White index cards are suggested for the main topic cards since they are the easiest to find in stores and are the most neutral in color. Each of the topics should be printed on clear or white mailing labels or directly to the index cards in a large font so they are easy to read. It is also a good idea that each label be numbered for ease of recording and analysis later in the study. Several copies of the topic card set in case one is misplaced, as labels become hard to read from participants write on the cards or cards begin to show wear. Have a large stack of blank white index cards for participants to rename existing cards as an alternative to crossing out the label on the printed card, or for creating a new card. Providing colored cards to participants for labeling categories makes it easier to discern category cards from hand written topic cards. Yellow is the best color to use for the category cards; blue, pink, and green tend to be printed with darker colored card stock and may be hard to read from.

Also be sure to have several pens or markers available. While participants are working, pens are easily lost underneath cards and it is better to have extra pens on hand than to have participants shuffle through their work to find one. Participants also tend to request rubber bands or paper clips to help them organize their cards, especially on small work spaces. These binding accessories may also be used by participants to join similar topics, or low-level content together which should be considered as a whole.

Day of the Study

Each participant should sign a participation consent form which informs them of their rights as a human study subject and releases artifacts from the session, including any recordings, to the researcher. Optionally, any entrance questions may be asked or questionnaires administered at this time. Once the participant has signed the consent form, the instructions for the study are read to them by the moderator.

The seed participant will be read instructions similar to those for an open card sort:

Here are cards which represent topics [of some product or website]. I would like you to take a look at these cards and sort them in to groups that make sense to you. After you have created your groups, use the extra cards to provide a label for each group. If you feel something is missing, you may add it, or if you feel something does not fit, you may discard it.

For participants other than the seed, the instructions for reviewing the previous participant's work should be stressed:

Here are cards which represent topics [of some product or website]. They have *already been sorted by a previous participant* in a way that made sense to them. I would like you to *review their work* and then make any modifications you feel would make better sense to you. This includes the labels they have given to the groups. You may change a label if it is unclear. If you feel something is missing, you may add it, or if you feel something does not fit, you may discard it.

The participants should be informed they are working with other participants' work but not how many participants have worked with the material before them. The purpose of this information is to inform the participant that they are working among peers; however, the exact number of participants may be intimidating and introduce bias.

The moderator should also inform the participant that they may ask any questions and work out loud by talking about the work they are doing and decisions they are making. The moderator should be present for most, if not all, of the session. They may interact with the participant if they are engaged, but should not help the participant. Sessions may last from 1 to 1.5 hours.

When the participant has finished making changes, step through each category with them and review their work. This review provides an opportunity for the participant to explain their organization strategy, as well as the moderator to clarify any messy handwriting or grouping. If the participant has organized their categories in to stacks of cards, this will be an opportunity to lay them out on the table for recording results and easy review by the next participant.

It is important that all of the cards are visible and categories clearly marked so that none of the cards are missed and the new participant can easily review the previous participants' work before making their own changes. Sometimes it is necessary to rewrite unclear labels and gather cards into their respective categories and lay them out neatly on the workspace.

RESULTS & ANALYSIS

Results may be recorded in a number of ways, depending on the facility setup and time between participants. If there is ample time between participants, results may be recorded on a piece of paper or directly in to a spreadsheet. When using the paper method, write the participant number on the top of each sheet used. Record the category name and underline or highlight it so it is distinguishable from topic labels. If the card is a new topic or label, record the text. If the card is part of the original dataset, record the label number for easy reference during analysis. At the end of the study, the paper data can be entered in to the analysis spreadsheet.

When using the spreadsheet method, create a new spreadsheet for each participant. Record each category in to a separate column with the title of the category in the first cell and highlight or bold the text for easy reference. If the card is a new topic or label, record the text in the category column. If the card is part of the original dataset, record the label number in the category column for easy reference during analysis. At the end of the study, there will be a record for each participant which can be referenced separately and easily imported in to the analysis spreadsheet.

Taking photos of the results with a digital camera provides a quick way to record a participant's work if there is not enough time between participants to write a record of the results. It is also recommended as a backup in case the written or spreadsheet records are lost. Write the participant number on a blank index card and make sure the card is in every photo. The photos can be downloaded to a computer and reviewed and entered in to the spreadsheet at a later time.

There are two strategies for analyzing the results of a modified-Delphi card sorting study. A simple method is to analyze the final participant's work in relation to the rest of the results. The strength of the modified-Delphi card sort is the evolution of a single model over time with the final result benefiting from all of the participants' involvement. A more familiar analysis strategy is calculating agreement weight with the results of each participant to build and verify the consensus.

Evolution Analysis

Prioritizing the final participant's work in relation to the previous participants' work is the simplest way of analyzing the study results. This is a more heuristic approach than calculating agreement weight and analysis can be easily integrated in to the actual design of the information architecture. Keep in mind the final participant's information structure as you review the previous participants' information structures. Use moderator notes and comments made by the participants to consider differences in the structure and help make decisions about the new information architecture.

A combination of this method and agreement calculations of the last few participants is a very quick analysis method, especially useful if the study was exploratory or part of short-cycle iterative design.

Agreement Weight

Calculating the agreement weight is often used in open card sorting as a simpler way of understanding card importance and relationships than using other clustering analysis techniques. This method works well with the modified-Delphi method because the results from each participant are based on each other whereas the results from open card sorting are independent.

To begin, create the set of categories to sort the calculated cards in to. Categories with similar names can be merged in to a single category with a note to decide the exact label later. For each category, keep track of how many times a specific card occurs in that category. Near the end of the analysis sorting process, you may find that some categories are lower level organizations of higher level categories. If it makes sense to the organization, the cards from these categories can be merged.

Next, calculate an agreement weight for each of the cards. Agreement weight can be calculated by dividing the number of cards in a category by the total number of cards. Cards with an agreement weight of greater than 50% are high agreement cards – more than half of the participants put the card in the same place. Cards which do not have a clear consensus can be sorted based on their agreement weight, similarity with other cards, or marked as discussion points. You may also notice that some cards should obviously be grouped together or belong in a certain category. These corrections can be made at this time. Remember, the point of the method is to discover how users understand and organize the data and not to generate an information architecture.

After the information structure is created, it is important to review your work, keeping in mind the goals of the website and tasks of the users as you refine it in to an information architecture.

DISCUSSION

The reduced costs and improved results help justify conducting the modified-Delphi card sorting method early in the design process, rather than waiting to test a design without the benefit of user research. It is simple to conduct and is a familiar method related to the open card sorting method, except for a few key changes in the protocol. The analysis strategies provide two ways of using the results from the modified-Delphi card sorting study to aid in the design of an information architecture.

This guide provides practitioner-oriented details which will help conducting a modified-Delphi card sorting study go smoothly. The modified-Delphi card sort is a relatively new method and I encourage the information design community to actively report and seek out previous studies in order to learn more about the potentials of this method.

ACKNOWLEDGEMENTS

I would like to thank the Information Architecture Institute for partially funding the initial investigation in to the modified-Delphi card sort.

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