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Abstract:

User research is often criticized for taking too long, costing too much, and not delivering deep enough insights. Even when research is successful, it can be a stress-filled experience for the team and the client as the insights slowly develop from a set of ambiguous, often hard to understand data. Much of this problem can be traced back to the fact that most designers "reinvent the wheel" every time they go about designing and executing a research study. Our research on the design process suggests there are a discreet set of research strategies that, if used by designers to frame discovery work, will yield insights efficiently and cost effectively. In this paper, we will outline one of these research strategies: Needs Clusters. This strategy looks to create an intersection between customer requirements (what they want / need) and customer behavioral modes (how they go about getting what they want / need). To illustrate this strategy we will refer to a student project that investigated the current experience at the Museum of Science and Industry in Chicago, Illinois USA.

Needs Clusters: a research strategy for accelerating user-centered design innovation

User research is often criticized for taking too long, costing too much, and not delivering deep enough insights. Even when research is successful, it can be a stress-filled experience for the team and the client as the insights slowly develop from a set of ambiguous, often hard to understand data.

Much of this problem can be traced back to the fact that most designers "reinvent the wheel" every time they go about designing and executing a research study. There are numerous reasons why designers feel compelled to start fresh every time, but none of those reasons are particularly strong or valid. We are not suggesting that design research should become formulaic, only that we should look for efficiencies in the design and implementation of research programs.

Instead, we have outlined a small set of research strategies. These strategies suggest the nature of the research outcome, the methods used, and value to the design team. The designer can diagnose the type of problem being addressed, and then choose the appropriate strategy for their research. These classifications of strategy are not random; having observed and worked on research projects over the past decade, we have seen teams start out with a custom, often wide ranging set of research goals and methods. After weeks of ambiguity and confusion, they eventually land on a model related to the set of generic strategies. This paper does not investigate why designers often end up in the same place (in terms of presenting research findings). We fill focus on outlining the procedure to executing one of these methods.

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Figure 1: benefits of using generic strategies

Common practice: no generic strategy	New practice based on generic strategy
Team / client does not know the nature of the final outcome / deliverable	Team / client determine nature / structure of final deliverable and outcome at the beginning of the project
Methods selected based on researcher familiarity, price, or timing	Methods selected based on research strategy / desired outcome
Time spent on developing insights and creating presentation models	Presentation models are already created, team spends entire time on insight refinement

These types of research should not be seen as limiting. Rather, they should be viewed as an opportunity for the team to present and execute a more structured, focused research program and focus on depth and meaning of insights, not the structure of those insights.

In this paper, we will outline one of these research strategies: Needs Clusters. This strategy looks to create an intersection between customer requirements (what they want to achieve) and customer behavioral modes (how they go about achieving it). To illustrate this strategy we will use a student project that investigated the current experience at the Museum if Science and Industry in Chicago, and then made recommendations for solving the needs of guests.

Before starting, we want to clarify our assumptions about user centered design research:

Design research is different than market research:
Discovery oriented design research, at its core, is about developing usable insights for a design project. It is dangerous to confuse traditional market research with design research; market research is an end in itself, and is often judged on whether or not the research told the firm anything new. Design research has a different, perhaps more challenging goal: provide the design team / management team the right inputs to create concepts and ideas that are distinctive. This is an important, but subtle difference. Often, design research may reiterate what a firm may already know, but in a more structured, usable, cogent way. This is completely reasonable, since the value of the research should be judged on the outcome of the design program. Market research, on the other hand, is rarely judged by the ideas it creates, but rather solely on the newsworthiness of its findings.

One challenge that the design research community faces as a whole is that advertising firms are starting to repurpose their research and planning departments to aid in product development. Research for advertising strategy is a disciplined, well tread field, but does not provide the right level of insight for product, services, or business strategy development. At a fundamental level, advertising research discovers how to leverage consumer perceptions and attitudes. It does not predict and uncover unmet needs. It also tends to look at people that already use the product (or those who might use the product), where design research usually defined users by activities and behaviors. There have been many cases of development projects failing because they leveraged an advertising firm's research department to execute development research. It is important that the designer can elucidate this difference to managers and clients. There is need for both types of research, but design research should not be executed to create advertising – the converse is also true.

Design research is also meant to be collaborative and inclusive:

It should be accessible to and doable by the entire team. This is not to say that research expertise is not required for implementing an effective study, but that the program should be designed in a manner that allows participation, input, and feedback from the individuals who will be responsible for acting on the results. Research in the corporate setting was often seen as a black box, something that was handed off to research specialists, and they would report back in a few months. Firms have lost their appetite for this type of study, nowadays managers and their teams want to be more involved. To spur this collaboration, we have developed two simple tools. First, outlined in figure 2, is a simple sheet that we give to managers when participating in research (this usually applies to a team member that is coming into the field for the first time, and will be there for only a day). This sheet is given before the research starts (as a primer), and then it is filled out and discussed when the research is complete. Second, in figure 3, we outline a chart that the team fills out at the end of each research sessions, it provides a quick way to start generating insights (this works for all three research strategies)
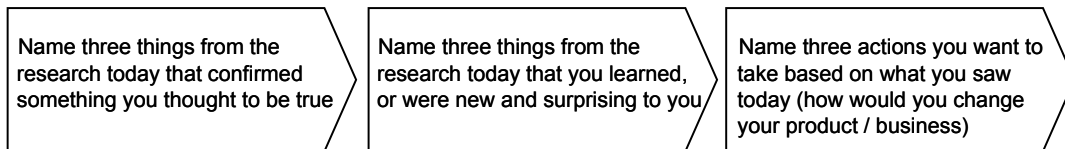
Figure 2: team member debrief sheet

Name three things from the research today that confirmed something you thought to be true	Name three things from the research today that you learned, or were new and surprising to you	Name three actions you want to take based on what you saw today (how would you change your product / business)

Figure 3: In process insight capturing framework

What we saw	What we learned	What it means	What we can do
• Observations • Stories	• Insights • Themes	• Criteria • Principles	• Concepts
Litmus test: Is this an undisputable fact?	Litmus test: Is this finding newsworthy?	Litmus test: Will this help us generate viable / desirable concepts?	Litmus test: Can we build a prototype of this concept?
Customers ask for promotional materials, but the store does not have any available	The store is not providing customers with the information they need to make purchasing decisions.	Company X should provide more useful and usable information to customers, both inside and outside the store	On-demand printed brochures In store communication strategy

Good design research reframes our understanding of users:

This mode of research is so often effective because it looks at what people actually do and how they actually behave. Firms become so focused on their product and business lines that they often lost touch with who their customer is. Typical segmentations and surveys do not deliver this type of insight, in fact they often reinforce to the manager they he or she already knows the customer well. When presented in the most elegant way, this research reports like the following: "here is how you think customers behave (based on how you design your products), and here is how they actually behave".

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Needs clusters

Overview

Marketers, who have long been tasked with new product definition as well as incremental improvements to existing products, have often defined these new offerings based on customer segments (for example, "we will develop this product for mothers in their early thirties") and / or the product category they have identified ("this is for value segment in retail").

The research they use to define these opportunities, segmentations and brand assessments, provides useful data when tuning an existing brand to better suit the customers that already use it (not changing the offering itself, but how the company talks about the offering). This research excels at describing the current state, but not predicting future opportunities or unmet needs. Basing a new offering on a segment, as it is traditionally defined, does not provide enough insight to make the offering distinctive. Segmentation work generally results in a small set of customer segments; none of these provide proprietary insight or are granular enough to accurately represent the increasingly fragmented market.

A better way to define new products is based on needs; in this case what we are calling "needs clusters". Needs clusters identify a gap in the market, an opportunity to serve customers in a distinctive, new way. Needs clusters rarely relate directly to segments – they are more closely linked to behaviors. This is critical, since behaviors can be observed (they are, for lack of a better word, facts), while segments are estimations – they are based on the manipulation of computer data and researcher intuition.

Needs clusters are created by the intersection of two models: requirements (what they are trying to achieve / do) and behavioral modes (how they go about trying to achieve / do it). Each of these models is powerful on its own. Requirement identification forces the research to look for motivations and desired outcomes – the essence of this investigation is capture by the aphorism "the customer wants a hole in their wall, not a drill". Behavioral modes identify what people are actually doing, and cut across traditional segments (meaning people in different segments may behave the same way). The intersection of these models provides the designer a more robust definition – you not only know what people are trying to do, but you can design around the appropriate behavior. Additionally, needs clusters can be used to find holes in the current market.

Appropriate use

This strategy is best used for identifying new market opportunities, as well as portfolio analysis and planning.

1. Identifying market opportunities: this strategy will identify unmet needs in the marketplace, and provide guidance for how the new offering can be defined. This strategy is based on the assumption that people are more complicated than one dimensional segmentations can predict. It does require some detailed work but the design team to understand the relevant intersection points between the modes and the requirements, as well as defining the opportunity space.

2. Assessing / planning your offering portfolio: this strategy also serves as a useful tool for planning a portfolio, since the team can see where existing offerings fit, and where there are gaps in the current system (both from your organization and your competitors). Of course, the team should use additional tools when looking at a portfolio, but needs clusters provide good framework for evaluation of offerings (and even brands)

Process

There are six steps for executing the needs cluster research strategy:

Step one: Data collection

The data collection step of this strategy should begin with a hypothesis generation and approval meeting with decision makers. At this meeting, the team should explain the process, outcomes, and timing, and then elicit conversation with the team to define an initial set of modes and requirements. It is important that the team is not biased by the results of this meeting. Rather, this helps the team understand what the decision makers believe to be true, and address these thoughts in later presentations (either proving they were right or showing, in a positive way, where new insights were discovered).

This strategy will use a combination of ethnographic interviewing and observation. Ethnographic interviewing intends to understand the goals and motivations of the user. The team should be prepared to do some interpretation here, since users are rarely eloquent when it comes to describing their goals. The observation stream will frame the behavioral modes. In this case, in situ interviewing is recommended.

The key challenge in this strategy is choosing who to observe / interview and when / where to observe and interview them. The team must balance the need for a broad sample to establish a nearly exhaustive set of behaviors with the need for deep interviewing and observation. The first step in designing the research is to define the arena (or topic / activity to be observed). The goal is to be specific but not limiting when defining this arena. For example, definitions could include gardening, non-corporate productivity, and bikes.

This arena is often defined by the decision makers, or during the problem framing stage in the process. Next, the team needs to define who to observe and interview in this arena. To do this, we recommend making a generic 2X2 matrix to define criteria for research participants. This strategy requires the team to interview and observe a cross section of users, not one specific type. So, to ensure good coverage, the team can create a matrix where the X axis is defined by level of engagement in the arena (or skill level, interest, and so on). This can be confirmed in the questionnaire to find participants by asking about frequency. The Y axis is defined by money spent related to the arena. Again, this can be quantified and be included in the screening questionnaire. This matrix is not meant to be an analysis framework, but rather a way to structure the research. The team should look to find participants in each quadrant. Figure 4 shows an example of this type of framing matrix.

Figure 4: research design matrix

	Low involvement	High involvement
High budget		
Low budget		
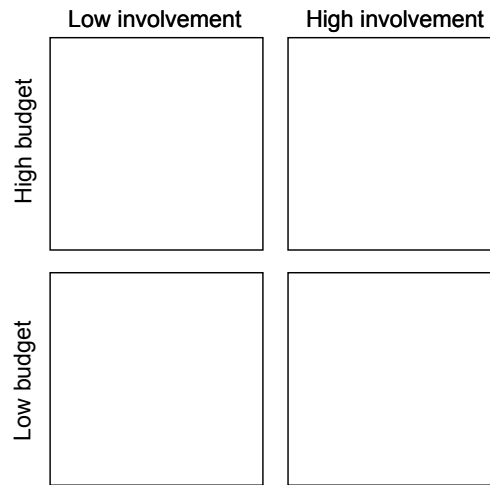
Step two: Develop behavioral modes:

With the data collected, the team can begin to define the different ways that users go about achieving their goals, or doing whatever it was that the team observed. It is important that these modes do not depend on a pre-defined segment, or are even based on the matrix created to screen research participants. We recommend the team begin by identifying an exhaustive set of observed behaviors, and then clustering them (both symmetrically and asymmetrically). This is best accomplished using the insight matrix tool.

The team should look to create a small set of behavioral modes that define the different ways users approach, engage, interact with, and even think about the topic area. Typically, somewhere between three and seven modes is ideal for creating the matrix. Once the modes are defined, the team should make sure that each one has been observed, and can be observed, so as not to define modes that sound good to the researcher but do not actually exist. Figure 5 shows an example of behavioral modes.

Figure 5: Five behavioral modes of Museum of Science and Industry Guests

Our observations discovered that guests demonstrate on of five behavioral modes:	
Mode:	Description:
Confused Decision Maker	…is trying to make sense of their options in planning their visit and path.
Perplexed Navigator	…experiences trouble locating themselves, exhibits and moving between spaces.
Uncertain Exhibit-Goer	…expected something more or something different than what was presented.
Frustrated Participant	…has faced too many hurdles trying to overcome logistical incongruities.
Withdrawn Tag-Along	…hasn't been sold that anything will be of value to them during the experience.
The student team spent several weeks conducting user research at the Museum of Science and Industry in Chicago. They had been challenged to identify the unmet needs of current guests and then propose a system of design solutions. They started by defining the behavioral modes that guests demonstrated while at the museum. These insights came from a combination of exit interviews, tag along observation, and observation at key points (exhibits, entry, exit, cafeteria, and ticket counter).	

Step 3: Develop requirements:

The team will need to switch gears from assessing observable activities to assessing more intangible things like motivations, preferences, hopes, and desired outcomes. "What are they trying to achieve" is a useful refrain for driving this analysis. Again, once the team has developed a large list of candidate requirements, they should then sort and cluster the requirements to create a final, manageable list.

Unlike the modes, where users will likely be in one mode or the other, the requirements do not need to be mutually exclusive, meaning that one user may have several of the requirements. Three to seven requirements is usually the desired range. Figure 6 shows an example of a list of requirements:

Figure 6: example requirements

Our observations discovered that guests demonstrate six requirements:	
Requirement:	Description:
Informed Wayfinding	Access to key information when they believe it is needed or important in a variety of ways.
Enticing Delivery	New ways of delivering information, which generates excitement for them individually and connects them to other participants.
Empowered Decisions	Participants with the ability to find necessary information and make informed and appropriate decisions given their personal interests and constraints.
Thematic Experiences	Connections for the participant between the Museum and its surroundings, from the immediate building into the community.
Continuous Transitions	The participant with continued immersion in the experience and connections between spaces and content.
Varied Engagement	Support for varied engagement styles, acknowledging unique behaviors, while maximizing the participant's control.
The students collected a large list of guest requirements (around 120 from interviews and observations). They used a spreadsheet clustering tool to help identify patterns in the data, ultimately arrive at a list of seven high level requirements. These high level requirements helped the Museum staff address the problem at a more strategic, systematic level. So, instead of just thinking about how to make ticketing faster, they began to create concepts that actually helped guest make better decisions about their visit when entering the facility.	

Step 4: Create matrix:

The team can now create the matrix, building the table with modes on the Y axis and requirements on the X axis. To identify the needs clusters, the team should look to identify the user needs in each of the cells. So, for each combination of a mode and a requirement, what are the unique needs? The team should fill out each cell, and then look for similarities between cells, both vertically and horizontally. When it makes sense (meaning the needs seem more similar than different), the team should combine the cells.

Once the team has combined all relevant cells have been combined, the team can give a descriptive name to each cluster of cells, or "needs cluster". Figure 7 shows the named clusters from the Museum example.

Figure 7: Example matrix

	Confused Decision Maker	Perplexed Navigator	Uncertain Exhibit-Goer	Frustrated Participant	Withdrawn Tag-Along
Informed Wayfinding	1.			2.	
Enticing Delivery					3.
Empowered Decisions					
Thematic Experiences					
Continuous Transitions			4.		
Varied Engagement					5.

The students identified five key needs clusters (represented by the overlapping shapes on the table above). They chose to name these clusters as directives: recommending a course of action for the museum to take based on the needs identified.

1. Simplify Logistics
2. Make Options Known
3. Make Content Relevant
4. Extend the content
5. Offer Unique Delivery

Step 6: Identify and present solution areas:

The needs cluster matrix is a powerful presentation tool. First, the team can describe each axis independently, talking about what customers want and how they go about getting it. Next, they can show how these can be combined to create a more sophisticated model that outlines a set of needs. Next, the team can show how well current offerings fulfill these needs. Finally, the team can show solution areas that solve for unmet needs and take advantage of market opportunities.

For presenting the recommendations, we suggest creating a solution architecture based on the needs clusters. A solution architecture is a simple information structure used to organize ideas and strategic directives. By focusing on directives and the structure, the conversation is held at an appropriate level. You should not be debating individual concepts at this point, but rather working with the decision makers to refine the framework for evaluating these concepts. Figure 8 shows an example of a solution architecture.

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Figure 8: solution architecture
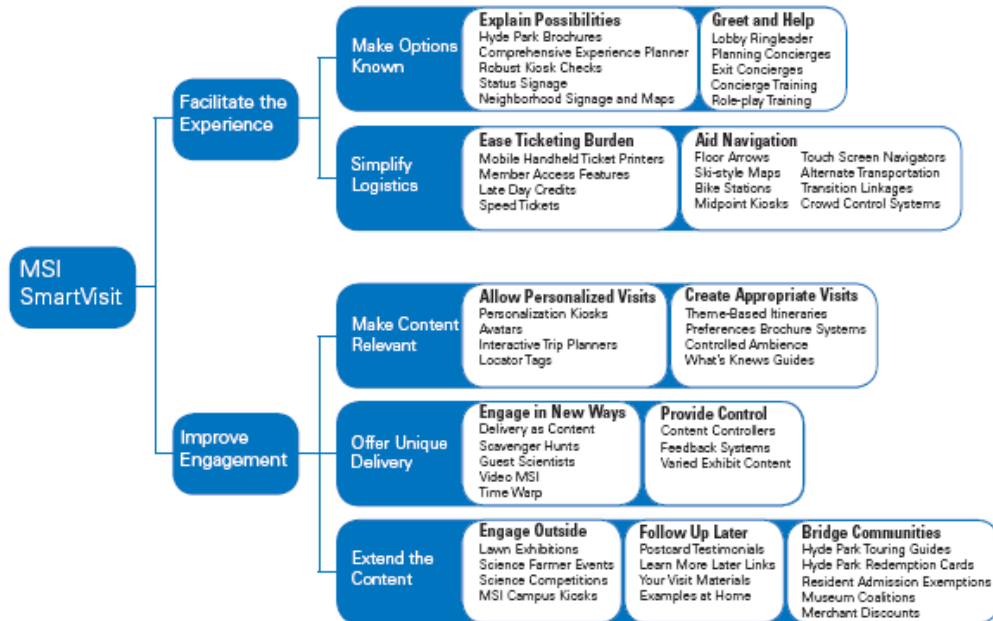
For the solution architecture, the students organized the needs clusters into two groups. One group focused on Facilitation of the experience and a second group related to improving engagement with the guests, providing two strategic pillars for the program. Then, the students used the clusters to guide brainstorming sessions with Museum staff to create ideas for addressing each cluster (and ultimately supporting the strategic pillars of the program).

Closing comments

Students have found it useful to start with a research strategy, designing their investigation to fill in a generic template, and then customizing when required by the client. This approach is different compared to traditional design research, which starts with research methods, not the eventual presentation framework.

Needs clustering is one of the most frequently used of the generic strategies, since it helps designers understand the behaviors and goals of their users, and then synthesizes these two data sets into a useful framework for developing a strategy and generating concepts.

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