VIJAY KUMAR

101 Design Methods

A Structured Approach for Driving Innovation in Your Organization

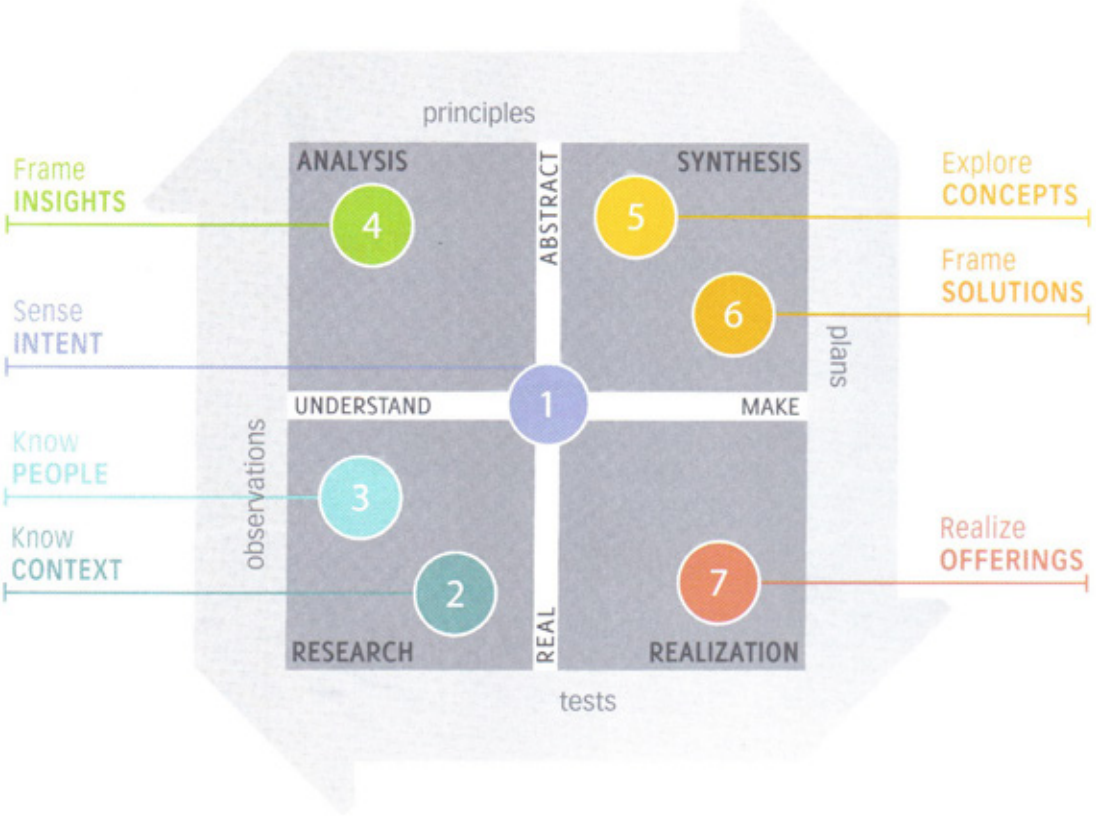
A Model of the Design Innovation Process

The reasons why organizations need a reliable innovation process, and some of the general principles that underlie successful innovation, were discussed earlier. In the remainder of this book, a model design innovation process is presented with discussion of 101 design methods innovators can apply throughout that process. These design methods evolved out of many years of studying cases of innovation projects and successfully applying the four core principles discussed earlier—building innovations around experiences, thinking in systems, cultivating an innovation culture, and adopting a disciplined process.

The Design Innovation Process

The design innovation process starts with the real—we observe and learn from the tangible factors from real-world situations. Then we try to get a full understanding of the real world by creating abstractions and conceptual models to reframe the problem in new ways. Only then do we explore new concepts in abstract terms before we evaluate them and implement them for their acceptance in the real world. This requires fluidity in our thinking between the real and the abstract.

Just as with nearly any creative or exploratory process the design innovation process moves back and forth through modes of activity, oscillating between poles of Real versus Abstract and Understanding versus Making. A 2 × 2 map illustrates the design innovation process. The lower left quadrant represents "research," about knowing reality. The upper left quadrant stands for "analysis," since this is where we process the information about reality in abstract terms and try to come up with good mental models to drive innovation. The top right quadrant is about "synthesis," during which the abstract models developed during analysis are taken as a basis for generating new concepts. And lastly, the lower right quadrant defines the "realization" of our concepts into implementable offerings. All these four quadrants—

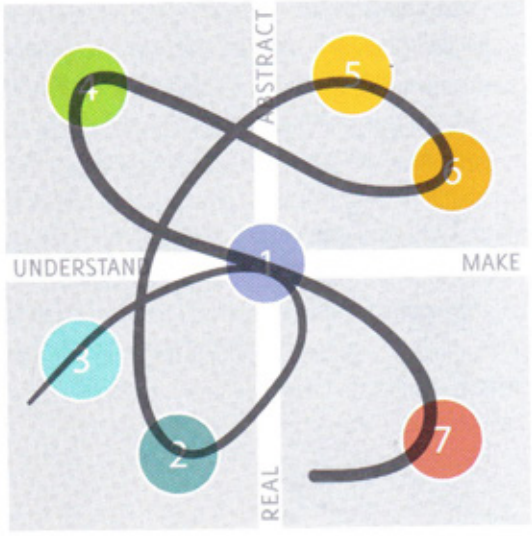


research, analysis, synthesis, and realization—combined together is a well-formalized process model with which to drive innovations in your organization.

Within this framework reside seven distinct modes of activity for design innovation: Sense Intent, Know Context, Know People, Frame Insights, Explore Concepts, Frame Solutions, and Realize Offerings. (These seven modes, incidentally, form the structure not only of the innovation process, but also of the rest of this book.) Understanding the outlines of the innovation process can greatly help innovators, by providing a guiding structure and sequence for any given project, and ensuring that the team has the right information and knowledge at the right time.

Process Is Nonlinear

Although the idea of a process implies a linear sequence of events, this can be misleading. Many projects are actually nonlinear. For example, a project may begin with a sudden brainstorm (Explore Concepts) and then proceed "backwards" to research and analysis to validate and improve the idea, followed by further exploration and iteration.



Process Is Iterative

The process is also iterative, requiring many cycles through the process, and often through one or more modes (cycles within cycles), rather than being a direct sequential push. A project might start with an intent and some contextual research; then follow several consecutive rounds of user research and analysis, with initial insights being fed back to users for validation; then several rounds of concept exploration, user feedback through prototype testing, refinement of analysis, and then further exploration, further prototyping, and so forth. The number of repetitions and loops in any given innovation project is largely a function of the project's budget and scope. In some cases, multiple loops may be necessary, in others merely desirable, and in still others totally unfeasible. Doing more iterations generally leads to higher-value, more successful innovations—although not if pursued for too long or without discipline.

1.9 Trends Matrix

Summarizing changes happening today that lead to a future direction

EXAMPLE PROJECT: Cultural Tourism—CityFriends (2007)

CityFriends **is a concept for a company developed by a team of IIT Institute of Design students. It provides cultural travelers with unique and local travel experiences by using local guides and a compelling online presence.**

The team's research through a *Trends Matrix* indicated that changes within the travel industry are leading to an emerging new group of travelers called "Venturers," who demand more authentic and off-the-beaten-path travel experiences. The team saw an opportunity to provide tailor-made services to this group of travelers. The Trends Matrix bolstered the team's understanding of how travel was evolving across the areas of technology, market, people, culture, and business. It also helped to isolate the emerging trends that would be important in concept development. The emerging trends highlighted reliance on technology such as mobile Web applications and virtual tour guides and that creating memorable cultural experiences are becoming an increasingly important differentiator for travel companies. In the concept stage, the team created a *CityFriends* system that gave travelers a compelling experience by directly connecting them to local guides or service providers through a friendly online site.

	Formerly	Currently	Emerging
Technology	Auto travel Paper maps/travel books 35mm	Online booking/price Mobile communication Audio guides 3G applications/GPS Digital cameras/movie	Mobile Web revolution Real-time interaction Virtual tour guides RFID
Market	Brand Holiday travel Sightseeing	Price and perks Weekend getaways No frills mass travel Single travelers L.O.H.A.S.	Experience More sporadic travel Segmented/customized Medical tourism
People	Travel as a luxury Family travel Camping-car traveler Unique local shopping 9-5 work life	Travel as routine Style-lifers; cities to rural Thrill/companion seekers Shopping traveler Flexible working conditions	Travel as escape Cultural travel Unusual destinations Secondhand nostalgia Flexible work life
Culture	Homogeneous culture Car culture	Hybrid culture Globalization Urbanization Hassle of travel	Less cultural shock More comfortable with world cultures
Business	Travel agencies Traditional packaged-tour AAA Motels	DIY online travel A la carte American Express All inclusive mega resorts Eco-tourism/Voluntourism	Personal concierge Network/local Delivery service Book buy back

BENEFITS

- Creates overview
- Maps change over time
- Encourages comprehensiveness
- Reveals opportunities
- Defines direction

INPUT

- Project aspects to be studied

OUTPUT

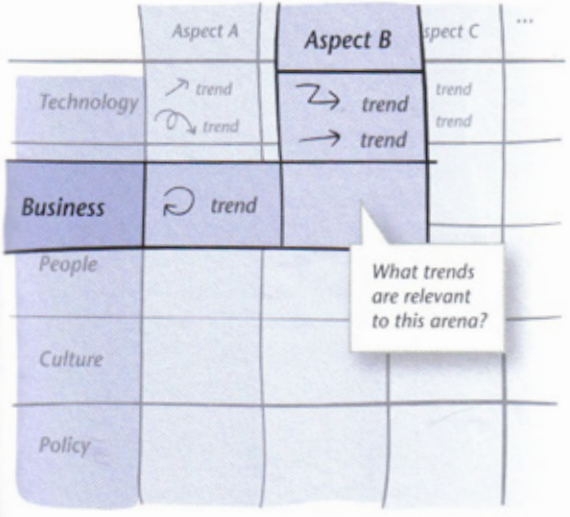
- Matrix with an organized set of trends
- Insights about trend patterns and possible directions

WHEN TO USE

WHAT IT DOES

A trends matrix presents a high-level summary of how trends and forces of change affect technology, business, people, culture, and policy. The matrix offers an at-a-glance understanding of how trends impact your project. For a project on cultural travel, one might study travel tools, travel-related services, travel experiences, travel information, and other similar aspects. Sometimes the aspects we study are time-related and structured: where we've been (formerly), where we are (currently), and where we may be headed (emerging). The Trend Matrix can also show how changes happening in one area, for example technology, may have influenced others, for example culture or business.

HOW IT WORKS



STEP 1: Set up the dimensions for the Trends Matrix.

The vertical axis is usually shown as technology, business, people, culture, and policy. The horizontal dimension shows the aspects of the project that you are interested in tracking, for example, types of users, topics, and components of a system that you are considering. Sometimes it is valuable to define the horizontal dimension as "formerly," "currently," and "emerging."

STEP 2: Fill the matrix with relevant trends.

Conduct research to identify trends in technology, business, people, culture, and policy that will have an effect on the project. Describe these as trend statements in the matrix cells. A trend statement is usually a short sentence that describes how something is significantly changing. An example of a trend statement is "travelers have an increased interest in unusual travel destinations and cultural travel experiences."

STEP 3: Take a step back and discuss the matrix as an overview.

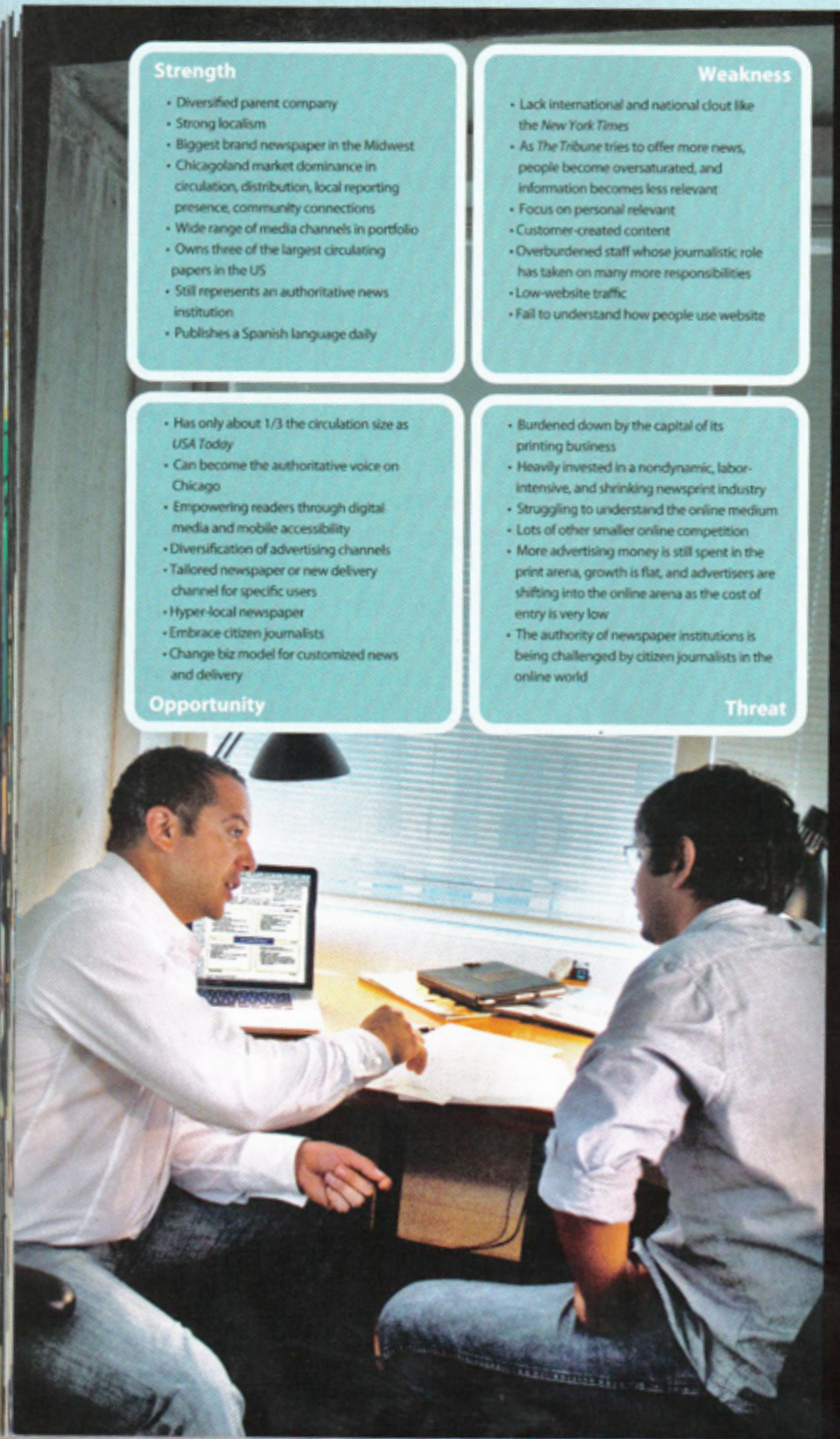
Remember that the purpose of the Trends Matrix is to offer a high-level overview of changes. Compare the trends to others to see how they are related. Recognize patterns of similar trends developing together. These might help you speculate on future directions and see how certain trends might affect your project.

STEP 4: Capture insights as overlays on the matrix.

Discuss and document your team's insights about trend patterns, how leading trends are affecting major changes, and speculations about how things might develop. Highlight these insights as overlays on the matrix for easy reading and sharing.

2.11 SWOT Analysis

Evaluate an organization's strengths, weaknesses, opportunities, and threats



EXAMPLE PROJECT: The Future of News Media (2007)

The changing landscape of print news media has galvanized news organizations such as a large Midwest media conglomerate into thinking about how to move forward in an environment where new technology and reader behavior are changing the way news fits into people's lives. A team from the IIT Institute of Design saw an opportunity for this organization by delving deep into its readers' behaviors and translating those insights into actionable strategic plans and solutions.

One of the tools the team used was SWOT (strengths, weaknesses, opportunities, and threats) to define the organization's position within a highly competitive industry. A clear strength for the organization was its dominance in the Midwest region and its diversified parent company with multiple media channels. These strengths pointed to opportunities in building on these diversified channels and becoming an authoritative "local" voice through digital media. Weaknesses were driven by the internal organizational changes, dependence on its printing business, low website traffic, and an overall lack of international presence compared to its competitors. Because readers are actively creating and engaging with content online, new competition is growing in the online space, leaving advertisers to abandon print media for online, where cost of entry is low. In understanding these industry forces and through participatory user research, the team designed an innovation strategy comprising four main concepts: (1) *Raw News*, which offers news content in a raw and customizable format across different media; (2) *Tribazon*, which offers content tagging and recommendation technology; (3) *Gap Map*, which visualizes where gaps in news coverage exist; and (4) *The News Place*, where the organization can welcome and engage the public's support.

BENEFITS

- Creates overview
- Provides direction
- Identifies challenges
- Reveals opportunities

INPUT

- Formal statement of the project objective and understanding of its context

OUTPUT

- Diagram showing the project's strengths, weaknesses, opportunities, and threats

WHEN TO USE

WHAT IT DOES

The SWOT Analysis, a method widely popular for decades, is used to evaluate an organization's strengths, weaknesses, opportunities, and threats. The analysis begins with studying the organization and its innovations and seeks to understand how the organization performs in relation to competitors in the market. A high-level assessment is made of the strengths and weaknesses of the organization, the opportunities available as well as competitive threats. It looks at factors inside and outside the organization to determine whether defined business objectives are achievable or not. Because of its general nature, a SWOT Analysis can be done with relative ease and speed in the early part of knowing the context.

HOW IT WORKS

STEP 1: Describe the initial innovation intent.

Define the basic goal that you are considering for your innovation, and clarify the reasons for pursuing that direction. Think of the benefits from doing so.

STEP 2: Assess the organization's strengths, weaknesses, opportunities, and threats.

Strengths: What about your organization gives your innovation an advantage over competitors in your industry? What are the organization's capabilities in technology, operations, people, brand, user experience, and other areas?

Weaknesses: What aspects of your current organization will make it difficult for the innovation intent to be realized? Examples may include: financial constraints, unproven technologies, or an unreliable supply chain. How do your weaknesses put you at a disadvantage relative to your competition?

Opportunities: What is happening in the marketplace that indicates the likelihood that your innovation intent will succeed? Where are the gaps in offerings that you can fill? Why aren't they currently being met?

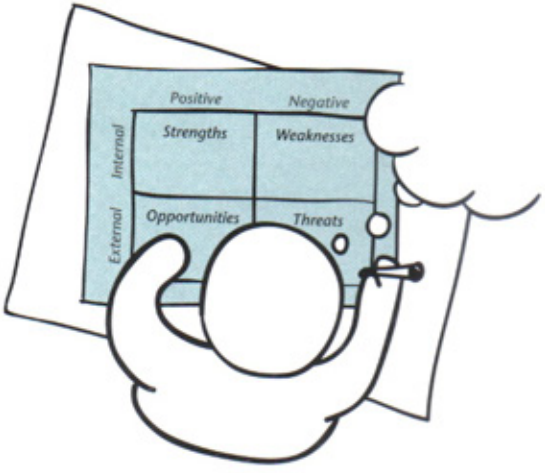
Threats: What are the external threats to realize your innovation intent? What elements exist in the current environment that will be barriers? What is the nature of rivalry in the industry?

STEP 3: Organize findings into a 2 X 2 SWOT diagram.

Summarize findings into brief statements that can be listed in each of the four quadrants, no more than seven or eight statements per quadrant.

STEP 4: Review, discuss, and analyze the SWOT diagram.

Involve key team members to discuss the findings. What does the unified presentation of the different elements suggest about the opportunity space? Is the innovation intent worth pursuing? Is the level of risk acceptable to you? Do your strengths outweigh your weaknesses? Do the opportunities outweigh the threats? Discuss these questions and summarize them for sharing. Involve key decision makers to determine the directions to pursue for the project.



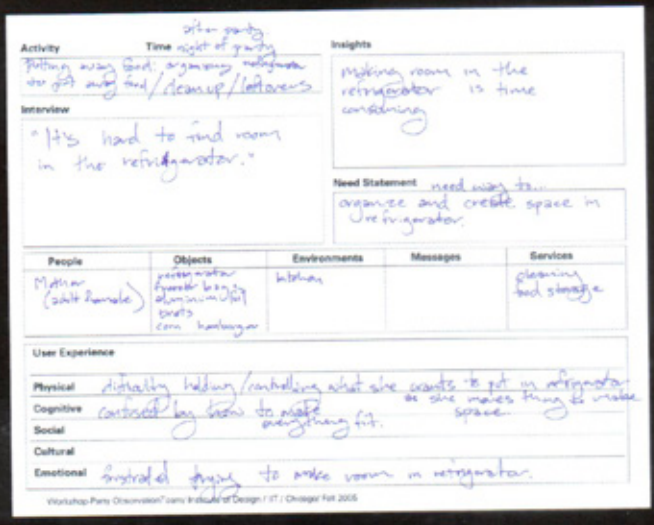
3.4 Five Human Factors

Studying physical, cognitive, social, cultural, and emotional factors that drive overall user experience

EXAMPLE PROJECT: Entertaining at Home (2005)

A top household products company worked with a design team to learn more about how to integrate the design-thinking process into their core business activities. The scope of the research addressed entertaining at home, an area indirectly related to the company's core business. Directing the research focus away from an area targeting one of the company's products to a focus on an analogous activity was deliberately decided upon as a way to better steer the company's attention to the design process than content during the project.

For primary research, the design team recruited five participating families and asked each of them to throw a party and take pictures before, during, and after the party ended. The team then organized the photos in a field notebook to conduct a follow-up interview with each participant. To ensure observations were captured in a comprehensive and organized manner, the notebook included annotation space for the *Five Human Factors* framework. The framework template helped the team look for particular issues across the five factors—physical, cognitive, social, cultural, and emotional—and probe for hidden insights during the interview. Some observations brought to light were the emotional frustrations in trying to find room for leftovers in the fridge, social aspects highlighting the fun participants had with food preparation in a social setting, and their preference to do clean-up individually. All the observations gleaned from the research were uploaded to the user observations database, where the photos were tagged and data organized and preclustered for further analysis.



BENEFITS

- Broadens mindset
- Encourages comprehensiveness
- Focuses on details
- Focuses on experience
- Gives focus to the process

INPUT

- Project's area of study
- Identified situations for user observation

OUTPUT

- Organized observations about each of the five factors that drive user behavior

WHEN TO USE

WHAT IT DOES

The Five Human Factors is a method for supporting observation in the field, prompting researchers to look for the physical, cognitive, social, cultural, and emotional elements present in any situation to understand how they affect peoples' overall experiences. Understanding five factors of a person in a structured way and thinking about all these factors together will give us a rich, deeper understanding of the experience of that person. The resulting holistic assessment can bring focus to the various elements that need to be considered when developing concepts and solutions. In this way, this research method breaks down a person's experience into its constituent parts to understand each in detail, and then reassembles our findings to understand how they form an overall experience.

HOW IT WORKS

STEP 1: Prepare to go into the field.

Create a note-taking template where you can record and categorize your observations according to the Five Human Factors. Carry tools (notebooks, cameras, pens, recorders, etc.) that will support user observation or interviewing.

STEP 2: Go into the field.

Observe or engage people in a conversation. Observe or ask about peoples' activities, the objects they use, their environments, the information they interact with, and similar aspects. Take down notes based on your observations or the responses from people.

STEP 3: Look through the lens of the Five Human Factors.

Physical: How do people experience their physical interaction with things and other people? What do they touch, push, pull, open, close, lift, carry, control, and so forth?

Cognitive: How do people associate meanings to things they interact with? What are the various interactions that require people to think? What do they read, research, process, assess, and decide?

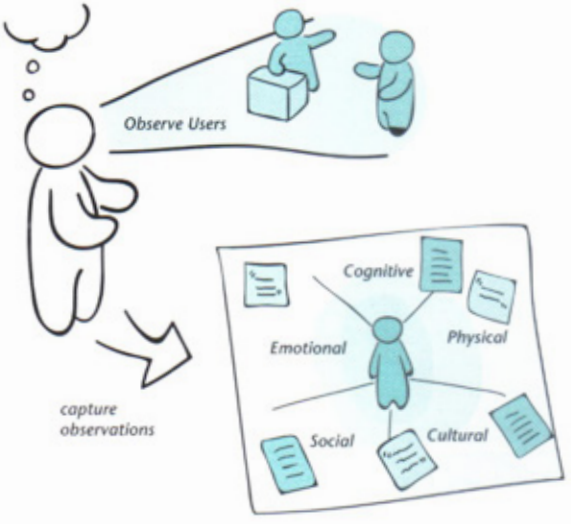
Social: How do people behave in teams or in social settings? How do they formally and informally interact, make decisions, coordinate actions, make schedules, and work together?

Cultural: How do people experience shared norms, habits, and values? What, if any, shared values seem present? How are they manifest?

Emotional: How do people experience their feelings and thoughts? What in the environment is triggering these emotions? Are people sad, aggravated, frustrated, or happy?

STEP 4: Describe peoples' overall experience.

Look for problems as well as surprisingly positive observations about each of the five factors. Describe your high-level sense of peoples' experiences in the situation that you have observed. Discuss and document.



3.12 Experience Simulation

Engaging people in simulated experiences to understand what matters to them

EXAMPLE PROJECT: Bus Rapid Transit (2008)

In 2008, a major urban transit authority planned to launch a high-speed bus service to reduce vehicle traffic and increase ridership. The new bus service is based on 60 feet of newly configured articulated buses. Key features of the system include improved fare handling through multiple entry points, select station service, and right-of-way signal prioritization electronics.

Through ***Experience Simulation***, the project team provided key decision makers the opportunity to *learn about passenger behaviors* to change the design of the vehicle's interior. Through the simulation the team was able to study improved passenger flows by reducing bottlenecks, enhanced riders' experience, and improved bus operations. The full-scale, low-fidelity bus simulation took roughly a day and a half to build, using 61 stack chairs, 2 rolls of tape, 6 particle boards, 9 sheets of foam core, and graphic printouts. The simulated experience promoted a "learn by doing" approach, fostering communication between the members of the transit authority and project team, enabling them to make quick and informed decisions about better passenger experience.

BENEFITS

- Captures information over time
- Facilitates comparison
- Focuses on experience
- Grounds conversation with artifacts

INPUT

- Research questions about behaviors or activities
- Selected experiences to simulate

OUTPUT

- Observations of how users might behave or interact in a situation

WHEN TO USE

3.12 EXPERIENCE SIMULATION

WHAT IT DOES

Experience Simulation is a research method used to help researchers understand how people might behave or interact in a given situation. The method is useful for studying experiential offerings such as new services, environments, or interactions. For example, researchers might set up a food stand that provides consumers with detailed nutritional information delivered in a variety of ways such as labeling, signage, or in-person coaching in order to observe how different methods affect food choices and purchase decisions. The method allows us to explore what matters most to users in an experience. An environment is constructed and participants are invited into it to spend time engaging in an activity or activities. Researchers observe participants' interactions with elements of the environment and conduct follow-up interviews with them to understand both details and overall user experience.

HOW IT WORKS

STEP 1: Identify the research question.

Decide what behaviors or activities the team is interested in studying. How people choose to buy organic food in supermarkets? How parents teach children about physics by playing with blocks?

STEP 2: Select a specific experience to simulate.

Determine which aspects of the experience need to be realistic and which can be "simulated." Does the "supermarket" need to be realistic or can it be constructed in a conference room?

STEP 3: Design the simulation.

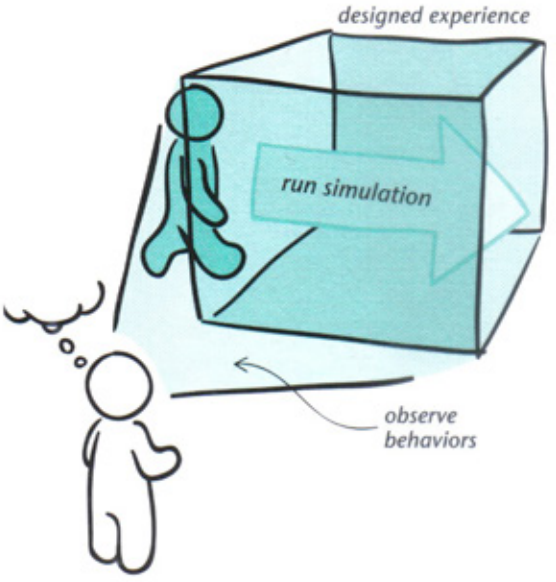
Build the environment, create the objects, develop the messages and services, find the people to run the simulation, and recruit the participants for it (this may be done beforehand, or, in the case of public simulations, people may be recruited onsite or passing by).

STEP 4: Run the simulation.

Simulations could last anywhere from a few hours to a few weeks; in some cases they might be semi-permanent, as in a test store. Obviously, different scales and durations of simulation will require different levels of planning, staffing, and resources.

STEP 5: Capture behaviors and insights.

Assign designated observers to take notes, capture video/audio/photos, and possibly identify gaps or flaws in the simulation or process that can be corrected. Document insights. Discuss them with your team and with participants to get more feedback.



4.2 Insights Sorting

Manually sorting insights from research to find clusters and hierarchies

EXAMPLE PROJECT:
Residential and Commercial Renovation (2010)

In 2010, a 3D design, engineering, and entertainment software company worked with the IIT Institute of Design team to understand how customers select products for residential and commercial construction and renovation projects. From research the team generated 40 insight statements. One of them, for example, was about access and it stated: "Quick access to real-world examples of product use and trusted product experts can be critical to validate product selection." Another insight was about experience: "Providing clients a way to experience the look and feel of the final design concept is important to convince them to pursue a design direction." At the end of the research phase, the IIT Institute of Design team invited the company representatives to participate in a work-session to present their early-stage research findings and to engage in a co-analysis of their collected insights.

One of the main exercises in this workshop was Insights Sorting in which the team and the company representatives together identified relationships among the insights and clustered them to find useful patterns. Some of the initial clusters dealt with customers' knowledge about renovation, their expectations of value, life of the renovation project, ownership, and trust among others. After many iterations of sorting, the team narrowed down their insight clusters into six themes: Value Creation, Roles and Expertise, Common Context, Personal Relationships, Project Transparency, and Making It Real. The theme of Making It Real, for example, showed that customers are reluctant to take a chance on new products, and this can be overcome with a tangible experience. Later, design principles were created for these themes. One of the design principles that came out of the Making It Real theme was, "Help homeowners understand spatial relationships and overall context of use." Each theme led to several such design principles that would provide a strong direction for concept generation, serve as an evaluation criterion to refine concepts, and further inform the company's strategic plan.

Amber Lindholm, photographer.

BENEFITS

- Reveals patterns
- Reveals relationships
- Structures existing knowledge
- Facilitates discussion

INPUT

- All insights captured during Know Context and Know People modes

OUTPUT

- Clusters of insights showing patterns and relationships

WHEN TO USE

WHAT IT DOES

The method starts with gathering all the insights we have generated from research. We write insight statements on sticky notes and start sorting them to find an agreed-upon clustering logic. Once the team agrees on this clustering logic, we resort all the insights to reveal interesting clustering patterns. Analyzing these clustering patterns not only gives us a better understanding of the topic but also provides a strong foundation for generating concepts. To get the most value out of this method, we should use a manageable number of insights—not more than 100 insights for a small project. This method is a quick and rough analog version of the digital spreadsheet-based matrix sorting.

HOW IT WORKS

STEP 1: Gather insight statements.

Gather all the insight statements you have generated from research. If you have not already generated insights, then go through your observations and other findings from research and generate them. Insights are interpretations of what you have observed in your research about people and the context that reveal something nonobvious, surprising, and valuable for your project. Write insight statements as one or two phrases or sentences.

STEP 2: Do a sample sort and reach alignment on clustering logic.

Write insight statements on sticky notes. As a team, start clustering these insight statements on a wall or table surface. Discuss the logic you are using to cluster them. A common logic frequently used is how one insight is "similar" to another in terms of meanings they share. Reach alignment about this clustering logic.

STEP 3: Cluster and recluster insight statements.

Complete the clustering activity based on the agreed-upon clustering logic. Discuss and gain a shared understanding about why all the insight statements in a cluster are grouped together. Cluster and recluster if necessary until you reach a stable clustering pattern.

STEP 4: Define the clusters.

Discuss insight clusters and recognize why they are grouped that way. Define each cluster and describe its overall characteristics. Give each cluster a short title.

STEP 5: Discuss next steps.

Document the patterns. Discuss among your team members how these clustering patterns can be made valuable to the later stages of the project. Are the insight clusters comprehensive enough to holistically address the project? Are there apparent gaps that need to be filled? Are the clusters defined well enough to generate design principles? Can the clusters be used as criteria to evaluate and refine concepts?

4.17 User Journey Map

Mapping the user's journey through the context

EXAMPLE PROJECT:
Social Kitchen (2010)

With more than one-half of the meals served in the United States today eaten outside of the home, a trend that shows no sign of reversing due to lack of time, a design team in an ethnographic research study set out to understand and define key motivators and constraints for current young and urban working adults' cooking experiences in their kitchen environments.

After conducting in-home observations, the research team clustered the observed kitchen activities of each participant by time and space. They began looking for patterns, from which four macrostages of the journey, which applied to all participants, emerged: Preparation, Cooking, Rewarding, and Finishing. The team then populated the ***User Journey Map*** chronologically with each participant's home-cooking process, using space and time as dimensions. Call-outs at certain stages of the journey indicated pain-points for the participants. One such pain-point was that users don't exactly know what they have or what they should buy before beginning the cooking process.

The team used this User Journey Map to outline each participant's steps and helped generate insights about the cooking experience as a whole. It also provided a way to identify problems and opportunity areas that led to design solutions centered on the social nature of kitchens.

BENEFITS

- Focuses on experience
- Reveals relationships
- Structures existing knowledge
- Visualizes information

INPUT

- List of all user activities happening in the context of study

OUTPUT

- Visualization of activity clusters over time representing the journey users go through in a particular process/experience
- Pain-points, insights, and opportunities along the user's journey

WHEN TO USE

WHAT IT DOES

The User Journey Map is a flow map that tracks users' steps through an entire experience. This method breaks down users' journey into component parts to gain insights into problems that may be present or opportunities for innovations.

Activities users perform (rinse, mix, heat, serve) are shown as nodes in this map. These activities are also shown in groups as higher-level activities (preparation, cooking, finishing). Problems and insights are called out on this map to highlight areas where attention is needed and where opportunities exist.

HOW IT WORKS

STEP 1: Generate a list of all the activities.

Identify all the specific activities that occur throughout an experience (for example, rinsing, chopping, and disposing for cooking experience).

STEP 2: Cluster activities.

Cluster related specific activities into higher-level activities (for example, rinsing, chopping, and disposing forming the higher-level activity precooking).

STEP 3: Show activity clusters as nodes on a timeline.

Represent high-level activities as nodes and place them on a timeline as a flowchart. List the related specific activities under each of these nodes. Show arrows connecting the nodes to show the flow direction. If needed, include arrows showing feedback loops.

STEP 4: Call out problems and pain-points.

Identify pain points while activities are happening during the process. Highlight these problems or pain-points as call-outs attached to the appropriate node(s) or arrows.

STEP 5: Extend the map with extra information.

Extend the journey map with additional layers of information such as video clips of user activities, quotations from user studies commenting on process stages, or layout diagrams showing where activities take place.

STEP 6: Look for insights.

Study the whole User Journey Map as a team, refer to your research findings, discuss them, and look for insights. For example, an insight might be stated as: "While rinsing and chopping ingredients during precooking is enjoyable, disposing of waste is universally perceived as unpleasant."

STEP 7: Summarize the findings and share them.

Highlight these insights as overlay descriptions on the User Journey Map. Discuss the biggest opportunities for making the user journey compelling and delightful for users?