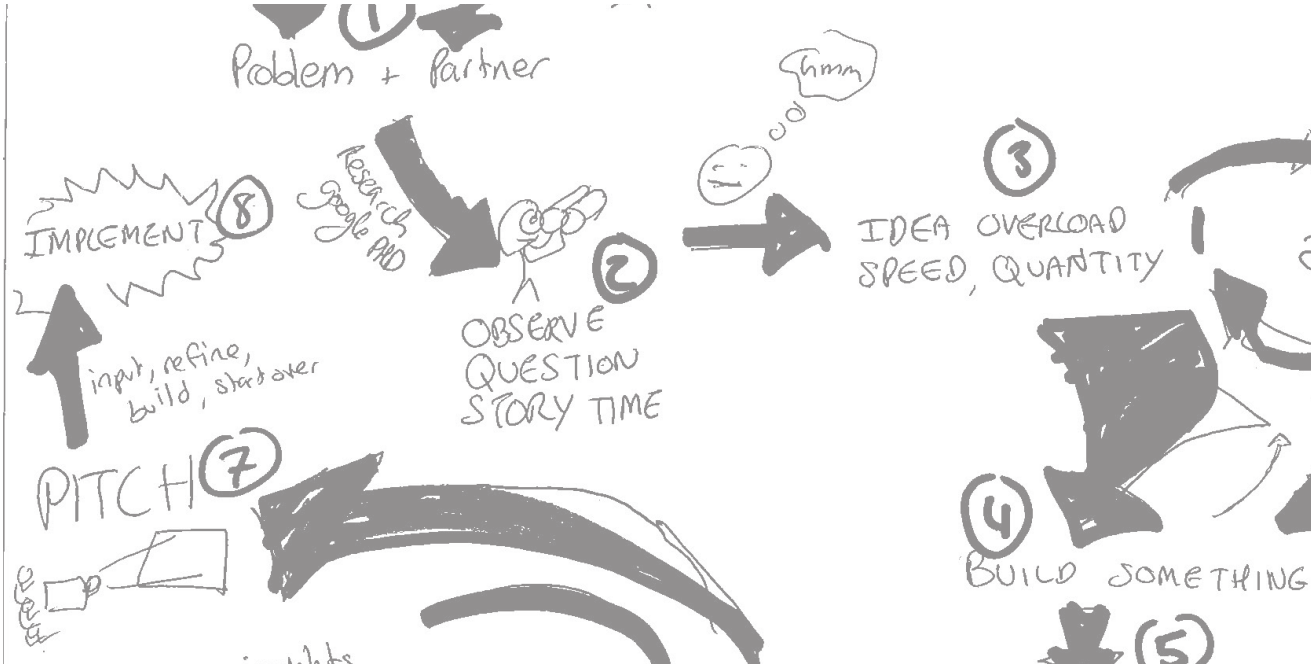
DESIGN *for* AMERICA

PROCESS GUIDE


Problem + Partner
1
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3
IDEA OVERLOAD
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input, refine, build, start over
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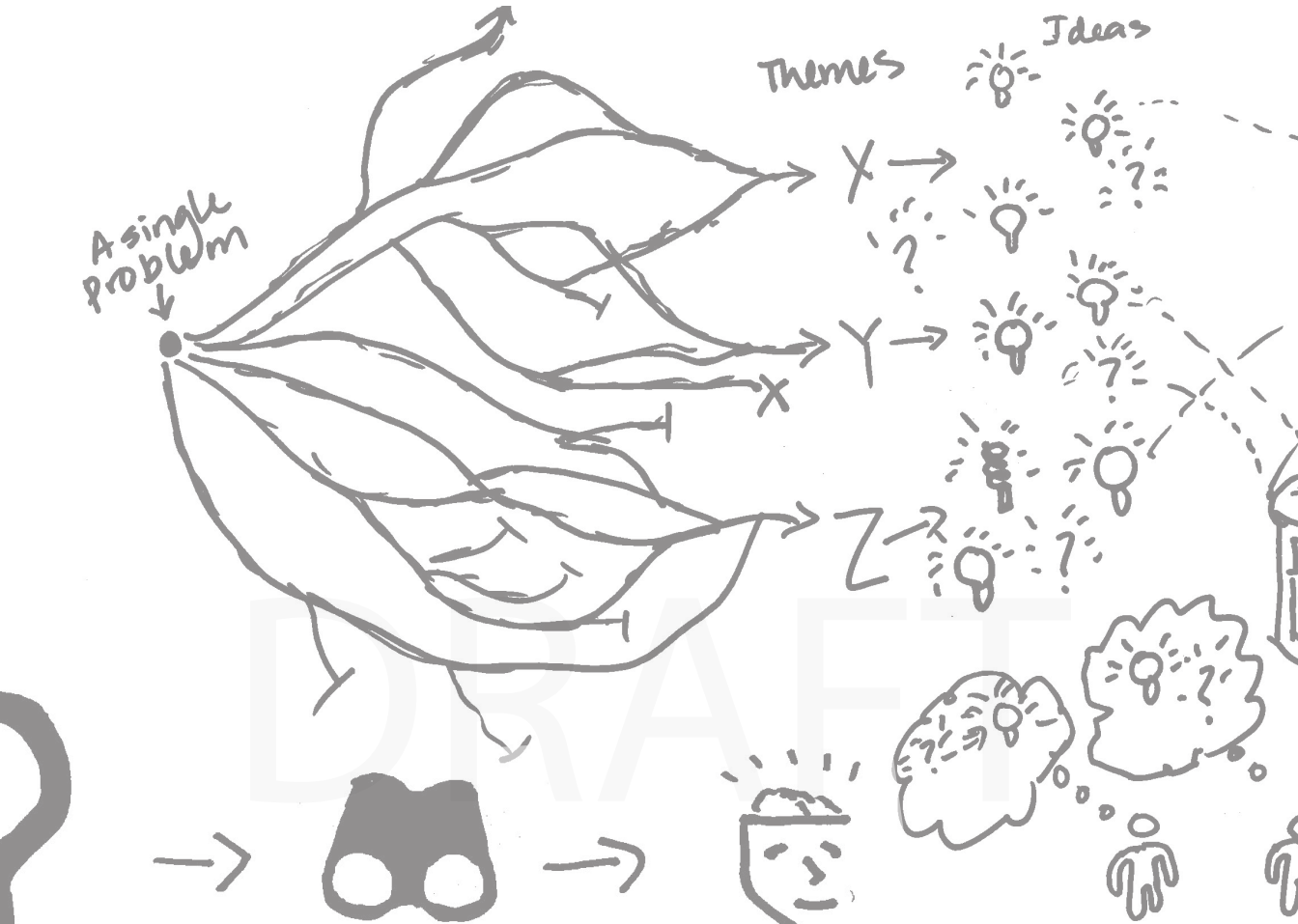
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Ideas
A single problem
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How does this work?
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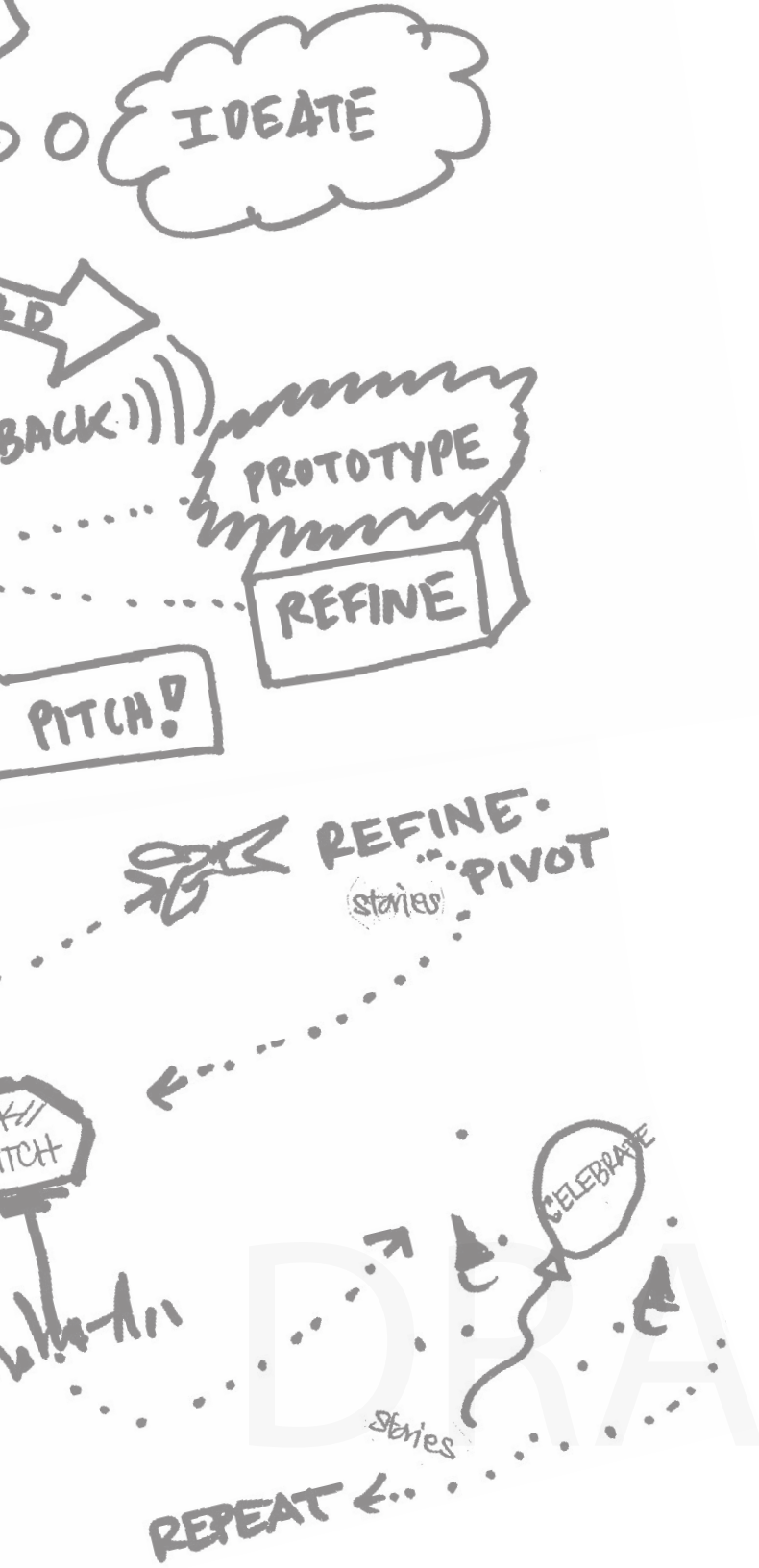
IDEATE
PROTOTYPE
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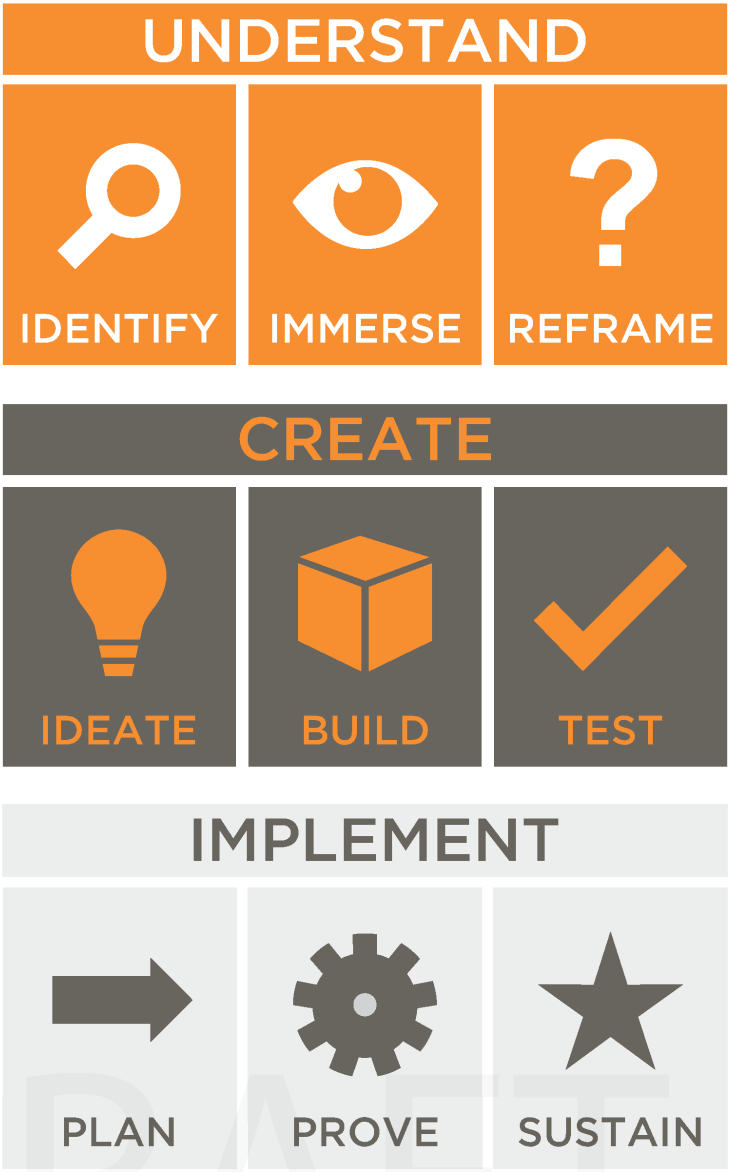
PITCH!
REFINE
PIVOT
stories
CELEBRATE
stories
REPEAT

DESIGN IS MESSY. PROCESS CAN HELP.

Welcome to the Design for America Process Guide! This guide was created for a specific purpose: supporting human-centered design projects that solve social problems. Design is a messy, ill-defined, roller-coaster of a ride, and designers of all levels benefit highly from a structured process. You can consider this guide to be a roadmap - it points out a series of steps and the most important topics within those steps to consider. We hope it will help you understand the what and the why of human-centered design, particularly in the Design for America context. The how of design, actionable advice on undertaking specific design activities, is contained in complementary How-to's and Techniques that are called-out throughout this guide. These elements are available on Design for America's Digital Loft and as shorter, paper-based hand-outs.

This is the second iteration of the Design for America Process Guide. Based upon feedback from the DFA community we have made many additions; the Guide now includes more on how teams implement projects once they have an established prototype and more detailed information on the motivations behind certain tasks. As design is an iterative process, always feel free to reach out and let us know what you think!

TABLE OF CONTENTS



The DFA design process with nine steps under three phases.

WHAT IS HUMAN-CENTERED DESIGN?

Human-centered design (HCD) is an approach to problem solving that stresses understanding people as a vital component to successful innovation. At Design for America, we practice a form of socially-driven HCD to solve problems in order to improve the lives of others.

Fundamentally, human-centered design is about having a sensitivity to the real needs of people, rather than just the trends of a marketplace. It is about understanding a problem's context fully and having empathy for the people in this context. HCD is not about being a slave to the user and making changes to your project every time someone makes a comment. Instead, HCD is about considering what these comments might be before jumping to a solution based in the biases of designers.

WHAT IS THE DFA DESIGN PROCESS?

The Design for America process is a description of the different types of activities and goals that DFAers engage in when solving social problems using human-centered design. The process is organized into three general phases - Understand, Create, and Implement - with three goal-oriented steps each (see left). It is created as an aide to help designers conceptualize their process, and make good decisions about what to do. While the steps of the process do sequentially feed into each other, this does not mean that it is good design practice to always follow them in a linear fashion. Oftentimes multiple steps of the process occur at any one time and in different orders, as projects have multiple goals that they are trying to achieve.

While the DFA ▶ process steps are often displayed as blocks, they do not follow a strict linear sequence. Steps need not happen in sequence, and often teams are in multiple steps at one time. Such iteration is key to successful projects, though there is a general shift from *Understand* to *Create* to *Implement*.


DESIGN for AMER

DESIGN ATTITUDES

Design attitudes are underlying ways to do and think that are common to the most successful design teams. They are important all throughout the design process, and remembering them will help your team become intuitively better designers.

Keep Optimistic!
Even the best designers in the world get stuck. Keeping optimistic about hitting an end-goal will help push your team out of the darkness quicker.

Document Everything!
Memories are limited, so don't assume you'll remember something later. Document research, ideas, and meetings using notes and photos. Be sure to organize the documents so you can quickly retrieve them.

Make it Tangible!
Words can only go so far when designing. Use drawings, mockups, improv, and post-its to help you communicate your ideas to others and to think through ideas thoroughly.

Reflect Regularly!
Pausing and taking a step back can often bring clarity to a project. Get together often with your team to share notes and evaluate the teams progress.

Tell Stories!
Designers learn a tremendous amount about their challenges during a project. Tell stories about your project so others may gain an understanding of your challenge and help you gather empathy around your cause.

Iterate Furiously!
The answers to messy challenges don't come easily. Learning by doing is often the best and most efficient way to find a solution, which means embracing failure and avoiding perfectionism.


DFA Project Scoping Wheel

PROCESS GUIDE SYMBOLOGY

In this guide, there is information beyond just paragraphs of text. The following symbols and styles highlight specific techniques, attitudes, terms, and projects that are useful resources through the design process. Each one provides deeper insight into some of the problems teams can face during a project:

Page Navigation
When reading through content about DFA process steps, a navigation tool appears on the top corners. It tells you what phase and step you are in along with a sneak peak of what's ahead.

How-To Callouts
How-to callouts tell you the name of a corresponding How-To guide that relates to a particular section. They can be found online at the Digital Loft or in print from a DFA staff member.

How-to:
EXAMPLE!
(description here)

Design Attitude Callouts
Design attitudes are always important to keep in mind, but they are noted in the outside margins in places where they are particularly important.

Design Attitude:
EXAMPLE!
(description here)

Vocabulary Words
Whenever a non-obvious or important design term occurs, it will be underlined. This means that it can be found in the glossary at the end of the guide on page 184.

vocabulary word

Example Projects
Many current and past DFA projects are referenced in this guide. Whenever a DFA project is used as an example, its name will be italicized. Projects that are use many times are listed in the Project Glossary on page 170.

Example Project

DRAFT

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UNDERSTAND

WHY UNDERSTAND?

IDENTIFY IMMERSE REFRAME

Understand is about getting to know the problem your team is tackling at a deep level. Rather than jumping straight to solutions based in assumptions and biases, your team will first identify what the problem is, immerse yourselves in its details, and reframe it into something actionable. Looking closely at both a problem's context and its users is important, and it will help glean the insights needed to best solve it. Your team will also set certain design goals and challenges that will guide the development of your future solutions.


FLAT FEET
Bunions all his life
JONNY
Didn't know how to take care of feet when young
Corns
TIGHT ARCHES
Dolly
NEURO-PATHY
HEELS
50 PAIRS OF SHOES
MARK'S POWDER
MARLA
TREATMENT NOT WORKING
USES SHOWER SHOES (Aloe)
97 @ TAP
PRICE? COMPETITION?
Athlete's Foot
Cream
Antifungal Cream
Too small Donated Shoes
Soaks her feet
ERICSTINA
CUTS DOWN NAIL
BLISTERS + FUNGUS
TREADMILL
DIDN'T FOLLOW TREATMENT
SHEILA
DOESN'T FOCUS ON FEET
RUNNERS TOE
SMELLY
DIDN'T TRUST DOCTOR
SOAKED IN WATER ALC SOAP
BUNIONS
KAREN
DIABETIC
BLEACH SHOWER
WHEEL-CHAIR
SHOE INSERT
CALLUSES
GOT INFECTION IN HOSPITAL
CROOKED FEET/ TOES
CALLUS
LOOKING FOR $
VARIETY OF SHOES
SHELTER = STORAGE
NOT PRIORITY
FERNANDO
SHELTER PROVIDES SOCKS
BULKY
KAT
Sizes Unavailable
Sexuality
COREY
STYLE
Sexuality
FLAT FOOTED
"Feels skin separate from foot"
MARIANNA
IMPRACTICAL SHOES
ELEVATE FEET
LIGHTWEIGHT
CALLUSES
SHARMAINE
DIABETIC DAD
"TAP" (STEEL CAP)
WASH & SLEEP W/ SHOES ON
EPSOM SALTS
BUNION
AISHA
SIDNEY
USED A KNIFE TO SCRAPE OWN FEET
CUT J POWDER
PLANTER FASCIITIS? - NOT SEEN DOCTOR
RON
"Walks everywhere" Estimates 7 miles a day
"Touch of arthritis" feet ON and OFF for years
Foot aches
Feet will hurt for 10 minutes after waking up
Previous shoes ogre foot pain
Uses Free Laundry Free Cream from Heartland
Needs Nails Cut
Shoes 1 size smaller
Walks 10-30 miles
Heel rides out of shoe because of size and blisters
Diane
FAMILY EDUCATION
BUNIONS
VASELINE
EPSOM SALT
HEEL SPUR
PEDICURE
PRESSURE POINTS
KYLE
CARRIE
ERIC
WALKING = WALKING
COMFORT
WALKS FOR JOBS
RECREATIONAL
PAN-HANDLE

Starting the design process at *Identify* requires a few things - primarily, a dedicated and passionate team that is rallied around a certain topic. At this point, your team should have most of its members on board and some sort of team charter documenting expectations and how you plan on working together. This is especially important when team members come from different academic backgrounds, levels of experience, or working styles.

Your team should also have some sort of project topic. The level of specificity can range - it may be something as abstract as “obesity” or as detailed as “how can we get children to exercise more?” Either way, you have a jumping off point to start figuring out the details surrounding the problem.

Some teams may also have established mentors, advisors, or community parters. While not necessary to begin the design process, it is highly recommended to start searching for these figures as early as possible. They can lend expertise, give advise, spark new ideas, and help make further connections.

IDENTIFY

getting on the same page and finding targeted problem spaces

TOPICS IN IDEATE

Foundations of Identify
Checking Your Challenge
Sharing Current Knowledge
Scoping How Can We Statements

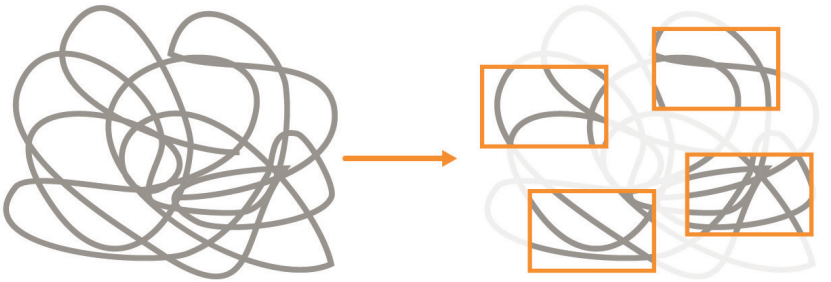
OUTCOMES OF IDEATE

A broad How Can We statement
A compilation of team knowledge and assumptions
Defined problem spaces

◀ The Northwestern studio identifying challenges to kick-off the school year.

FOUNDATIONS OF IDENTIFY

Identify is a time to build a shared understanding of what your team already knows and where you can learn more. The goal is to begin to define subsets of the larger problem, called problem spaces, where your team can dive deeper during research in *Immerse*. This process of finding such focus is called scoping. In DFA, it is up to you to scope your problem and define a particular challenge to tackle. Whereas a problem describes something negative that exists in reality, a challenge is a positive call-to-action to solve this problem. A common way of framing challenges is through the use of a How Can We statement (more on page 24), which are used throughout the *Understand* phase. Problems and their challenges can be large and abstract or narrow and specific, and the point of *Identify* is to begin this narrowing.



Initially, narrowing your scope involves identifying different potential factors of a problem. Sharing your team's current knowledge and assumptions around the problem can help reveal these factors before diving deep into research. Oftentimes thinking about where the problem might occur and who potential stakeholders are leads to the best places to start research.

Community partners (more on page 27) are also good sources of preliminary information. These are local organizations focused on the same problem or topic as your team. They are vital in gaining access to users and have real-life experience in the causes of certain problems. Setting up these relationships early on benefit your team's project in the entirety of the design process.

CHECKING YOUR CHALLENGE

Challenges tend to start off by stating a general problem without suggesting how your team will solve it. For example, “reducing water waste” or “tackling childhood obesity” are very broad and open to many possibilities. Narrowing these challenges down to something more palpable will happen as your team does further research. Before spending time and energy narrowing, however, it’s a good idea to double-check that your challenge is a worthy one to undertake. DFA projects are socially-minded, intrepid, and aim to create real impact. Challenges that lead to these sorts of projects tend to have three characteristics: they are Daring, Feasible, and Applicable.

Daring

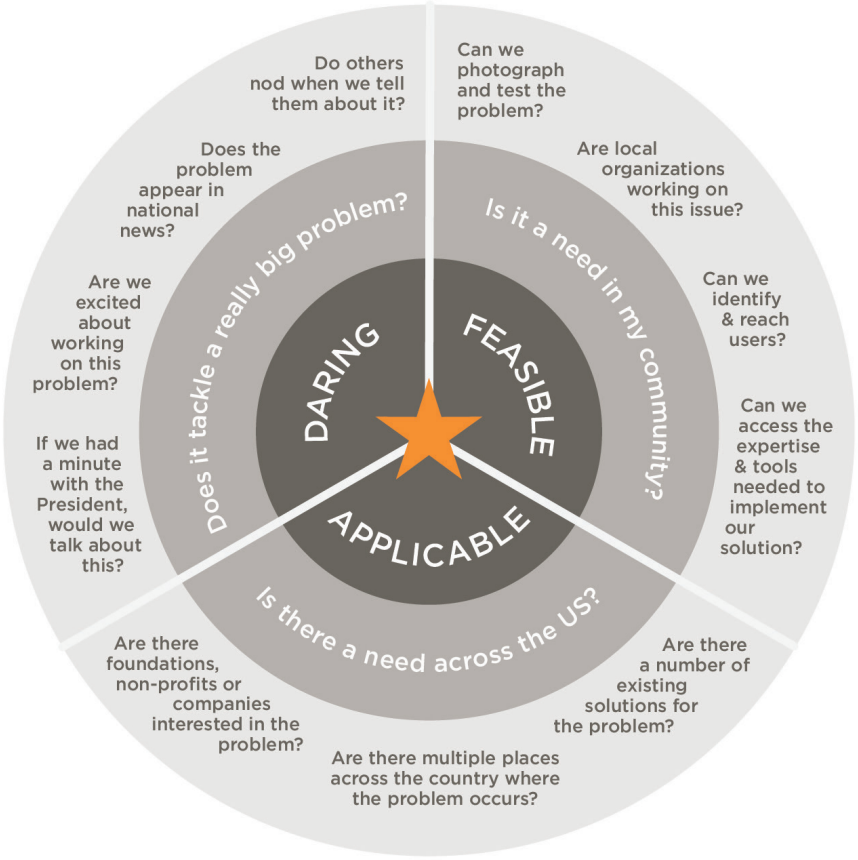
A Daring challenge is one that is not easily solved and has the potential to affect people in very significant ways. This could mean saving lives, preventing environmental degradation, increasing learning, or anything else affecting quality of life. DFA teams take on daring challenges because they have the most potential to make a difference--especially for people that really need it.

An example of a daring challenge: *Reducing hospital acquired infections could potentially prevent 100,000 unnecessary deaths.*

An example of a non-daring challenge: *Making a library at an elite university more comfortable does not likely impact users in a significant way. It also primarily benefits those who are already fortunate.*

Feasible

Feasibility pertains to two things: easy access to users (and partners and experts) and your team’s ability to influence the problem. Human-centered design projects rely on interviewing, observing, and testing, so access to users and experts is key. You team’s ability to influence is how likely you are to see a project



◀ The DFA Scoping Wheel is useful when making sure a project is worth moving forward with.

through to implementation given your expertise, connections, and the nature of the project

An example of a feasible challenge: *A challenge related to childhood health is likely to be more feasible if there is a YMCA in the local area.*

An example of a non-feasible challenge: *Working on issues of childhood obesity is not feasible if all of the children at all available community partners are not currently obese or at-risk.*

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Applicable

Applicable challenges are those that can be translated beyond one particular community. While DFA projects aim to solve problems locally first, those that extend to a broader scale have greater impact. Challenge that only affect a small subset of people or are tied to a specific place may be more difficult to scale.

An example of an applicable challenge: *Working on a project about autism awareness can apply to many people across the country and even the world.*

An example of a non-applicable challenge: *A challenge that fixes the plumbing system in a local homeless shelter could reduce health problems, but the solution only works for a specific location.*

Design Attitude: REFLECT REGULARLY!
(the characteristics of Daring, Feasible, and Applicable are useful beyond *Identify*, so be sure to reflect on them often)

Challenges that are Daring, Feasible, and Applicable are much more likely to lead to impactful solutions. Keeping these qualifications in mind beyond *Identify* is a good habit to get into. They are just as applicable when narrowing in scope, defining design goals, and forming solutions.

SHARING CURRENT KNOWLEDGE

At the start of any project, articulating your team's shared understanding sets the stage for what to do next. This involves determining both what is known and what is assumed about the problem you are tackling. It is also about documenting the main questions your team has off the bat and the people that you know and can reach out to. Getting together as a team and sharing about the following categories can help you find gaps in your knowledge and potential problem spaces to investigate:

Facts & Stats

There are likely facts and figures that your team members know that made them interested in the project in the first place. Some members may also have background knowledge from classes or projects. Mapping out this information will lay out the basics around a problem and lead to further questions to ask.

Personal Experiences

Personal experience with the problem often drives passion. Voicing personal stories early on can help everyone better understand each others' perspectives later in the project. These experiences can also shed light on some of the factors surrounding a problem.

Assumptions

Assumptions encompass things that you think are true but are not backed up with evidence yet. They are not bad, but if unrecognized, or mistaken for fact, they can weaken your project's foundation. Think instead of assumptions as untested hypotheses that remain speculation until users or facts validate them.

Questions

Asking questions is key throughout the entire design process, but particularly in the *Understand* phase. Listing off the immediate questions your team has about a problem gives you a good sense

of what to research first. Keeping a running list of questions is also highly recommended in *Immerse* to stay organized.

Connections

Connections are people, groups, and organizations that your team members know personally and are related to your challenge. They're often easiest and quickest to reach when searching for initial allies who can get your access to further information, experts, and users.

Ideas for the Fridge

Most designers are problem solvers at heart and can't help themselves from constantly coming up with potential solutions. But, thinking about solutions before understanding a problem can be highly distracting and lead to poor ideas. The fridge is an imaginary place where your team can put premature ideas aside and "keep them cool" for later in *Ideate*. This way team members can rest assured that their ideas will be revisited and can focus on the task at hand.

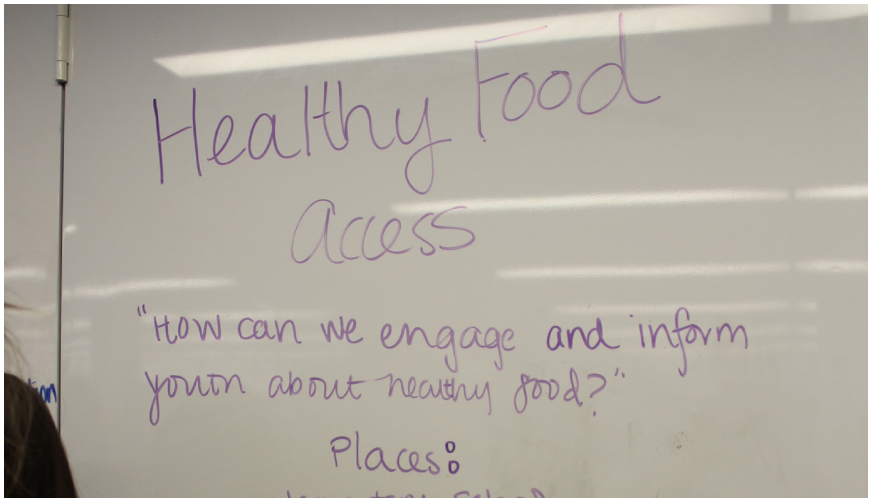
Design Attitude: DOCUMENT EVERTYHING!

(Consider keeping lists, maps, or records of each of the above types of information that you can add to as a team throughout the project.)

The *Garden in a Box* team writing down their current knowledge and assumptions

SCOPING WITH HOW CAN WE STATEMENTS

Just as the quality of a challenge is important, so is the way it is phrased. One common set-back for design teams is maintaining their shared understanding of the problem. Challenge statements are sentences that outline the problem a project team is trying to solve. They document your team's agreed-upon direction, and can evolve over time as you learn more about a problem.

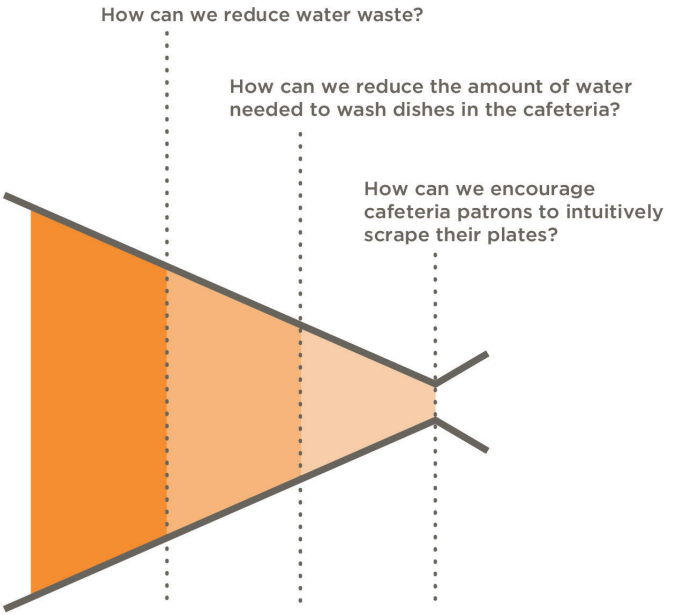


◀ The *Healthy Foods Access* team presents their challenge at the *East Coast Meetup*.

How Can We statements, are a type of challenge statement that is commonly used in DFA. As the name implies, they take the form of a specific question: "How can we...?" Other design groups use the term "how might we" or a regular sentence, which also work. The advantage of How Can We statements lies in its phrasing; firstly, it frames the problem as a question that begs for a response. It calls and rallies your team to action. Secondly, the "can" implies confidence that your team can indeed solve the problem, it is just a matter of figuring out how. Thirdly, the "we"

shows the importance of problem solving as a team instead of as siloed individuals.

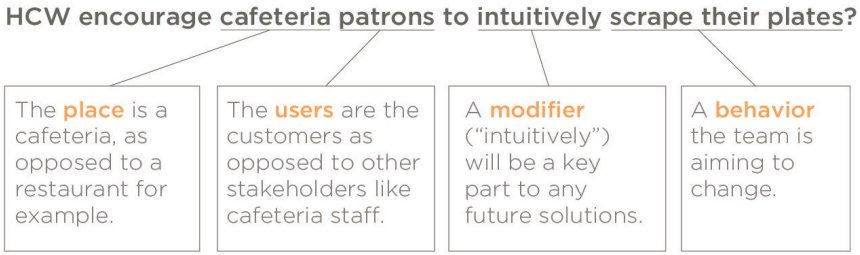
Your team can think of How Can We statements as the backbone of the *Understand* phase of the design process. As you continually research and redefine the problem, your How Can We's will evolve over time into a statement that is much more specific. This evolution can be represented like a funnel:



In the above funnel, the How Can We starts out very broad with "how can we conserve more water?" and eventually narrows to "how can we get cafeteria customers to intuitively scrape their plates?" This progression led to the creation of a vertical dish rack that prompts users to scrape their food more. In hindsight, the progression may look obvious, but the Right Angle team, like all design teams, had many different options to choose from at each junction. It is not unusual to have three to ten different statements at a time. Nor is it unusual for a team to pivot, i.e change direction

entirely based on an insight gleaned from further research.

By the end of *Understand*, a good How Can We statement consists of four fundamental components: a user, a place, a behavior, and important modifiers. These components outline some of the most important components of a challenge. Looking at the Right Angle example, their final statement does just this:



An *Identify* How Can We Statement, however, does not need to be at such a level of detail yet. It may just indicate the general topic of your team's challenge, like with "How can we conserve more water?". In which case, identifying a good place to start researching is the same as identifying the missing parts of your How Can We. Thinking about where the problem occurs, who is affected by it, and any other factors at play are big indicators of the problem spaces your team can investigate further in *Immerse*. Your team may already have some ideas on potential places, users, and behaviors from your current body of knowledge (see page 22).

FORMING COMMUNITY PARTNERSHIPS

How To: FORMING COMMUNITY PARTNERS
(for detailed steps and templates)

The importance of a community partner cannot be stressed enough. Community partners are local organizations that are working within your problem domain, meaning they have considerable access to expertise and users. If you're tackling health emergencies, a community partner might be a nearby hospital. If you're looking at childhood obesity, your community partner might be a local elementary school that provides meals. DFA teams also often rely on accessing typically restricted spaces, like schools or hospitals, and community partners enable your team to enter them. Sometimes community partners turn into implementation partners and help provide financial support or mentorship for your project later on (see more on page 145).

The *Fruit Buddi* ▶ team connecting with snack food stakeholders.

Initiating and building a partnership with a local organization rarely happens overnight, but investing the time in doing so is worth it. Existing connections or a quick internet search of potential partners within a 15 minute radius is a great starting point. Within any given organization or institution the goal is to find a champion - someone that is excited about the work your team is doing and has influence in their domain. Sometimes your team will find a champion on the first try, but more often than not it will take some networking and patience.

Design Attitude:
STAY OPTIMSTIC!
(it can sometime be hard to find the right person to talk to at an organization - staying optimistic and being persistent can help your team find success)

IDENTIFY PAUSE

Do we have a well-founded How Can We statement?

Do We have a Community Partner we are happy with?

Do all of the members of our team have a good sense of the direction we are headed in?

Do we know what information we need to find out in order to better understand our challenge?


Bess

IMMERSE

understanding the problem at a deeper level

TOPICS IN IDENTIFY

Foundations of Immerse
Secondary Research
User Research
Empathy
Synthesizing Findings into Insights
Iterating Your How Can We Statement

OUTCOMES OF IDENTIFY

A body of research
Key insights
Narrower How Can We statements

◀ The *Garden in a Box* team observing young students learning about sustainability at *Global Citizenship Chicago.*

FOUNDATIONS OF IMMERSE

In *Immerse*, the goal is to become well-versed in the problem your team is tackling. By the end, you should be able to answer any key questions about its context or targeted users. Becoming well-versed requires a good amount of research - both through secondary research (gathering information through reading and speaking to experts) and user research (direct contact with potential users). After gathering this information, synthesizing it is just as important. Synthesis in *Immerse* allows your team to form useful insights to apply to your future solutions (more about insights on page 46).

Problems in the modern world are usually multifaceted and highly interwoven, so it can sometimes be difficult to keep hold of the bigger picture while focusing on details. Regardless of the methods your team uses to research, there are fundamental parts of a problem's context to keep in mind. In human-centered

design, there is a focus on the user perspective, but it is also important to understand the system surrounding the user, i.e. the problem context (see left). Some of the key parts of this system include:

The problem: The combination of causes and effects that have an undesirable consequence on the user and other stakeholders. Problems can be very broad or very narrow, and there can be problems nested within bigger ones.

The user: The person who experiences the problem first hand and whom your team is primarily trying to help.

Community parters: Organizations and groups that are already trying to help your team's targeted users in some way.

Other stakeholders: People who come into contact with a problem or users and are somehow affected by them.

The place: The location where a problem occurs.

Existing solutions: Solutions that already address a problem in some way, but are likely insufficient or unknown of.

Political, Cultural, Economical, and Environmental factors: Any influences from popular culture or outside groups that affect how people think, act, and feel, and could affect how your team solves a problem.

The relationships between these entities are just as important to consider as the entities themselves, and they will likely vary from problem to problem. Such complexity can feel overwhelming, but your team does not need to answer everything at once. Throughout *Immerse* there are many (and fun) ways to collect and make sense of a problem's context.

SECONDARY RESEARCH

Secondary research is the act of collecting information from existing and reputable sources. It can save your team a great deal of time and is usually more trusted and proven than what you could feasibly gather yourselves. Secondary research generally comes from written sources and from communicating directly with experts. They can tell you things like particular places a problem manifests itself, or what users and stakeholders to focus on in user research. It can also substantiate your team's challenge by finding Slap Stats - statistics that are so shocking and persuasive they may as well slap you in the face. Furthermore, secondary research can provide an understanding of the technical or systematic parts of a problem, which is vital to speaking knowledgeably about a topic to others.

The challenge of secondary research lies in locating reputable sources. The following methods are generally reliable ways to find information:

How-To: PUBLICATION REVIEW
(for detailed steps and best practices)

Publication Review

Reading relevant publications can help your team understand the important factors of a problem. In DFA, we sometimes call this "getting your Google PhD." There are masses of information all over the internet and in books and magazines, so consider starting in these places first:

Reports from NGOs and Government Institutions

For example: *The MacArthur Foundation*, *The World Health Organization*, the *Yale Facilities Energy Explorer*, or the *Google Public Data Explorer*.

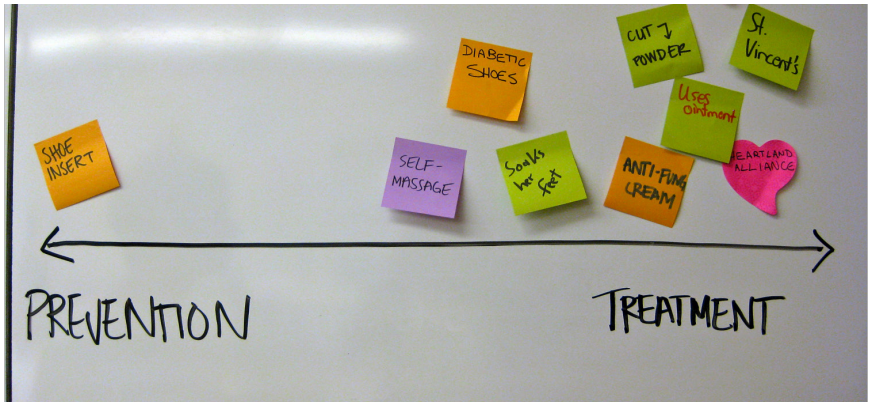
Books by Experts

For example: *SwipeSense* used *The Doctor's Plague* by Sherwi Nuland, and *Better* by Atul Gawande to learn more hospital acquired infections.

Research Articles in Respected Academic Journals
For example: *Psychological Review*, *Journal of Human-Computer Interaction*, *American Journal of Infection Control* or using *JSTOR* or *Google Scholar* to search

News Stories
For example: *The New York Times*, *The Texas Tribune*, *The Economist*, or the *Case Western Daily*.

Technical Manuals, Textbooks, and Websites
For example: *Usability for the Web: Designing Web Sites that Work* by Brinck, Gergel, & Wood; or the *Arduino Playground* (http://playground.arduino.cc/)



◀ Part of the *NUMAT* Team's Competitive Analysis in 2011

Analysis of Current Solutions
Existing solutions to a problem can say a lot about what does and doesn't work. Designers often conduct competitive analyses to survey available solutions and compare their important features. Using a competitive analysis can help your team find opportunity gaps - approaches to solve the problem that are not addressed by the current solutions.

How-To: COMPETITIVE ANALYSIS
(for detailed steps and team activities)

Sometimes it is also useful to understand how existing solutions actually work. Doing a product dissection means opening up a

Design Attitude:
KEEP OPTIMISTIC!
(just because a solution exists doesn't mean you're working on the wrong problem. There is always a way to make it better!)

physical product or analyzing the pathways of a service in order to look at their mechanisms. It is a deep dive into one solution rather than the collective overview of a competitive analysis. Using both methods can often inform each other. For example, a dissection of a hand sanitizer dispenser in a hospital could reveal and interesting pump system. This might inspire your team to conduct a competitive analysis of different pump systems. Conversely, a competitive analysis of different heating systems could show two different knob designs, which could lead to product dissections of both.

A DFAer dissecting ▶ an asthma inhaler to see its inner components.

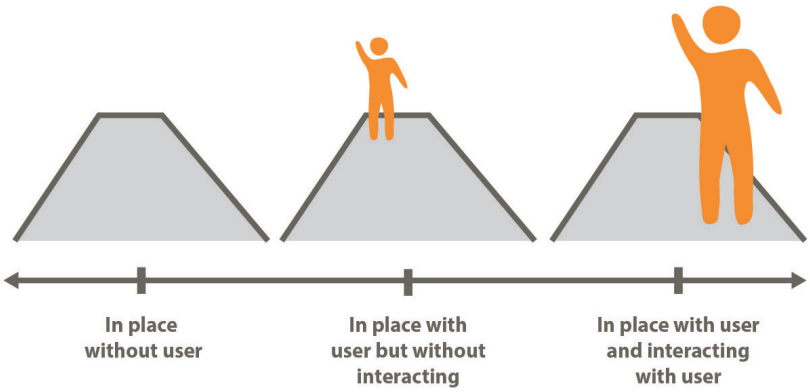
Expert Interviews

How To:
EXPERT INTERVIEWS
(for detailed steps and templates)

Sitting down with someone who is more experienced that you is an invaluable resource. Unlike with text documents, interacting with a human being means that your team can ask specific questions and get more directly relevant information. Experts can also point you in the direction of further reading material and possible allies. For example, the NUMAT team, working on foot care for the homeless, interviewed a pharmacist who worked with a homeless shelter. The expert helped them understand that fungal infections are the biggest issue for their user.

USER RESEARCH

User research is the act of collecting information about user experiences, behaviors, thoughts, and interactions directly from the user. It is vital to the human-centered design process; knowing how your user thinks and acts allows you to design solutions that are tailored to their needs and more likely to be used. There are many different ways to get this sort of information. Sometimes your team may be speaking directly to the user, while other times the user may not even know you are there. In this way, it is useful to think about different techniques of user research along two axes: proximity and granularity. Proximity asks the question "How close to the action does your team need to be to get good data and make sure your users are comfortable?" while granularity asks "how general or specific the information your team seeks?"



Early on in research, your team may just need to get a broad picture of multiple places in which a behavior happens. Later on, proximity and granularity will likely increase as you have a better sense of the problem space, including the users and places your team wants to focus on. Regardless of chronology, there is a wide variety of user research methods that vary in proximity, granularity, and the type of information that is gathered:

How-To: USER OBSERVATIONS
(for detailed steps and best practices)

Observations

Observing users gives your team a chance to see behaviors and interactions first hand. Oftentimes there is a difference between how people say they act and how they actually act. It's important, however, to remain objective and avoid assuming that actions imply certain motivations. For example, observing a child laughing and smiling while doing school-work does not necessarily mean she likes the activity. Perhaps she is happy because he likes her classmates, or because the teacher's classroom management style makes her feel safe.

Within observations, there are a few particular techniques to keep in mind:

Fly-on-the-wall: Observing from a distance so as to not interfere with the normal behavior or flow of spaces or users.

Shadowing: A type of observation where team members closely follow a user or group of users through a specific experience or routine.

Participant: In participatory observation, team members themselves experience a user's process or place in the

The *Healthy Food Access* participated in a cooking class for teens as part of their observations.

field. Doing so allows your team to observe more of a user's normal environment and any stakeholders they interact with. For example, if your problem is transit for wheelchair users, a participatory observation might entail experiencing public transportation in a wheelchair and noting every time you had difficulty traversing an obstacle.

Interviews

Interviews are sessions where your team asks users and stakeholders questions in order to understand their feelings or motivations. Interviews can be short and informal or prepared and scheduled. They can also happen in a variety of media from in-person to skype to a phone call. In-person interviews are preferable since they allow your team to better observe the interviewee's reactions.

How-To:
USER INTERVIEWS
(for detailed steps and best practices)

◀ Students interview older adults at the *North Shore Retirement Hotel* as a part of Leadership Studio.

Asking straight-forward questions is fundamental to most interviews, but there are also a number of techniques that specifically expose the thoughts of users:

Think-alouds: Asking users to speak their thoughts as they

work through a task or interact with a space, interface, or product. This technique is also useful in prototype testing (see []).

Card-sorting: Asking users to organize words or pictures that your team has put on cards. This allows you to understand how a user relates different ideas in their mind.

Laddering: Continuously asking users for the "why" behind certain remarks they make. Probing deeper allows your team to discover less obvious values that the user might not express without prompting.

Design Attitude:
TELL STORIES!
(it's easy to feel like your team is finished researching after a few surveys, but keep in mind good user stories often come from qualitative data and real-life interactions)

Surveys

Surveys are questionnaires that allows your team to get a large number of responses about what people say or think around a topic. Their greatest assets are their scale, ease of setup, and ease of analysis. The biggest disadvantage is that they do not allow your team to see reactions or ask follow-up questions. Relying just on survey is not recommended - comparing survey data against information from other user research makes it much stronger.

User-generated artifacts

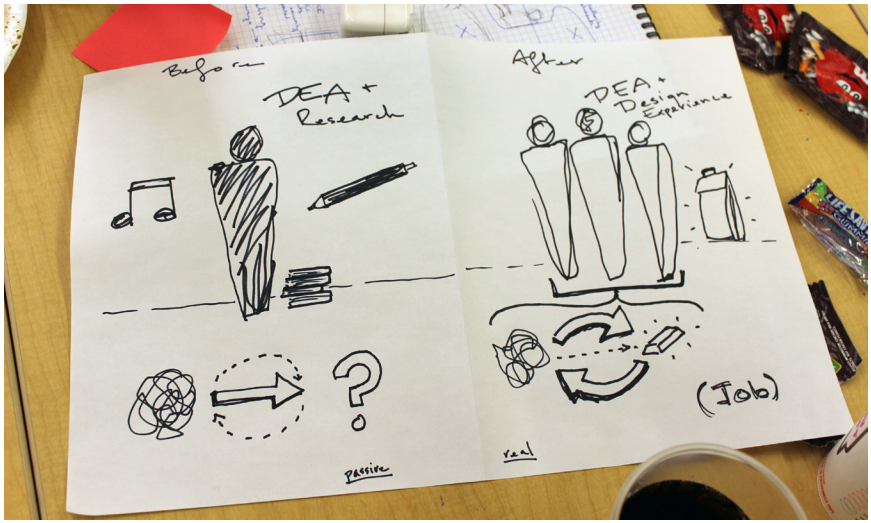
Team members do not actually have to be in the same place as the user in order to glean useful information. Asking users to create artifacts that capture their processes and feelings is another way to learn about their perspective. Some of these artifacts include:

Journals: (aka Diary Studies or Photo Studies) Journals or diaries are written or photographed records of a period of time in the users life. They can be guided with prompts for each entry or free-form with entirely blank space for the user to fill.

Personal inventories: Users document items that matter to them and explain why. Inventories can help your team understand what possessions a user values. Dissecting the

themes in these objects can lead to insights about a user's needs and desires.

Collages: Collages provide an opportunity for users to express themselves visually using found or provided images and text. Like card-sorting, there can be significance in arrangement of items.



◀ A DFAer chronicles her before and after vision of her DFA experience.

In this age of social networks, personal blogs, and big data, there is also a good amount of pre-existing user generated content available on the internet. Like physical spaces, virtual spaces can be observed and interacted with using almost any of the user research methods. By reading, exploring, and prompting content generated by your user group online, your team may be able to elicit themes or insights about what matters most to them.

How-To:
CHOOSING AN VIRTUAL USER RESEARCH
(for detailed steps and best practices)

EMPATHY

How-To: EMPATHY
(for detailed steps and team activities)

Empathy is the ability to share another person's perspective, and it is at the heart of human-centered design. Putting yourself into the mind of another person heightens your awareness of their needs and reactions, and can further inspire your team to action. Solutions based in empathy are much more likely to have impact because they understand what it takes to change behavior. When applying empathy, it is useful to highlight the four different aspects of a user's dynamic: what a person says, feels, thinks, and does,

Building empathy is partially a mindset and partially a set of activities. Your team can be more empathetic simply by opening up your minds and being hyper-aware of when you might be assuming something or basing decisions in biases. There are also certain actions that your team can take to specifically experience and document the point of view of your user (see right). They are different from user research methods in that your team projects yourself into the experiences and mindsets of users rather than externally discerning them. Practicing empathy is

especially important when a user's age, gender, culture, ability, or circumstance differs from your own. Any differences in how your team expects a person to feel or act and how they actually do can lead to key insights. The following are a series of techniques your team can use to build empathy:

Location: Chicago, IL

BACKGROUND: Maya has li
the Howard area of Chicago wi
family since she was born. In t
she is starting kindergarten at th
Elementary Community Acade
she is really looking forward to
favorite activities are going to t
playground and coloring. She l
playing with her older siblings,
and Susan and can't wait to go
school every day, just like they

STORY: Maya's mom takes her grocery shopping every week and it is usually
highlight of her week. She loves being able to run around the grocery store and l
mom lets her pick out one snack every time she goes (though she can usually sne
couple extra snacks). Her favorite part of the grocery store is the chip aisle becau
loves looking at all of the different options and her mom usually lets her pick ou
favorite one to have as a snack after their shopping visit. Her favorite chip to bu
Cheetos because she thinks they look pretty cool and she remembers seeing Che
Tiger when she was watching TV.

Maya is starting to want to feel more independent. She loves it when her mom l
push the grocery cart herself because she feels so grown up doing the same thing
mom does. She also enjoys helping her mom pick out what they're going to eat
week. She loves to help her mom cook, especially when she gets to mix stuff on
own. Her favorite foods to eat at home are chicken, potatoes, oranges, and cooki
likes to eat fruit when her mom gives it to her at home but she never picks it out
grocery store.

**CHALLENGE: How can we encourage Maya to choose fruit as a snack at th
grocery store?**

Personas

Personas are fictional characters that represent your users. They are usually documented with a picture, certain personal characteristics, and a background story. The included information stems from both secondary and user research and is useful in building empathy because it details out the characters your team can embody.

Mind and Journey Maps

Mind maps are a type of documentation that describes what a fictional user thinks or feels about a problem. Your team imagines what is going on in the head of a user and puts it down on paper. Journey maps are similar, but with a focus on what a user does and where she goes. These types of maps are useful for understanding the different factors of a user's decision-making.

Experiential Role-Play

Role-playing allows your team to truly experience what it is like to be in the shoes of your user. Props or scenarios can help facilitate the experience. For instance, in order to understand the physical restrictions of older adults, teams in the past have worn multiple rubber gloves to simulate limited joint movement while opening jars.

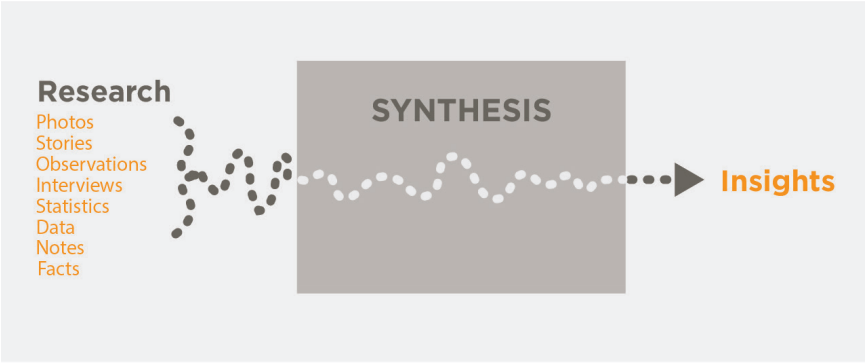
Design Attitude:
REFLECT REGULARLY!
(being empathetic requires the ability to reflect on another person's experiences)

Participatory Observations

Participatory observations can be about building empathy in addition to gathering information about a problem's context (see page 39). While your team is following the path a user normally takes, consider the way the environment makes you feel, and the things it makes you think of. One team once blindfolded themselves and used walking canes to experience what it is like to be visually impaired.

SYNTHESIZING FINDINGS INTO INSIGHTS

Immerse is not just about doing the research, it's about understanding what that research means. Synthesis is when your team pulls together all the information from research and analyzes it for opportunities. It is also a way to make sure that you are solving the right problem in the first place.



The tangible goal of information synthesis is to discover insights: nuggets of information that are surprising or powerful, and that are directly applicable to your team's future solution. Good insights ensure that your solutions will actually be relevant, novel, and impactful because they are based in a keen understanding of your problem and its users. Here are a few examples:

> *"Children are more likely to eat something if they pick it out themselves, but there is little opportunity to do so in grocery stores."*

This is an insight from the Fruit Buddi team. They discovered it by reading through scholarly articles and observing families in grocery stores. Their final solution - a shopping cart attachment

that encourages children to pick out fruits and veggies for themselves - stems directly from it.

> *"Doctors want to stay by their patients' side and need to complete a number of tasks there, but the handwashing station is at the other side of the room."*

This is an insight from Swipe Sense. They found this out by observing doctors interacting with patients in a local hospital, and used it to determine that their solution must be portable.

> *"Older adults are most scared of falling in outdoor environments, but most falls actually occur in the home."*

The Luna Lights team discovered this insight by interviewing older adults and reading statistics about where falls typically occur. They determined that they should focus on the homes of their users rather than exterior environments.

There a few key properties of insights that these examples show:

1. insights are different from facts or statistics.
Facts and statistics are static and isolated. Insights, while they often explain a current status or phenomenon, hint towards the future. They call for a targeted kind of change by revealing something of importance. Insights also often deal with a user's motivations, premeditations, or behavior. Facts and statistics mostly deal just with quantitative values.

2. insights can inform your team in two ways.
One is directional - these insights help you choose a direction to go in while researching and narrowing your How Can We statement. They deal more with a problem's context. The second is qualitative - these insights hint at the qualities your future solution should have. They deal more with preparing for *Ideate*. Sometimes an insight can be both, such as in the Fruit Buddi example, where they used their insight to both focus in on a particular location as well as target a particular behavior in their solution.

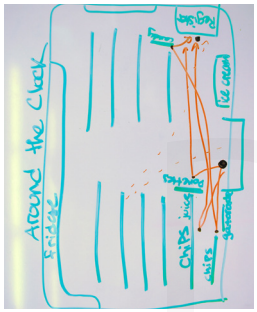
3. insights come from multiple types of research.
Observations are big suppliers of insights because they give the most direct access to user behaviors, but interviews and scholarly research are also valuable sources. In fact, insights often come from comparing different sources of research. For instance, in the Luna Lights example, cross-referencing different sources was key to adding legitimacy to their chosen direction.

Finding insights may seem easy in hindsight, but they require a good amount of high-level thinking. Ultimately, synthesis depends upon organizing information through various lenses and seeing the connections between them. Often this means gathering up your team's research findings and searching for trends or gaps. Designers use a variety of techniques to do so, which can be categorized into four types:

How-To: INFORMATION SYNTHESIS
(for detailed steps and best practices)

Clusters: Writing down information on post-its and grouping them in order to observe trends. Clustering is good for organizing many different types of information from many different sources.

Design Attitude: MAKE IT TANGIBLE!
(it's easier to see connections and patterns when information is laid out visually)



Maps (time, space, and concept): Visually mapping out information in order to understand user experiences. This can help your team see inefficiencies in current practices and the different factors to a problem.

Diagrams (process, stakeholder): Organizing information into diagrams in order to see relationships and cause-and-effect. Diagramming can lead to insights about where design can make a difference.

Matrices (general, 2x2, competitive analysis): Laying out information across different axes to compare certain properties. Matrices are useful for many things including prioritizing characteristics, seeing unexpected patterns, and deciding on a future direction.

ITERATING YOUR HOW CAN WE STATEMENT

While How Can We statements may seem to play a more obvious role when kicking off in *Identify* or preparing for ideation in *Reframe*, they are just as important during *Immerse*. Their value lies in having a quick embodiment of your team's current project status that also acts as a target to shoot for and an easy way to keep everyone on the same page. As your team continues researching, your How Can We will be constantly evolving, gaining more detail and helping define your project direction. In fact, it is common to have more than one How Can We at any given time teams progress.

In *Immerse*, a How Can We moves from an abstract statement to one that starts to hint at the properties of a future solution. It aims to hit the fundamental components of a good How Can We: a user, a place, behaviors, and modifiers based now on research and synthesis (see page 24 for more about the fundamental components). In the How Can We funnel, the Right Angle team's statement transitioned from "How can we conserve more water?" to "How can we reduce the amount of water needed to wash dishes in our school's cafeteria?" after visiting various locations on campus. The latter statement describes both a place (the cafeteria) and a behavior (washing dishes) and suggests cafeteria customers or staff as potential users.

Here are a few other good How Can We statements in *Immerse*:

> *"How can we engage children in the fruit and veggie aisle of the grocery store?" (FruitBuddi Team)*
>
> *"How can we immerse pre-K to 3rd graders in reading culture while in extracurricular settings?" (New Reader Valley Team)*

These statements both identify who the primary user is and the place that is relevant to the problem. The FruitBuddi statement also notes that the future solution must be engaging in some way, and further research indicated that children respond best to things like games and feeling a sense of ownership. The New Reader Valley statement suggests a solution of creating a sustained pro-reading environment. The New Reader team also selected their user's age group, which when dealing with children can drastically affect the type of solutions that are effective.

Conversely, here is a not-so-great example:

> *"How can we reduce the spread of bacterial disease on campus?"*

While this statement identifies a place, it is still very abstract and doesn't indicate who the user might be or what the target behavior is (for example, washing hands versus sharing cups and utensils). For this reason, it is a great *Identify* How Can We, but it isn't useful in helping you think about where to investigate.

In addition to the fundamental components of a How Can We, it is always a good idea to keep in mind the scoping guidelines of "DFA": Daring, Feasible, and Applicable (more on page 19). When creating HCW statements, teams can sometime get derailed in choosing users, places, and behaviors that are easy but not necessarily impactful. How Can We statments are often a good way to check yourselves throughout the design process.

IMMERSE PAUSE

Have the examined all parts of a problem's context?

Have we checked our assumptions against our research?

Do we have a series of good insights to work with?

Does our How Can We hit most of the necessary parts?


SegalDesig

REFRAME

defining the change you want to make

TOPICS IN REFRAME

Foundations of Reframe
Turning Insights into Design Goals
Defining Measures of Success
Preparing How Can We's for Ideation

OUTCOMES OF REFRAME

Design goals
Measures of Success
Narrowed How Can We statements

◀ Matt Brooks and team reframe their challenge surrounding asthma.

FOUNDATIONS OF REFRAME

Turning a messy, ill-defined problem into a concrete, specific problem requires setting tangible goals. *Reframe* involves turning your team's understanding of a problem into a set of three different types of goals: design goals, measures of success, and a detailed How Can We statement. Together, they define the details around what your team wants to change. A How Can We statement sets up the aspects of a challenge, while design goals describe the properties future solutions should have, and measure of success give a way to evaluate for impact. These goals apply the valuable insights gleaned in *Immerse* towards a manageable number of directions in *Ideate*.

Knowing when your team is finished researching and ready to ideate can be difficult. The term analysis paralysis refers to the phenomenon of teams getting stuck in an endless loop of research. Learning more about a problem often exposes more of what a team doesn't know, and the cycle continues. No team can learn everything about a problem, and often teams learn the most from testing with actual prototypes. As long as your team can set specific design goals, easily-testable measures of success, and a fully-formed How Can We, it usually means you've done enough research to move forward. Taking action is almost always better than fretting over perfection when it comes to design.

TURNING INSIGHTS INTO DESIGN GOALS

Designers often intuitively apply the insights they've learned from research towards the creation of solutions. While much of this process may be subconscious, agreeing upon and documenting such decisions is very useful. An open discussion allows your team to prioritize certain insights among many. The outcome of such a conversation is a defined set of design goals: descriptions of properties or qualities that your team's future solution should have. Design goals do not describe intended solution outcomes, rather they explain the best ways to achieve these outcomes. Often, they are the effect of rephrasing an insight into a defined direction (see below).

Team	**HCW Statement** (Prior to *Reframe*)	**Example Insight**	**Related Design Goal**
Fruit Buddi	How can we encourage kids to eat healthy?	"Children are more likely to eat something if they pick it out themselves, but there is little opportunity to do so in grocery stores."	Give children a sense of agency and selection
SwipeSense	How can we reduce hospital acquired infections?	"Doctors want to stay by their patients' side, but the handwashing station is at the other side of the room."	Make hand sanitation accessible near patient
Luna Lights	How can we reduce falling among older adults?	"Older adults avoid using safety devices that make them feel or appear 'old'"	Avoid connoting"old" (like a walker or cane)

Design Attitude: REFLECT REGULARLY!
(some insights may seem obvious, but don't overlook them - they could lead to a very important design goal)

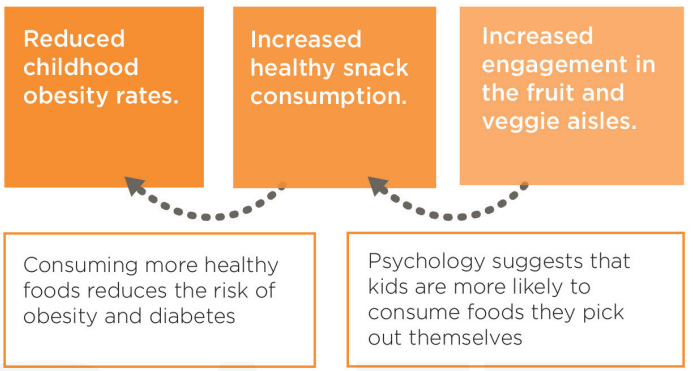
While such specificity before brainstorming might feel too confining to promote creativity, constraints and clear directions are actually proven to help promote idea generation. Taking design goals into ideation will make sure that your team incorporates the most important insights from research.

DEFINING MEASURES OF SUCCESS

A measure of success is a tangible metric that describes the end-goals of a solution. They ask the questions "what are we trying to change" and "what are the indicators of that change?" For example, a team working on reducing car pollution might choose the measure of success "decreased car usage." The value of defining such measures before ideating lies in the clarity and focus they give during ideation. With a set of clear goals about the impact your team is trying to create, you can better form solutions with that impact.

Given that modern problems are usually complex and abstract, defining metrics that are closest to your sphere of influence will be the most useful. Creating measures of success involves thinking about the big-picture change your team is trying to create and the smaller, more tangible changes underneath them. Using the insights and findings from research, your team can create a logical framework like the one below:

Design Attitude:
KEEP OPTIMISTIC!
(your team don't need to stop something like childhood obesity full on; break it down into something you can change, like engaging kids in the healthy aisles. Same end goal!)



The first box is the *Fruit Buddi* team's overall goal of reducing childhood obesity. There are many different ways to tackle this issue, but they decided through research that the best way would be to increase healthy snack consumption. Further research lead

them to believe a barrier to healthy snacking is that the fruit and veggie aisles in grocery stores are not as engaging as the chip aisles. The Fruit Buddi team can measure success in any of these three categories, but measuring obesity rates takes a long time and is hard to prove. Instead, they could very feasibly measure success in the other two categories, with a list of questions such as these:

- Do children consume fewer unhealthy snacks than before?
- Do children consume more healthy snacks than before?
- Do parents purchase less unhealthy snacks and more healthy snacks than before?
- Are children picking out produce themselves in the fruit and veggie aisle?
- Are they excited about fruits and veggies in the grocery store?

These measures of success help provide a clear target for future solutions during the *Create* phase; first while coming up with ideas and later when testing prototypes.

PREPARING HOW CAN WE'S FOR IDEATION

While How Can We statements in *Identify* and *Immerse* give direction during research, How Can We's in *Reframe* capture your team's understanding of a problem and directly prepare you for generating solutions in *Ideate*. They are more specific and hit all of the fundamental components of a good How Can We by detailing a user, a place, a behavior, and important modifiers (see below). Anyone reading your How Can We should be able to understand what your team is trying to accomplish in a precise way. Of course, a single sentence cannot capture the entirety of the research your team did during *Immerse*, but paired with design goals and measures of success, it can give a good overview of what is most important.

Team	Initial HCW Statement	Example HCW Statement at *Reframe*
Fruit Buddi	How can we encourage kids to eat healthy?	How can we create a shopping experience in grocery stores that engages kids and rewards healthy choices?
SwipeSense	How can we reduce hospital acquired infections?	How can we help hospital staff sanitize their hands at all of the critical points?
Luna Lights	How can we reduce falling among older adults?	How can we reduce the risk of older adults falling in their homes at night?

Converging upon *Reframe* How Can We statements sometimes happens in a flash of inspiration, while other times takes back-and-forth rumination. Your team may have multiple users or behaviors to decide between, though it is not always a bad thing to have multiple How Can We's when moving towards ideation. Teams may also pivot during *Reframe*, with their How Can We representing this change. In the end, whatever gives your team the best focus and inspiration is the best direction to go in, while also keeping in mind the qualities of Daring, Feasible, and Applicable (page 19).

REFRAME PAUSE

Do we have a How Can We that prepares us for ideation?

Do we have design goals based on our insights from research?

Do we have feasible measures of success?

Is our project still Daring, Feasible, and Applicable?

CREATE

WHY CREATE?

IDEATE

BUILD

TEST

The *Create* phase is about turning your team's understanding of a problem into an actual solution. It is a highly iterative process of generating ideas, refining ideas, building prototypes, and putting everything to the test. Your team will use the goals and How Can We statements set up in *Understand* to guide your project direction. However, this doesn't mean that learning about the problem you are tackling is over. Much of the work in *Create* is about finding precisely what the problem needs in order to be solved, and what form this solution should take.

IDEATE

generating ways to make change

TOPICS IN IDEATE

Foundations in Ideate
Generating Ideas
Refining Ideas into Concepts
Selecting Concepts to Move Forward With

OUTCOMES OF IDEATE

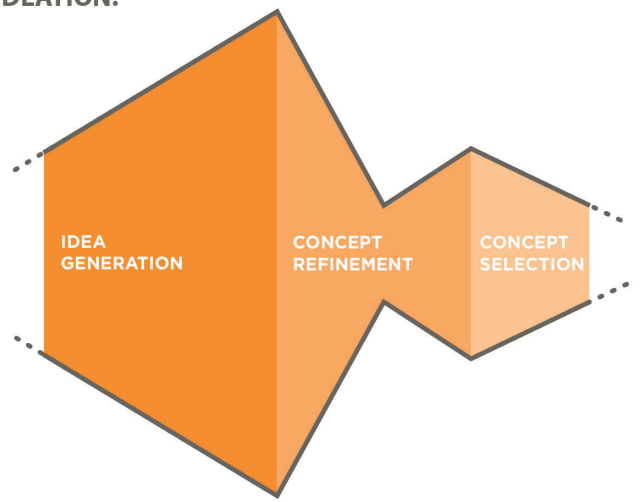
Many insight-driven ideas
Multiple concepts to build

◀ A team at Leadership Studio uses post-it notes to write down all of their ideas.

FOUNDATIONS IN IDEATE

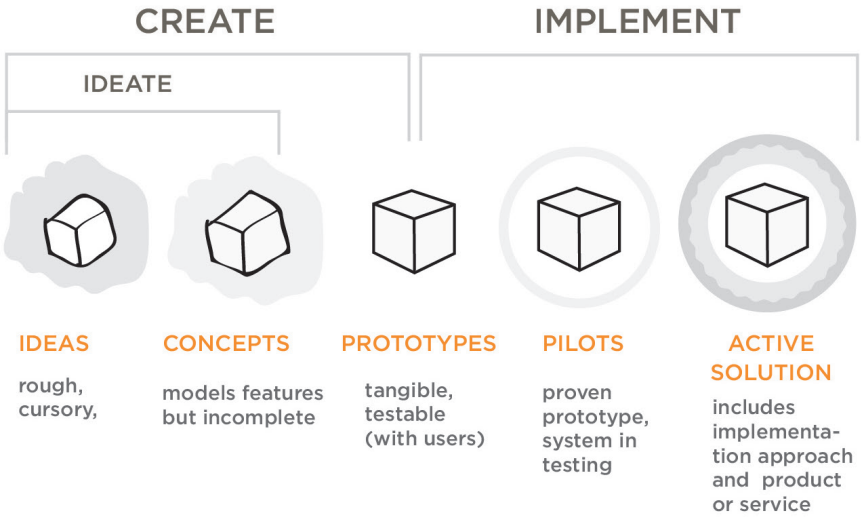
Ideate is the step where solutions are born. Your team has researched and become immersed in a problem, and now you are ready to start solving it. The end goal of *Ideate* is to have a number of potential solutions that you are confident enough to build into prototypes. But, ideas do not come out of thin air. The process of generating and refining ideas in the design world is called ideation, and it can often be highly structured. It as a process of both divergence and convergence - divergent as your team comes up with a large quantity of idealistic, abstract ideas, and convergent as you flush out some of their details and eventually select which ones to move forward with.

IDEATION:



It is also useful to think about the different outcomes of each ideation stage (see right). Ideas are formed from divergent generation; they are not very defined or detailed, but represent big-picture differences. Concepts are what ideas turn into after a period of refinement. During this period, team members consider the feasibility of ideas and further details about the form and

function of a potential solution. For example, when the *NUMAT* team was ideating around the problem of poor foot hygiene in homeless shelters, they initially thought of ideas such as disposable shoes, special shower mats, or anti-microbial curtains. They then took the shower mat idea and refined it into different concepts that conveyed the materials of the mat and how it would stay put on a shower floor.

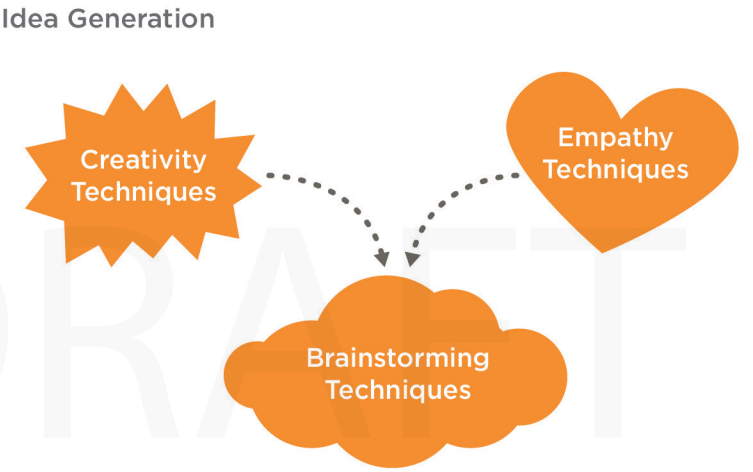


Later on, in the *Build* and *Test* steps, your team will build prototypes of your concepts in order to further define potential solutions. Prototypes are often physical or otherwise tangible representations of a solution that can be tested with users. Eventually, after many rounds of iterative building and testing, all this work will converge upon a prototype that has been thought through enough to pilot. Pilots occur during implementation as a way to test a fully-developed prototype in the real world along with the system that brings it to the hands of users. The end goal is to reach an active solution - one that can be implemented and thrive on its own. While this whole progression may seem linear, it is in reality a highly iterative cycle that never truly stops.

GENERATING IDEAS

Generating ideas is the crux of the design process; it is where research and understanding turn into potential solutions. Often a period of excitement and energy, your team can start to see how your efforts could tangibly impact others. In previous eras, inventors and scientific discoverers were commonly seen as lone geniuses - people who locked themselves up in their garages or laboratories until a magic spark suddenly came to them. However, when tackling the wicked problems of today, designers find greater success in going out into the world and putting together ideas as a team in order to capitalize on the multiple perspectives of their members.

Coming up with ideas is never the same experience twice. Sometimes, the answer is obvious straight from a particular insight. Sometimes, ideas come randomly, for instance while a team member is taking a shower or trying to fall asleep. Other times, it can take a lot of work to get at something your team is happy with. Luckily, there are many methods used by DFA and in professional practice that can help. They fall into three categories: Brainstorming techniques, Creativity techniques, and Empathy techniques. Their differences lie in their purpose. Creativity and



Empathy techniques are key to priming your team to come up with the best ideas possible, while Brainstorming techniques are more targeted for the creation of actual ideas. Using all three is highly recommended as they are all very much interrelated.

How-To: CHOOSING AN IMPLEMENTATION APPROACH
(for more information on how to setup and run these generation techniques)

Creativity Techniques: The benefit of creativity in design is inherent - imaginative and original thinking more often leads to new and intriguing ideas. Creativity techniques aim to prime such thinking by pushing team members beyond their normal understanding of what is reasonable. Some examples include: word-association, improv games, and mockuptionary.

Empathy Techniques: Empathy is important in all steps of human-centered design, and can be applied to *Ideate* just as it can to *Immerse*. Empathy exercises aim to help your team get into the mind and body of your user in order to better come up with solutions that fit their needs. Some examples include: bodystorming, role-playing, and creating personas.

Brainstorming Techniques: While brainstorming is often thought of as organic and free-flowing, having a structure can be immensely helpful. Brainstorming techniques help keep teams on point and make sure all voices are heard. They are also specifically organized to be the most efficient with time and resources. Some examples include: sticky-note clustering, charrettes, and diarying.

Common to all idea generation techniques, however, is a fundamental mindset of divergence and play. The following Rules of Generation are often used to help teams think in these ways. They can even be applied to generating other possibilities such as How Can We statements.

1. Quantity over Quality
Details and "good" ideas are not as important as coming up with anything and everything that could work. You never know what might spark another idea, and your team will have time to refine ideas later.

2. Defer Judgment
Judging ideas (either negatively or positively) can discourage team-members from contributing further or steer the activity off-course. Save this for later during refinement, and for the time being accept all kinds of ideas.

3. Build on the Ideas of Others
Putting together multiple ideas or using the ideas of others as stepping stones is a great way to go beyond the obvious. It also helps individuals get less attached to their own ideas, which can cause shortsighted thinking.

4. Encourage Wild Ideas
While pie-in-the-sky ideas might seem absurd, they can inspire your team to think big and spark other solutions that were previously unthought of. No idea is too crazy or big to disregard.

Design Attitude:
MAKE IT TANGIBLE!
(keeping post-its, markers, whiteboards, and mockup supplies nearby will make a much more productive idea generation environment)

5. Visualize Ideas
Using sketches and mock-ups not only gives clarity to an individual's idea but helps assure that everyone on the team is picturing the same thing when discussing it.

6. Stay Focused
Even though idea generation is all about divergent thinking, being sure to stay on topic will save time and keep minds sharp. Using a How Can We statement as a guide is highly recommended since it encompasses the work your team already did during *Understand*.

REFINING IDEAS INTO CONCEPTS

How-To:
CONCEPT REFINEMENT
(for team activities and best practices)

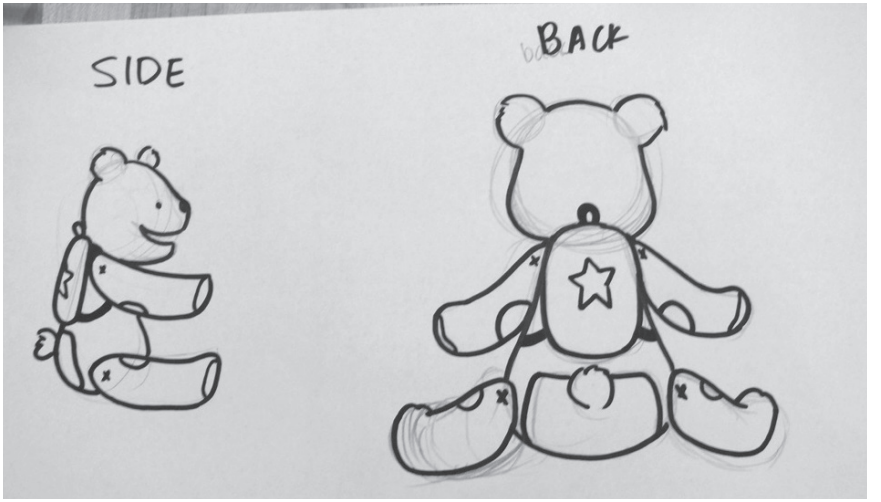
Having ideas about possible solutions is just the start. Refining those ideas into concepts means thinking more about the constraints of reality and other important details. Having refined concepts makes it easier to start building a prototype and have concrete elements to test. When going through refinement, many of the Rules of Generation tend to get flipped into pseudo Rules of Refinement. Rather than prioritizing quantity, deferring judgment, and encouraging wild ideas, refinement requires thinking critically and realistically. In fact, a common method in the design world is called "kill your darlings", where team members actively attack their own ideas. The principles of building off the ideas of others, visualizing everything, and staying focused, however, still aptly apply.

In order to think through the details of a potential solution, consider the questions that arise around what an idea is. For instance, if your team has the idea to make a toy, you may be asking: What type of toy? What will it look like? Will it have any interactive elements? Answering such questions relies heavily on your team's understanding of your user, their motivations, and the problem context. Applying your insights from research to the following categories can help your team think about the different aspects of a particular concept:

Function: Function encompasses the features and ways that the concept will 'get the job done'. For a teaching teddy bear like Jerry the Bear, the function is how children learn from the bear, be it a digital screen, interactive accessories, or spoken phrases. For a web app like GroupWalk, the details regarding function might include how the back-end software will be set up.

Form: Form describes the key physical and aesthetic components of the concept. It goes beyond just the senses of sight and touch; consider the case of designing for users

who are blind and have a heightened sense of hearing. With a teddy bear toy, the shape of the bear is key, but so is how soft or scratchy the fabric is. Online, the color scheme and typography of a website can elicit an emotional reaction that can make or break a solution.



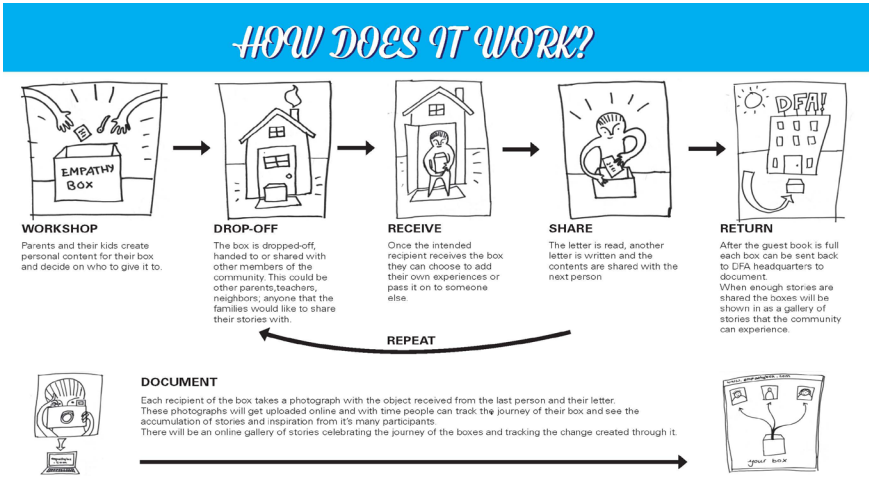
A sketch from the early days of *Jerry the Bear* shows both form and function - the patches and backpack indicate different functional features, while the shape of the bear shows its playful and cuddly nature.

Context: The context of a concept refers to the place and situation where the solution will be used. A more accessible context is likely to draw in more users, increasing the amount of potential impact. With the teddy bear toy, there is a big difference if it is going to be used in the home versus a school versus a hospital. With a web app, it is accessible everywhere there is Internet, but it is helpful to think about where people will use it most and through what means (laptop, cell phone, desktop, etc.)

Delivery: Delivery is the system that gets the solution to the user. It looks at the which stakeholders are required, such as manufacturers and distributors, and what pathways the solution takes. For instance, with a portable hand sanitizer dispenser like SwipeSense, this would include the fact that hospitals purchase and give out the dispensers rather than

individual doctors. It would also consider the way that the dispensers are refilled with gel.

Implementation: Implementation describes how the solution will be put into place and maintained. Sketching out a high-level business-plan or non-profit funding model can give a better sense of future feasibility. Considering key stakeholders and needed resources can do the same. (See more in the Implement phase on page 130)



◀ *Empathy Box*'s outline of how their prototypes get passed around and collected among the community.

While thinking through these categories will give your team a sense of direction for what to build, be wary of growing too attached to any one concept. The vast majority of these details, or even preliminary ideas themselves, are likely to change based on insights from building and testing.

Design Attitude:
SEEK FEEDBACK!
(it's unlikely that your team will know all the answers to all these questions. Tapping into the knowledge of expects is usually more resourceful than trying to find everything out on Google)

SELECTING CONCEPTS TO MOVE FORWARD WITH

Ideas and concepts mean little if they are not translated from abstract thoughts into concrete objects and actions. Choosing which concepts to build and test requires assessing which ones are worth your teams' time and energy. This might seem difficult before conducting any user testing, but you can still clearly articulate why you've decided on which concepts. Doing so requires asking questions about how a concept would be brought into the world and the chances of its future success. In fact, this type of thinking is very similar to using the scoping wheel in *Identify*. The following questions are very helpful in thinking about the daringness, feasibility, and accessibility of a concept as well as its impact potential and originality:

Which concepts have the most potential for impact?

Is the concept based in insights from your team's research? (see page 46 for more information on insights)

Does the concept have tangible measures of success? (see page 59 for more information on measures of success)

Are the concept's projected effects aligned with your team's impact goals?

Design Attitude: SEEK FEEDBACK!

(your team may not know the feasibility of a solution. Seeking out experts can help you understand what a concept might look like in the real world)

Which concepts are the most feasible?

How easily can your team access resources such as funding, supplies and tools, mentorship, community champions, relevant classes, etc.?

What is the foreseeable timeline for the concept, and does it match up with your team's personal timelines? Are there any "quick wins" that could be implemented immediately as you work on a longer-term concept?

Does your team have access to target users for testing? Can you imagine how to break up the components of the concept for testing?

How manufacturable is the concept? Does your team have the skills to build your concept, and if not, can you learn it through a class or access those who can help you?
Are there any foreseeable roadblocks, such as restrictive policies, hard-to-get technologies, expensive manufacturing, etc.?

What concepts are the most novel?

If there are similar solutions existing in the world, does your team's concept distinguish itself from the rest in a new way?
When telling others about the concepts, do they say "I never thought of that!" or "that's such a good idea!"?

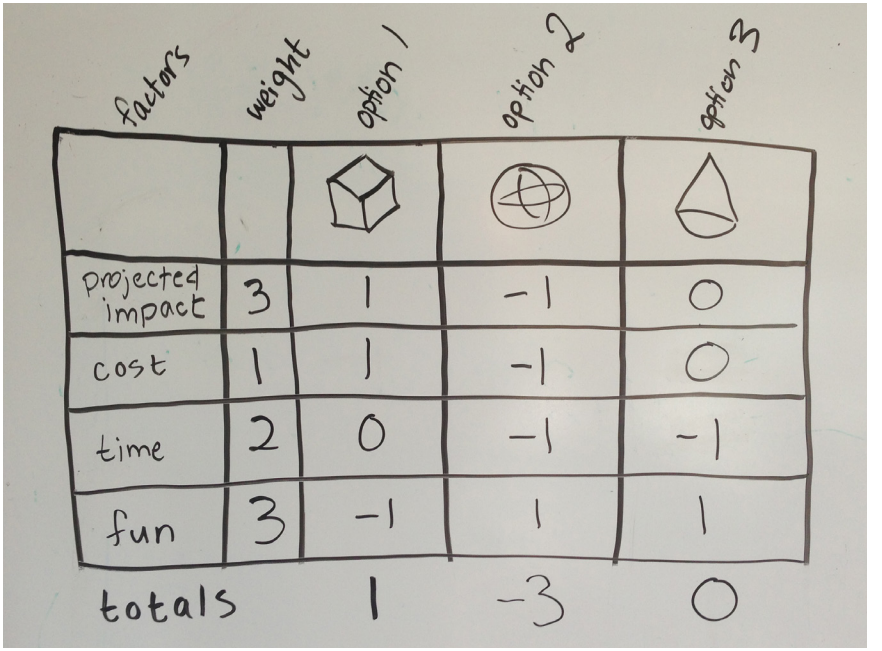
Which concepts is your team the most excited about?

Are there any concepts that your team would do anything to pursue?
Are there any concepts that would allow your team to learn a specific skill or domain of interest?

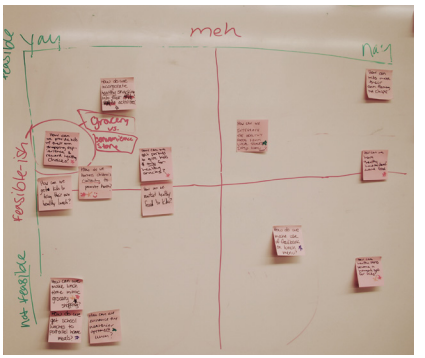
In the end, choosing somewhere between two and five concepts has worked well to maximize potential success and minimize time wasted. Sometimes this is an easy decision, but sometimes questions of feasibility can be at odds with questions of impact or novelty. When it comes down to actually making a decision, using matrices gives your team a concrete way to weigh the different characteristics of concepts.

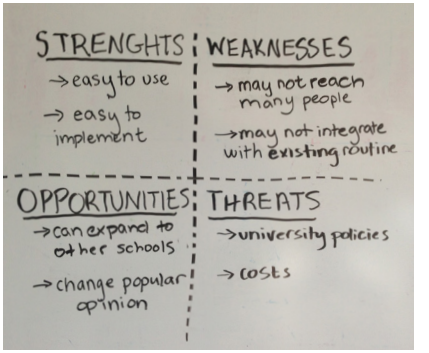
How-To: MAKING COLLECTIVE DECISIONS
(for detailed steps and team activities)

One particular kind of matrix, a Pugh chart (also known as a Decision Matrix), is especially useful. The idea behind a Pugh chart is to rank multiple concepts based on a number of weighted characteristics - which during this step likely relate to the questions in this section. Oftentimes the conversation about what values to give each characteristic is more valuable than the ending tally. A 2x2 Matrix can achieve a similar effect, but along two targeted characteristics. S.W.O.T. charts (standing for "strengths", "weaknesses", "opportunities", and "threats") can also help your team lay out the qualities of different concepts.



An example Pugh chart.





A 2x2 used by the *Fruit Buddi* team (left) and an example S.W.O.T chart (right).

In addition to analysis-based decision making, designers often talk use their own intuition to move forward. There is certainly value in trusting one's "gut" feeling, and usually it is based in a rational reason that just needs to be teased out. However, it often takes time to develop good design intuition. It requires lots of practice in synthesizing and problem-solving spanning multiple projects. When working on a team, team members may also have

different intuitive leanings. The articulation of these gut feelings is the trademark of a great designer. Ultimately, your team's concepts should make sense when explaining them to others, and using decided-upon questions and metrics will make sure there is a common explanation.

IDEATE PAUSE

Do we have multiple concepts to test?

Are our concepts based in the insights we found in research?

Are our concepts testable and feasible?

Have we considered some of the details of what it would take to bring our concepts into the world?

BUILD

making concepts tangible and testable

TOPICS IN IDENTIFY

Foundations of Build
Key Principles and Types of Prototyping
Prototyping Digital & Service-Based Solutions
Diving Deeper into Design

OUTCOMES OF IDENTIFY

Prototypes to test

◀ A team during Leadership Studio starting to build a prototype.

FOUNDATIONS OF BUILD

When using mockups earlier in the design process, your team likely used play-doh and popsicle sticks to better understand each others' ideas and push yourselves to think about the details of certain concepts. In *Build*, making things with your hands takes on a new role through prototyping. While mockups are most useful for internal communication, prototypes are external, meant for testing out your team's concepts with users and experts. One can even consider prototyping as researching through a physical object or interface - it is a way to learn more about what users need and want.

MOCK-UPS:

- made quickly using cheap materials
- for internal communication of ideas and concepts
- help think through further details

PROTOTYPES:

- made of a variety of materials--from readily available to high quality
- for external testing with users or communication
- help answer key questions and challenge assumptions

Ultimately, the point of building prototypes is to test them. Testing allows your team to answer questions, test assumptions, and gain insights in order to improve your solution (more on page 103). For instance, assuming a child will be more attracted to a game that features sounds and bright lights may seem true, but could in testing prove to be too distracting. Only by actually building the game could this aspect be discovered. Even concepts that are not physical things can be built and tested through simulations and diagramming.

Regardless of whether your team is working on a product, service, or other type of design, there are a few key principles and types of prototyping common to *Build* (more on page 89). They are used to help your team be the most efficient with time and resources while yielding the best results in testing. The process of prototyping is a highly iterative one that can move quickly, so clarity over what and how to build is highly useful. Your team can think of your future solution like a child; it first begins as a barely formed idea that grows into a concept, then its tests its boundaries in adolescence as a prototype, until it matures into an active solution. Correspondingly, a design starts with basic form and function and develops to integrate the more systematic details of thriving in the real world. As your team dives deeper into the design of a solution, things like safety measures, manufacturing, or sustainability become more important. *Build* is the step where your solution's development tangibly manifests itself.

KEY PRINCIPLES AND TYPES OF PROTOTYPING

How-To: PROTOTYPING
(for more detail on prototyping techniques and ways to make things)

In order to create prototypes that are the most apt for testing, there are a few key principles that are widely used in the design world. All of them have to do with iterating in smaller chunks rather than putting all your bets on a single, final prototype. While doing so may seem like it will take longer, it will actually save your team valuable time and effort by assuring your solution is one that will work. The four principles are as follows:

1. Build to Test

Since the point of building prototypes is to test them, it is important to know what your team is testing ahead of time. Understanding the questions you are trying to answer with a prototype will help define how to build it. Thinking about how the prototype will be used (i.e. is it for a performance test or a user test? What will the procedure be?) will also dictate how to build.

The "graveyard" ▶ of *SwipeSense* prototypes; they have gone through over 150 iterations with their fair share of failures since starting in 2009.

2. Fail Early, Fail Often

This mantra - made popular recently by David Kelley and IDEO - is an embodiment of the power of iteration. Rather than spending time perfecting a prototype that then fails utterly in user testing, your team can learn more by taking smaller steps. Failure, in this case, is not a negative failure as long as it leads to ultimate success. Since we learn from making mistakes, often realizing crucial insights in the process, doing so early and often makes sense in order to learn the most in the least amount of time. Your solution will be much stronger as a result.

◀ The first prototype of *Fruit Buddi* was just a foam core sheet with plastic bags stapled on (right). Later, the team created a higher fidelity out of plastic, metal, and mesh (left).

3. Lowest Fidelity First

If your team is going to fail early and often, then it makes the most sense not to spend too much time and energy on your first few prototypes. Fidelity refers to the degree to which a prototype is similar to the final vision of your team's design. Building at the minimum level of fidelity is not laziness or unpreparedness, but an awareness that a prototype need not be fully polished in order to answer desired questions. Foam core and found materials are often enough to test a basic function or preference. Afterwards, your team will know that using more expensive and time-intensive materials is worth it. The same goes for scale - the size of a prototypes does not always need to be the same as the final size depending on the type of testing being done.

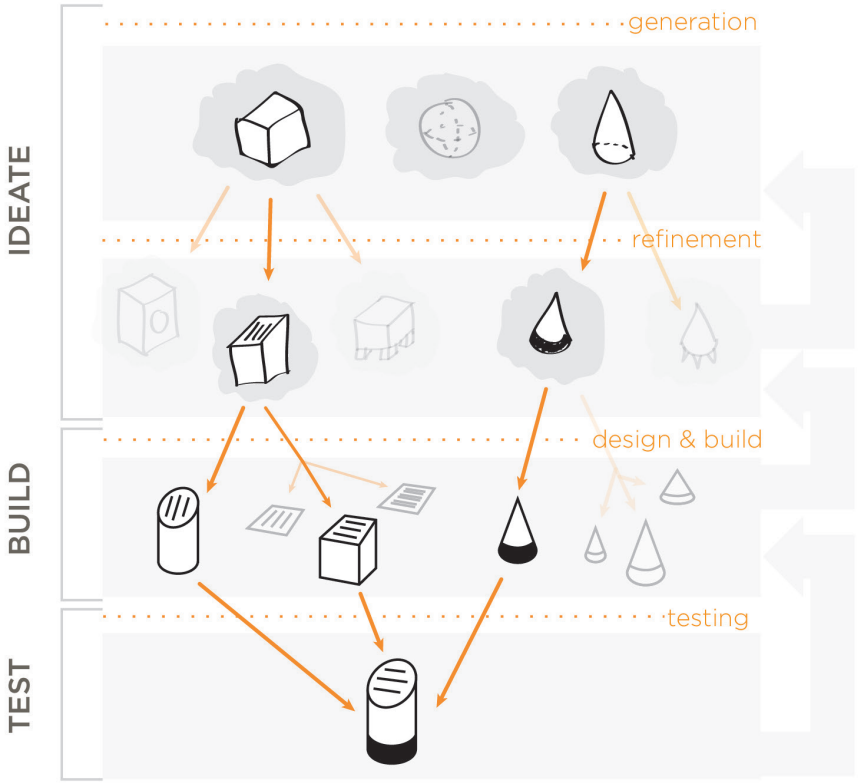
One technique to use while thinking about Lowest Fidelity First principle is the 30-60-90 technique. With this technique, your team specifies ahead of time what percentage of fidelity you hope to achieve in this iteration. The 30%, 60%, 90% categories are less important in terms of their actual number and more important in terms of what they represent - a common vision among your team and a way to articulate the iterative nature of your building process.

The form and function of *Jerry the Bear*'s screen and display have developed over the course of the project from simple and hand-sculpted (30%) to highly interactive and computer modeled (90%).

4. Parallel Prototyping

While your team will likely have a vision of the final design in your heads, a single prototype does not need to be a comprehensive representation of it. Splitting up a concept into its different parts and building different prototypes for those parts can help isolate failures in testing (see right). That is, if a prototype fails it is easier to pinpoint where it failed when there are less parts at play. Working in parts also means that your team can work on multiple parts at one time. This is called parallel prototyping, and it is a great way to divide and conquer in order to work more efficiently.

A common prototyping technique that utilizes building by parts is the Looks-like, Works-like, Feels-like technique. With this technique, your team specifies the type of prototype based on what you are trying to test - looks, feel, or functionality. You might build all three at the same time, or at different times depending on what needs testing when. This technique is also easily combined with the 30-60-90 technique.



◂ Working in parallel and in parts while prototyping can happen across all steps in *Build*.

LOOKS-LIKE

FEELS-LIKE

WORKS-LIKE

◂ *BottleShare* team prototypes of with various functionality for demonstrating and testing their concept.

DIGITAL AND SERVICE-BASED PROTOTYPING

While much of the language of prototyping implies that your team's solution is a physical thing, sometimes the best way to solve a problem is through a digital- or service-based design. Many DFA teams take this route, and are very successful in doing so. Fundamentally, all the principles of prototyping are still applicable. For instance, with digital solutions utilizing the Lowest Fidelity First principle, instead of coding an entire smartphone app upfront your team could create analog versions on notecards to first test basic elements with users. After, you could use Powerpoint to make interactive displays. Once the basic form and function is proven, you could use Parallel Prototyping to work simultaneously on back-end coding and the front-end interface. The same goes for websites, graphical displays, and other electronics.

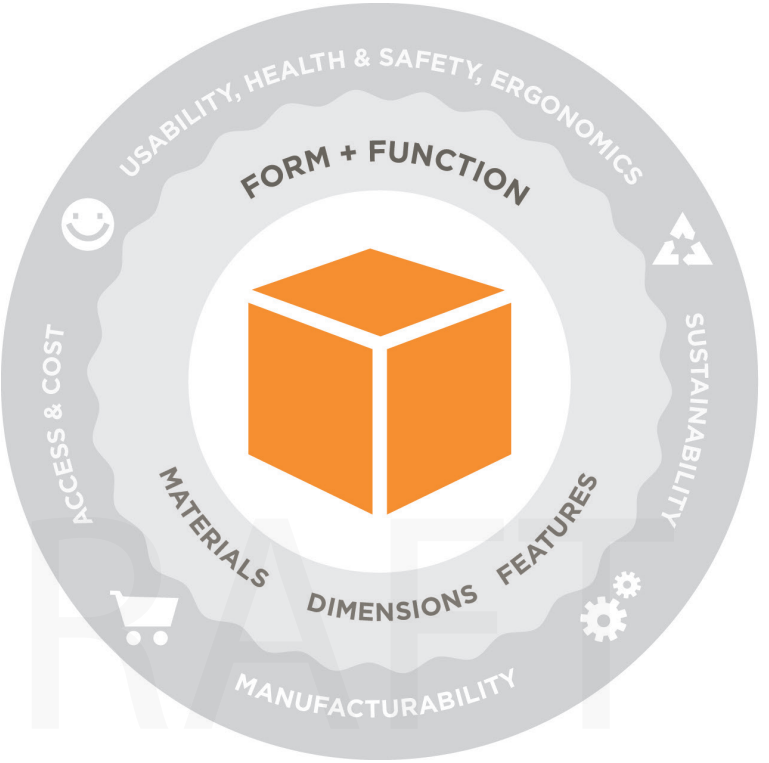
The *Seeds for Change* team prototyping their smartphone app with markers and paper.

With service-based solutions, figuring out what to prototype can be a little trickier. But, while they can feel very abstract and intangible, all services have some element of interaction with the user and other stakeholders. Likely this interaction is about communication or a transaction or both, and it must live somewhere. For instance, with a service that coordinates student feedback on dining halls in order to reduce waste, there would need to be some transaction of the feedback either through a website, app or on paper. The design of this platform would be ripe for prototyping (in the design world, user-experience design and interaction design are highly applicable to this sort of design). The system around this platform would also become a part of your prototype, since in order for the solution to work, people would need to aware of it and the dining halls would need to know how to integrate the information. Talking to stakeholders and experts can be a form of testing for such systems to see whether your team would be able to get buy-in.

Design Attitude:
GET TANGIBLE!
(even though services may feel too abstract to make physical prototypes out of, they can still be represented in tangible ways)

DIVING DEEPER INTO DESIGN

Before building a prototype, it must first be designed. At DFA, “design” commonly refers to design as a process; something more than deciding how something looks and feels, a means of understanding people and their needs at a fundamental level. The act of designing, however, is not to be overlooked. Design as a verb is about figuring out how an abstract concept is going to be brought into the world - determining the materials, dimensions, and features that will form your solution. Often the outcomes of this sort of design are things like computer models, dimensioned drawings, refined sketches, wireframes, a bill of materials, architectural plans, etc. These documents represent the form and function of your team’s solution, the two elements that traditionally define design.



Form and function are both fundamental to any design that expects to be tangibly appealing to users. How something looks and feels (i.e. materials and dimensions) and how something works (i.e. features) are what define the nature of a solution. But, form and function also inform beyond just appeal. The way something is made and shaped affects the entire ecosystem of the solution, from manufacturing to ergonomics to sustainability (see left). When using human-centered design it is important to also think beyond the user, about the other humans involved, including future generations. The following factors of design do just that:

Usability
How intuitive is the solution to use on the first try?
Does it anticipate mistakes people might make?

Human Factors (i.e. Ergonomics and Health & Safety)
Does the solution fit the physical needs of its users?
Does it consider any safety concerns? OR Does prolonged use have any adverse effects on the human body?

Manufacturability
How easy is it for the solution to be made in the desired end quantity? What sort of processes must it go through, and are they readily accessible? (Further information on page 130)

Sustainability
What environmental effects might the material choice, manufacturing technique, and energy requirements have?
What happens to the solution once people are done with it?

Accessibility
Can users with disabilities use the solution easily enough?
Are there any potential barriers to a user being able to use the solution?

Cost
How much does the solution cost to make?
Can its target users afford it?

Branding

Would branding the solution help connect its parts together?

Design Attitude:
SEEK FEEDBACK!
(your team may not be experts in something like ergonomics - seeking feedback from those who are can make your design stronger)

Taking into account so many factors to a solution can feel overwhelming, but not all need to be present in your team's first few design iterations. Testing basic form and function with users is most important at first, but later on considering the implications of these decisions will become increasingly important as you near the *Implement* phase.

BUILD PAUSE

Do we have a series of prototypes to test?

Are our prototypes specifically build to answer questions?

Do we know how we plan to test with our prototypes?

Are our prototypes at the right level of fidelity for testing?

TEST

learning how to make your solution better

TOPICS IN IDENTIFY

Foundations of Test
Being a Good Scientist
Performance Testing
User Testing
Applying Feedback

OUTCOMES OF IDENTIFY

New insights
Tangible next steps to improve a solution

◀ A Leadership Studio team testing their prototype of a kid-friendly asthma inhaler.

FOUNDATIONS IN TEST

In *Test*, the goal is to learn about how to best improve your team's prototypes. It is about answering questions, testing assumptions, and gaining new insights. Questions like "Will this work? Is this the best material? Will users like this interface?" are common sources of uncertainty while first building, and testing helps to reduce this uncertainty. Assumptions like "older adults do not engage as well with modern technologies" may or may not be true until an older adult actually uses the technology. During testing, unexpected insights such as "children are fascinated by color matching" can help gain clarity by providing new paths for future prototypes.

A team testing a ▶ prototype of a bedside mat with users during Leadership Studio

There are many different ways to go about testing depending on the types of questions and assumptions being tested, but they boil down to two main types: performance testing and user testing. Performance tests are those that test functions and features and are done in a lab setting, while user tests are those that involve a live user and can help gain insights about user behavior and preference (more on page 109 and page 111). Both are vital; your team's solution needs to work functionally

while appealing to users if it is to succeed. Both also rely upon well-thought out and executed tests, so having the mindset of a scientist will help your team get the best results.

In the end, testing, whether performance or user, can help your team move forward in a number of different ways. Applying the feedback from testing often manifests itself in four categories:

Checking Function

The simplest category, checking function tests if something you've built works in the way you intended. For example, running separate bits of code to see if they work before compiling them all together.

Choosing Among Many

Utilizing parallel prototyping, your team may want to use testing in order to decide which combination of materials, features, or dimensions work best to achieve a particular goal. Sometimes the choice actually comes from the user and their preferences, other times it can come from your team through internal performance testing.

Finding Failure Modes

In order to ensure the safety and satisfaction of your users, your team may want to find out how a part of your prototype may fail. This can sometimes be discovered accidentally when testing in other categories, or your team can purposefully push a prototype to its limits. For instance, a team testing an anti-fungal shower mat could test a material to see if it is too slippery to stand on.

Maximizing Efficiency

Once your team has decided upon a particular way of doing something, you may want to experiment with ways to make it even better. For example, a website that loads even 1 second faster is shown to increase user satisfaction significantly.

BEING A GOOD SCIENTIST

Many aspects of good testing can be summed up in the idea of being a good scientist. Scientific experimentation is often about rigor and critical thinking, and applying such thinking will help your team get the most reliable and applicable test results. At the same time, scientists generally have more time and resources to spend on their experiments than designers do on their testing. In the words of Andy Grover, former CEO of Intel, "decisions don't wait." The art of testing is to make tests that genuinely increase your team's certainty around a prototype within the shortest time frame. The following are the aspects of being a good scientist that most apply to doing so:

Using hypotheses and gathering evidence
Hypotheses propose an assumption as truth and then challenge it until it cannot be disproven. Scientists use them in order to make sure there is certain evidence towards a claim before stating it as true. Your team's prototypes are like physical hypotheses. You are hypothesizing that a particular combination of materials, dimensions, and features is going to have a particular effect on a user or function. A prototype can only be "proven" if there is evidence from testing that shows this hypothesis to be true.

This is not to say, however, that if evidence points elsewhere, the test is useless. In the design world, the mentality around testing is about answering questions rather than validating theories. Even in the scientific world, it may still be a victory if a hypothesis is proven wrong because it can lead to new types of insights and discoveries.

Simulating and modeling reality
When scientists are unable to test in the field due to proximity, scope, or funds, they use highly accurate simulations and models instead. While tests in the real world are useful as they often come up with unforeseen obstacles, building simulations or models can be much more efficient at gathering needed

information. In the design world, simulations and models happen mostly through creating test-rigs or setups in the studio.

Choosing the right variables to measure

Variables are the elements of an experiment that have an effect on its outcome. For example, the placement, color, and size of a button on an app are three different variables that can affect how easy it is to locate and use the button. In this case, there are two types of variables: independent variables, which are the aesthetic factors, and dependent variables, what are the effects of these factors. They represent the causes and effects of the experiment. There are often an infinite amount of possible variables, but the right ones are those that can prove your team's hypotheses and are easy to test.

The Right Angle team is a good example of testing the right variables. When testing their new dish rack prototype, they could have measured either the amount of food people scraped off their plates, or how long the water tap was on while washing dishes. While their intended behavior change was to encourage plate scraping, the underlying goal was to reduce the amount of water

	Without Right Angle (Control)	**With** Right Angle
Cumulative Time Spray Guns Were Used (Minutes)	301.5	162.9
Amount of Water Used (Gallons, based on 1.2 gallon/min flow)	361.8	195.4

Total Actual Savings:	166.4 gallons
Projected Annual Savings:	33,278 gallons

◀ Testing data collected by the Right Angle team.

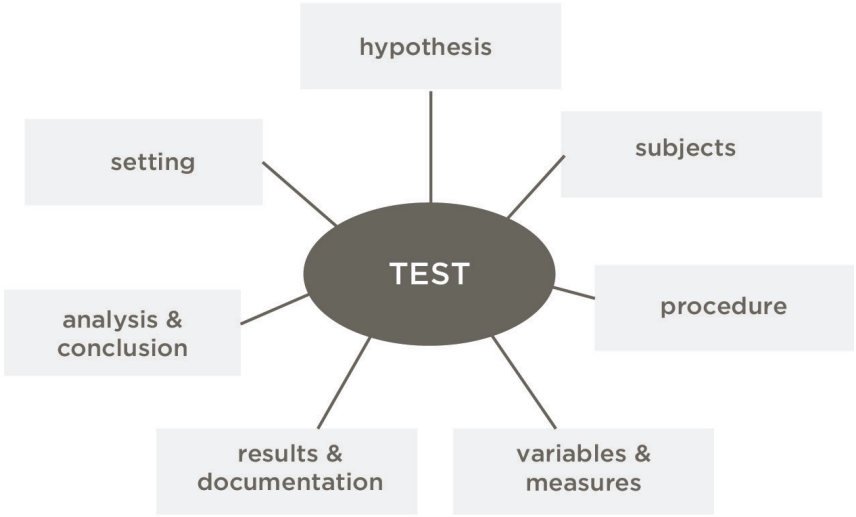
in the cleaning process. In reality, plate scraping was a variable affecting water use, so the Right Angle needed to measure both in order to be confident enough to further their design.

Measuring variables accurately

Test results have a direct effect on your team's future direction, so it is highly important for those results to be accurate. Scientists usually make sure their variables are accurate by using the best instruments and by cross-checking results. As student designers, your team may not have the luxury of expensive equipment, but you can carefully choose how to collect data and what to compare it to.

In an experiment, the results are more robust when variables are collected at multiple points in time and in multiple places in space. When the *Right Angle* team tested their prototype, testing both how much students scraped their plates and how much water was used to clean the plates off helped substantiate that their claim that the prototype works. Measuring the water flow in multiple places or over multiple days to double-check their numbers would have made this claim even stronger.

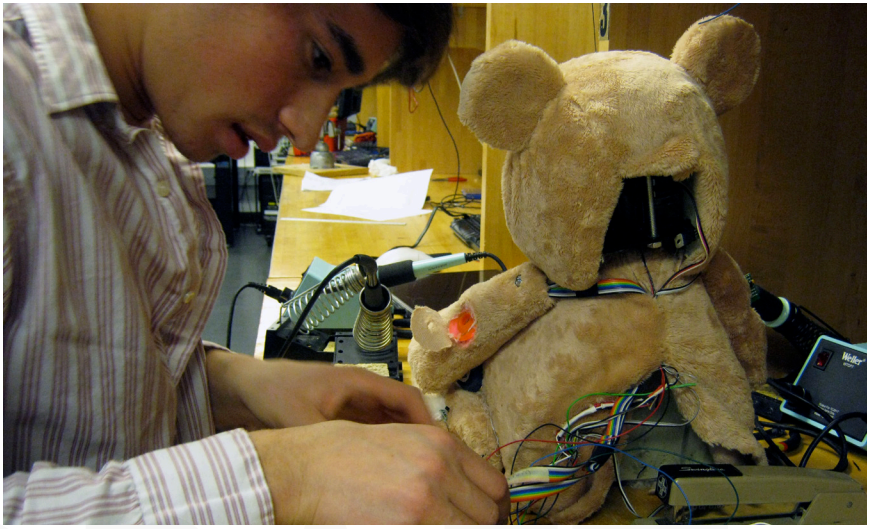
Scientists also use what is called a control variable to make sure that their data is correct and accurate. Control variables are those that are held constant because, if they changed, they could affect the outcome of the experiment in unintended ways. They are useful in order to prove that other variables (i.e. the independent variables) are the true reasons for an experimental outcome. The design equivalent is making sure to measure what happens before introducing the prototype as well as with the prototype in place, then comparing the results. Doing so will allow your team to better know for sure if your prototype has had any impact.



In addition to following the general methods of scientists, looking to them for the elements of an experiment can also be useful when designing your own tests. In preparation for a test, considering the hypothesis, setting, subjects, procedures, and variables will make sure your team is covering all the important elements (see above). In fact, thinking about your desired results at the beginning can help your team design the what and how of a test. Additionally, organized documentation is key to scientific rigor. Planning the ways your team will measure variables and document any results will make the analysis of a test much easier and more reliable.

PERFORMANCE TESTING

Testing without the user present may seem counterintuitive to the human-centered design process, but the performance of a prototype can highly affect the user's experience. Being able to use a solution without fear that it will break or malfunction is essential to user adoption. Performance testing makes sure the functional aspects of a prototype are the best they can possibly be. For instance, testing materials for how much weight they can support or trying different methods to soundly adhere two components together are important aspects of quality. They are also most quickly and easily testing in the studio by just your team. Sometimes, initial tests can also be dangerous for users, so performance testing is preferable when the safety of a user is at stake.

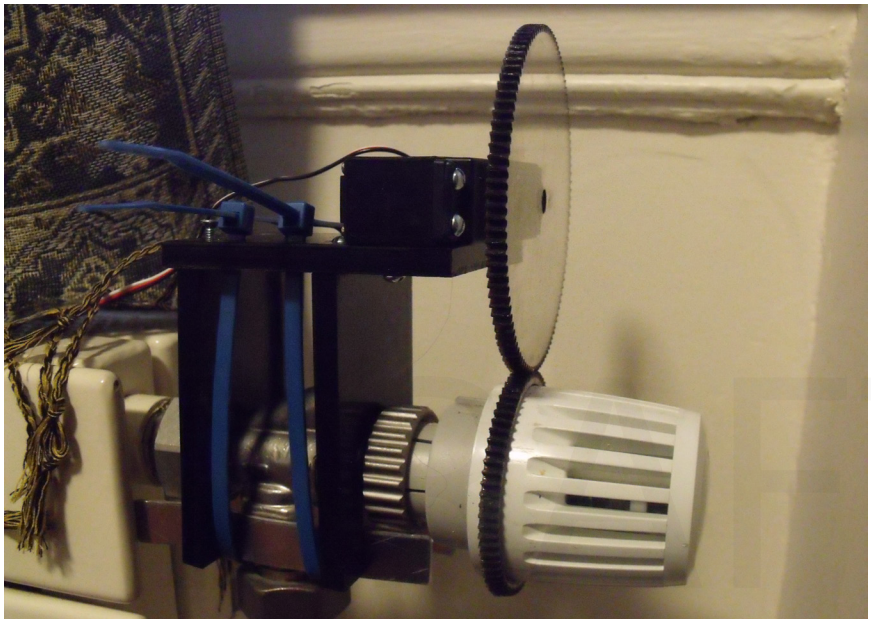


The *Jerry the Bear* ▶ team testing the electronic components of their teddy bear.

Being a good scientist usually comes more naturally in performance testing than with user testing. Performance testing is almost always done in a simulated environment, and the results are usually more quantitative over qualitative. In the engineering

world, the term specifications (or "specs" for short) is used to describe the desired list of numerical characteristics of a solution. For example, a team could specify a 300 pound weight minimum for a stepping stool or a .5 second page loading time for a website. More general measures about quality can also fall under performance testing. For instance, when SwipeSense discovered their alcohol-based gel was dissolving its container, they submerged several different plastics in the same gel and visually inspected them for damage. In doing so, they were able to isolate any variables causing the corrosion, which ended up being the particular type of plastic.

Sometimes with performance testing, part of creating a simulation means building a test rig in addition to your prototype. The key principles of *Build* are also applicable here. Your team doesn't need to spend a lot of time building up a test rig with welded metals parts if the same can be done with duct tape and zip-ties. Similarly, utilizing testing in parts, performance testing can often get split up by individual features rather than testing a complete prototype.



◀ The *Hot Dorms* team used zip ties and laser-cut gears in preliminary performance tests.

USER TESTING

How-To: USER TESTING
(for detailed steps and best practices)

Unlike performance testing, user testing is testing that is done with actual users in order to gather information about preferences and interactions. No solution can survive if it is not user tested first. It is an opportunity to put assumptions to the test and learn whether a prototype has the desired effects on a user or whether it would be adopted. Oftentimes, testing prototypes in a live environment or the hands of users uncovers unexpected outcomes, such as a new observed behavior or an undiscovered need. Without user testing, your team would not know if your solution would work in the real world. In this way, iterative cycles of building and testing are key to human-centered design.

As with all testing, user testing requires careful consideration of the settings, subjects, procedures, and documentation to get the right kind of results. There are a few elements that are specific to keep in mind when interacting directly with users:

Settings

A testing location can affect the variables you are able to monitor and the preparation required. With user testing, there are two main options: in the studio or in the field. Both have different outcomes, so a combination is usually best.

In the Studio: In user testing, a controlled space can be an opportunity to focus subjects' attention on particular interactions, choices, experiences. Your team can even create realistic enough simulations through scenery, props, and volunteers that make users feel like they are in another place. Generally, setting up in the studio is easier and quicker than doing so in the field, so it can be especially helpful early on in building and testing. It can also be a safer environment for your users, or let your team more easily capture data.

In the Field: Field testing, as it relates to user testing, is necessary for seeing if the concept fits into the larger

ecosystem and relates to the many variables a user will encounter. Sometimes finding the right setting can be challenging if you need the permission of patrons or visitors. But, the benefits often outweigh the work it takes to set up, as unexpected opportunity gaps or thwarts can be revealed. Pivoting after field testing is not uncommon.

◀ The *Fruit Buddi* team first user tested in the studio by creating a mock supermarket. In later tests, they moved to an actual supermarket nearby.

Subjects

Depending on the setting of a test, your team may need to recruit or reach out to users. In planning for user testing, it's also helpful to consider the number of users you need to properly test the scenario and what expectations you have for these individuals. A common approach is to think about extreme users - users who lie on the extreme ends of a characteristic spectrum. For instance, a team creating a solution for elderly adults might test with subjects who are particularly strong and those who are particularly fragile, in addition to those with average strength. Setting expectations around the physical capability, busy schedules, ability to focus, etc. of users helps both parties have the best experiences. Occasionally, financial or other compensation is expected by users and can be a good way to recruit.

Procedures

Much like user research, user testing encompasses a number of techniques. These techniques allow your team to facilitate

the interactions between a user and a prototype so that you can be sure to get quality results. Sometimes facilitation is very directed in order to be efficient with time and specific with the type information returned by users. Other times, facilitation is purposefully minimal in order to be the most realistic as possible. The differences are akin to the distinction between interviews and observations in user research (more on page 38).

What is the same for all techniques, however, is consistency of facilitation; certain phasing or structure can sometimes lead a user to give different responses. Confirmation bias is when a facilitator either knowingly or unknowingly prompts a user towards a desired answer. It is the opposite of the scientific method. Even facial expressions or tone can indicate certain biases, so it is sometimes helpful to have someone from outside the team conduct user testing sessions. Separation between the prototype and the facilitator can also enable users to give a more honest critique as they don't have to worry as much about hurting a designer's feelings directly. Outsides facilitators take time and expertise to set up, however, so facilitating in-house is often done early on.

The following represent some common techniques that DFA teams and professional designers use to test their solutions with users:

Interviews & Focus Groups: Question-based interviews allow your team to query the user regarding their thoughts and feelings about your prototype. Focus groups are when this is done in groups rather than individually, and can be great tools for getting instant feedback.

Think-alouds: Think-alouds are a technique that encourages users to speak their stream-of-consciousness thoughts as they interact with your prototype. The hope is to elicit feelings or opinions they might not vocalize otherwise.

Observations: Watching how a user interacts with your team's prototype can reveal functions or features that aren't

clear to your user. Some of the same methods from user research can be used (see page 38).

Task & Time Studies: One measure of usability is the time it takes for a user to complete a process or task. Identifying tasks that require more time than expected is one way to learn how to improve a prototype.

◀ A team at Leadership Studio observing a child using their prototype of a new inhaler.

Documentation

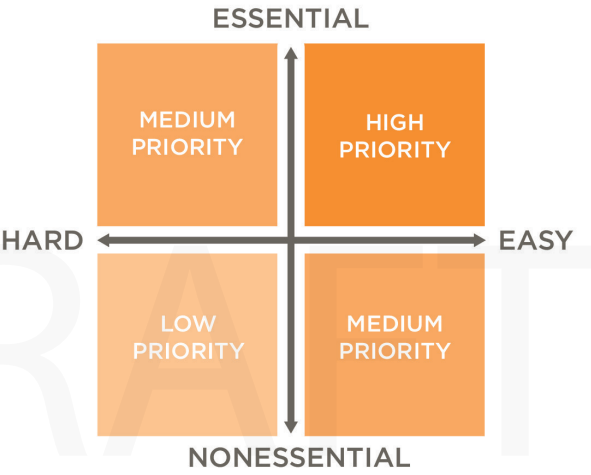
Performing tests without capturing data well is practically useless. But, sometimes the richest form of capturing information is too intrusive or distracting for the user. The goal is to get the best information without taking away from the quality of that information by disturbing the user. It must also be easily reviewing by your team. For example, a video recording of a test session can clarify and capture missed information. It does, however, takes a long time to set up and navigate afterwards, and users may feel under pressure if there is a video camera present. Taking photos and hand written notes on the side may be less intrusive, and are likely easier to go through afterwards.

APPLYING FEEDBACK

Design Attitude:
ITERATE FURIOUSLY!
(even though *Ideate*, *Build*, and *Test* are three separate steps, it's expected that your team will run through them many different times)

After each round of testing, your team will have amassed a wealth of information that needs to be digested. Similar to synthesis in *Immerse*, figuring out what information is most important can be daunting, especially if results are conflicting or ambiguous and require further testing. Going through notes and other documentation, your team can use information synthesis techniques to find insights that indicate something needs to be changed (see page 46). For instance, a team that tests a web app may find their users did not know how to get back to a home menu, so a more visible menu is clearly needed. Other insights may not be as apparent, but herein lies the beauty of building and testing rapidly: your team can create multiple options to fix an apparent problem and see which one sticks.

In the case of having many changes to make, deciding which ones to make can be a source of healthy disagreement or anxiety. While different data may have different applications - like changing certain functions, ruling out various options, improving failure modes or increasing efficiency - their priority lies in two characteristics: necessity and ease.



Necessity: The necessity of a change is determined by the degree to which a user would be positively affected by it, as well as the number of users who would benefit. A high necessity change might be removing or redesigning a feature that confused all of the users your team tested with. Be mindful, however, that some individuals or prototypes might be outliers and therefore not represent the majority of cases.

Ease: The ease of a change corresponds to the amount of time and effort it would take to make. Here, the focus is on making changes that require the least investment of your team's resources but still improves the quality of a design.

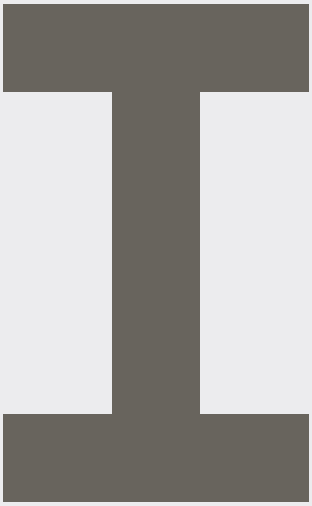
TEST PAUSE

Have we done both performance and user testing?

Do we know how we are going to improve our prototypes?

Were our tests good enough replicas of reality to yield good results?

Did we make sure to avoid biases while testing?



IMPLEMENT

WHY IMPLEMENT?

PLAN PROVE SUSTAIN

The *Implement* phase is about creating sustainable impact with your solution. In DFA, getting to a proven prototype is a big achievement, but the end-goal is getting solutions into the hands of users for the long-term. Doing so requires thinking about how a solution will be delivered, how the project will be supported financially, and how to measure its impact in the world. In many ways implementation is similar to designing the solution itself; your team will research, ideate, build, test, and iterate away. The difference lies in the lenses through which you approach these actions. In *Implement*, money becomes much more important. While making money is not the end goal of a DFA project, there is a shift from thinking about "users" to thinking about "customers." Without funds it becomes nearly impossible to bring a solution into the world. Similarly, thinking about delivery, strategic partnerships, and measures of success are important to the system around a product or service. They describe how your team's solution will survive in the real world.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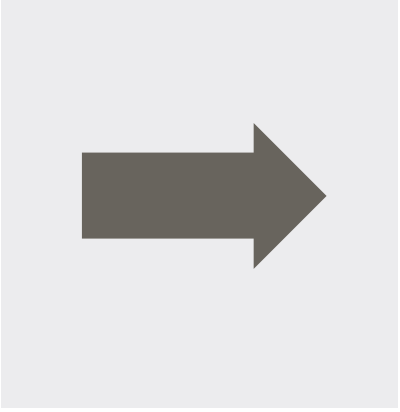
In order to begin implementing a solution, two things are needed: a great prototype and a great team. A great prototype is one that has been iterated on many times and validated by users and experts. This normally happens over multiple cycles of Build and Test. A great team is one whose members are dedicated, passionate, and fearless. They embrace ambiguity and are willing to take a few risks to make things happen. Sometimes this can mean taking the time and energy to learn new skills that the project needs. Other times it can mean devoting a few years after graduation to the cause. Whatever the need, your team is in it for the long-haul.

Because of the level of commitment required for Implementation, it can be common at this point for team members to shift around. Sometimes expectations change over time, which is a very natural part of the process. Having a discussion about team members' future goals and how your project fits in with these goals will help your team align expectations (taking a look at the different implementation approaches on page 128 may be helpful). Some team members may wrap-up their involvement, and establishing how they will be recognized later on is integral for future clarity. Sometimes new members are needed with the right skills to continue a project. For those staying on and any new members, re-visiting a team charter can get your team ready to work together on the adventure that lies ahead.


For Profit
Providing
+
P.R.
Similar Models
Business Model Canvas
Designed for:
Designed by:
Mission:
Key Activities
Iterating Products to incorporate customer Insights
Curating + Generating Content
Key Resources
Robot human Interaction experience
Network of Diabetics
Value
Alleviate stress to Pressure on Parents
Ease transition into Diabetic Life
Diabetes Education through... PLAY!
Early access to potential life time Users
Customer Rel
Products Co-create w/ Parents & T1D Kid
Mutually Beneficial Advertiser
credibility
Product Placement for Device Companies
Channels
Online Shop
Non-profit Distributers
Customer Segmer
PARENTS
Children w/ T1D
Medical Device Companies
Content Generators
Blogs / Forums
Medical Device Companies
R&D
Production
Revenue Streams
$$$
Books
APPS
Web
Affordable Solutions for multiple income levels
Tool Kit
Cook books
Jeep adventures
Shopping apps
Product Placement
Bear - 175



PLAN

designing how to actualize a solution

TOPICS IN PLAN

Foundations of Plan
Choosing an Implementation Approach
Developing an Implementation Model
Developing Short- and Long-Term Timelines

OUTCOMES OF PLAN

Implementation Models to Test
A short-term Timeline
A long-term Timeline

◂ The *Jerry the Bear* team developing their implementation model using the *Business Model Canvas*

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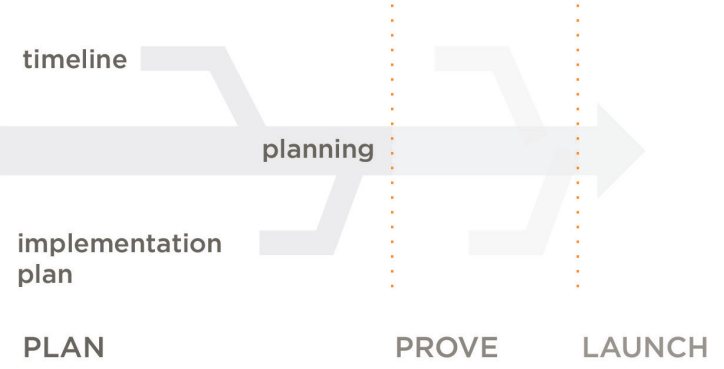
FOUNDATIONS OF PLAN

The goal of *Plan* is to figure out how a solution gets into the hands of users. It's a time to paint the picture of what the system around your solution will look like and the steps that are needed to get there. This information is vital not just for the sake of the solution, but also for providing enough structure so that others can be confident in supporting your work. There are two main types of plans that are integral to project success. First, an implementation model is an outline of the delivery path of a product to its user, the financial system around the solution, and the value proposition for customers. Second, timelines, both short-term and long-term, explain how your team plans to achieve the goals laid out in the implementation model. Knowing these details will allow your team to start gathering the initial funding and support network needed to test with customers.

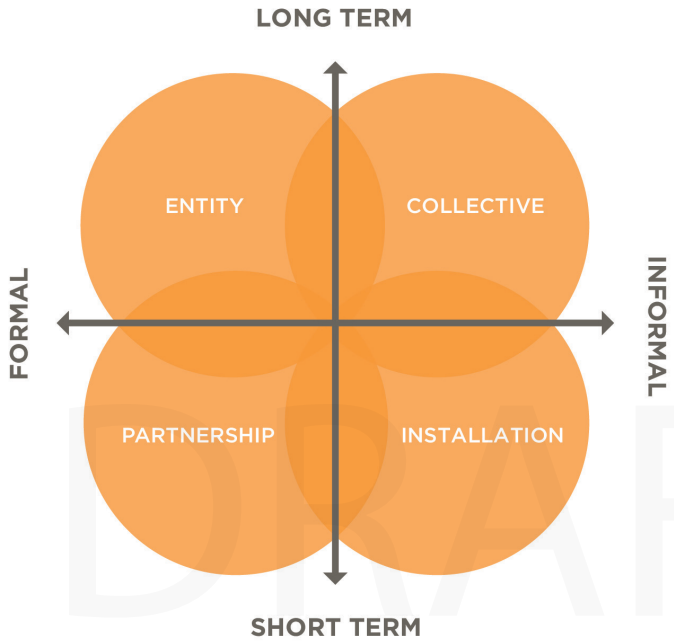


While *Plan* is, of course, all about planning, this doesn't mean that initial plans can't change down the line. In the words of Dwight D Eisenhower "plans are useless, but planning is indispensable." Utilizing the spirit of iteration, your team should be confident enough in a particular plan to move forward, but flexible enough to change it as the need arises. Testing out multiple plans at once will also help find the best one.

CHOOSING AN IMPLEMENTATION APPROACH

Before starting to work on an implementation model, it is important to first decide what approach to take. If some team members think that starting a business will best deliver your solution to its users, but others believe working within a partner organization is best, developing future plans will be difficult. Ultimately, implementation approaches can be categorized by two spectrums: the duration of time a solution takes to setup and the level of formality of doing so. A long-term approach generally means the team is committed for at least two to five years, while short-term approaches usually last around six months to a year. A formal approach implies that a designated group of people is working on the solution for a good percentage of time and likely for pay, while an informal approach relies more on individuals who are volunteering their time.

How-To:
CHOOSING AN IMPLEMENTATION APPROACH
(for detailed steps and team activities)



◂ Implementation approaches can lie across different categories and can change over time

How-To:
FILING LEGALLY AS A CORPORATION
(for different corporation types and their logistics)

When combining these spectrums, four main implementation approaches arise (see previous page):

An Entity: A legally recognized institution such as a non-profit or a corporation. There are different types of corporations based on their tax status; in the past, DFA projects have gone on to become LLCs (limited liability corporations) and C-corps. For example, *SwipeSense* and *Jerry the Bear* are for-profit entities planning to be self-sustaining.

A Partnership: When a set of concepts, insights, prototypes, or plans are packaged and given to an organization or institution to incorporate into their future work. For example, The *Melo* team is developing an interactive tool to help calm children with autism. They could hand-off this concept to their community partner to install in one of their classrooms.

A Collective: A number of volunteers actively engaged in using and sustaining the solution over time. For example, the *Empathy Box* team created a traveling box and online platform for families experiencing autism to share their stories. They could sustain updating the website and collected the boxes through a community of volunteers.

An Installation: When a solution is put into place by your team for a particular location and period of time. For examples, the See[K] team installed a series of signs in their nearby downtown in order to encourage walking and cycling.

Choosing a direction depends on both the personal goals of team members and what is best fit for users and customers. Figuring out the former takes some introspection, while the latter likely takes some contextual thinking. What's best for users likely depends on things like where they tend to gather or travel to and any preconceptions they may have of different organization types.

DEVELOPING AN IMPLEMENTATION MODEL

An implementation model is most important part of the *Plan* step and perhaps *Implement* as a whole. It is where your team articulates how your team's solution will actually be brought into the world, no matter what approach you decide on. The idea behind an implementation model is both internal and external; it is partially a tool to help your team ideate on the system around your solution, and partially a way to communicate your plans to outsiders who may want to support your project. Correspondingly, having a good implementation model can make or break a project's success. Luckily, the ethos of the design process still holds - your team likely won't find the perfect implementation model on the first go. Coming up with multiple models, talking about them to experts, and testing them out with customers is vital to the iterative development of an implementation model. It is very much like the cycles of *Ideate*, *Build*, and *Test*, only this time your prototype is a plan written down and visualized on paper.

◀ The different components of an implementation model.

In the business and design worlds there are many different ways to communicate an implementation plan. Methodologies like "The Lean Startup" and tools like the "Business Model Canvas" are popular today and can be very useful for your team. But, no

How-To:
USING THE BUSINESS MODEL CANVAS
(for detailed steps and a plan outline)

matter how your team coveys your implementation model, there are a few key elements to them all:

Customers and Stakeholders

Customers are key to an implementation model because they are the main source of funding for a project. While a user is the person who primarily interacts with a solution, the customer is the one who pays for it. In this way, users and customers are not always one of the same. For instance, the *Fruit Buddi* team created a shopping cart attachment meant for children to use, but the parents or the local grocers are the ones paying for the actual product. With other projects, the customer could even be a foundation or group of people looking to support the cause your solution addresses.

A stakeholder ▶ map of potential customers for the *Fruit Buddi* Team.

Since a customer could be anyone of your stakeholders, reviewing and updating your project's stakeholder map is an important step in identifying potential customers (see left). In Implement, the stakeholder map also becomes a way to define the key activities needed for your solution to reach your customers. These might include: how your customer learns about the solution, evaluates it among multiple options, chooses to acquire it, and is contacted by your team over time.

Value Proposition

A value proposition is a statement about why a solution should exist and how it addresses an unmet need. It articulates not just how the user benefits, but also how customers benefit. Clarifying value is vital to convincing others to support your solution, and defining it involves weighing the costs and benefits of a solution. There are a variety of ways that to do so that look at what already exists in the world:

Market Analysis: Looking at the number of potential customers there are and the extent to which your team's solution can help them save time, money, or other resources.

How-To: MARKET ANALYSIS (for detailed steps)

Competitive Landscape: Identifying similar solutions and highlighting how your team's solution or implementation model is different and better.

How-To: COMPETITIVE ANALYSIS (for detailed steps)

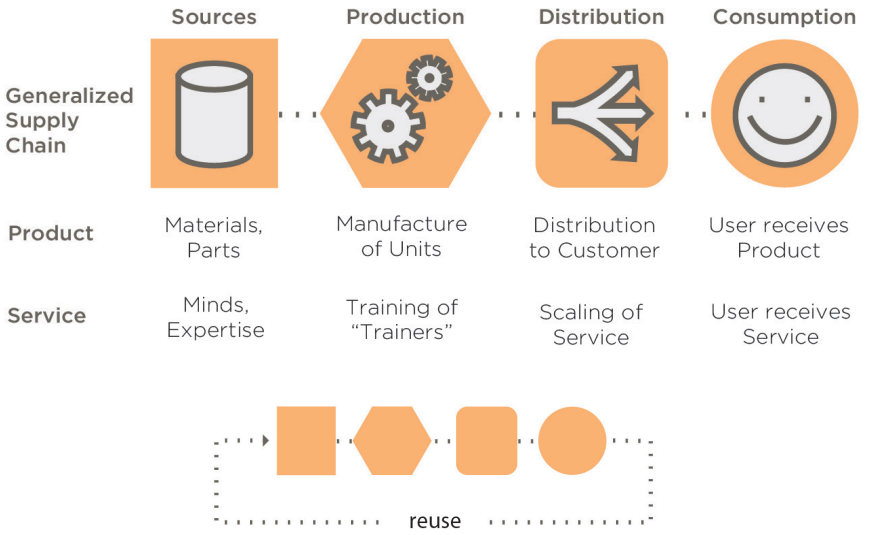
Intellectual Property: Both looking at what has already been patented (legally protected by the United States government) and what patents your team might file for. If a concept, process, or technology does not currently exist, patenting it might increase your solution's value and give your team legal protection.

How-To: INTELLECTUAL PROPERTY (for detailed descriptions and steps)

Supply Chain and Delivery Channels

A supply chain is a series of pathways that maps out the materials, information, and people needed to produce a solution and deliver it to customers or users. There can be any number of different pathway types, so every supply chain will look a little bit different. For physical products, questions like "who builds the

product?", "where do the raw materials come from", and "how does the product get from the manufacturer to the customer?" are good places to start. For services, questions like "how will people know about the service?", "who is training the users?", and "what are the communication paths within the service?" are key. It can also be worthwhile to look at existing services to leverage so that your team can be as efficient as possible. Regardless of the type of solution your team has, supply chains generally follow the same organization:



The places where human lives and the environment might be affected are also important elements of a supply chain. The terms closed-loop and cradle-to-cradle refer to systems where a product's materials can be broken down and reused to create more products of the same kind. This way there is little to no waste beyond the resources needed for manufacturing (the opposite would be cradle-to-grave, where materials end up in a landfill).The inspiration for such thinking comes from self-sustaining ecosystems in the natural world, where the waste of one organism becomes the food of another. With your team's solution, considering where it goes after consumption can make a more complete supply chain.

Revenue Streams & Compensation

While money is already a key consideration with customers and supply chains, revenue streams are clear-cut ways to articulate where the money that keeps your solution running comes from. For many projects, money is needed to purchase materials and manufacturing processes, pay any employees, and maintain a space and operations. For projects that are volunteer-run, money may be less of a concern, but finding a way to compensate people for their time and effort is still important.

Revenue, the income an organization receives, can come from many different sources. Choosing the best ones requires thinking about the type of your team's solution and its stakeholders. In general, there are two types of sources of revenue: from customers and from periphery groups.

Revenue from customers is good for when the customers are the users or are stakeholders very close to the users. Some cases include:

Direct Sales: Selling your solution to customers either at a retail location or through online sales.

Fees for Service: Customers paying for ongoing support or access to your solution.

Revenue from periphery groups is good when users cannot, or will not, be the customer, and other stakeholders are unavailable for funding. Some cases include:

Sponsorship: Engaging with corporations to fund your work in exchange for marketing or some type of returned value.

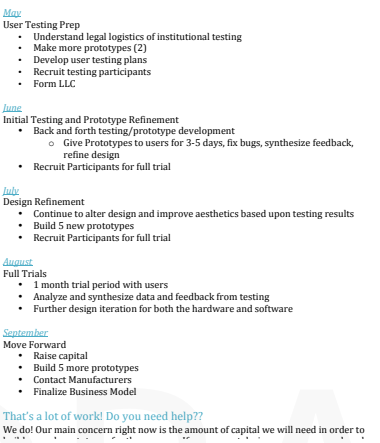
Regular Fundraising: Engaging the community to donate funds on a regular basis.

Long-term or Recurring Grants: Applying for funding from foundations or organizations on a regular basis.

DEVELOPING IMPLEMENTATION TIMELINES

An implementation model is only useful if your team has a plan to turn it into a reality. Timelines are good ways to organize the actions that are needed to proceed forward. For implementation, there are two main types of timelines: short-term and long-term.

Short-term timelines look at the next few months and describe specifically what the team is going to accomplish. They likely involve things like talking with stakeholders, further prototype testing, testing with customers, legal activities (intellectual property or incorporation), applying for funds or incubators etc. It is an opportunity to discuss what success looks like at an immediate level and highlight any key milestones, deliverables, and deadlines. Furthermore, it can help keep the team accountable and communicate key dates to mentors and partners.



May
User Testing Prep
- Understand legal logistics of institutional testing
- Make more prototypes (2)
- Develop user testing plans
- Recruit testing participants
- Form LLC

June
Initial Testing and Prototype Refinement
- Back and forth testing/prototype development
  - Give Prototypes to users for 3-5 days, fix bugs, synthesize feedback, refine design
- Recruit Participants for full trial

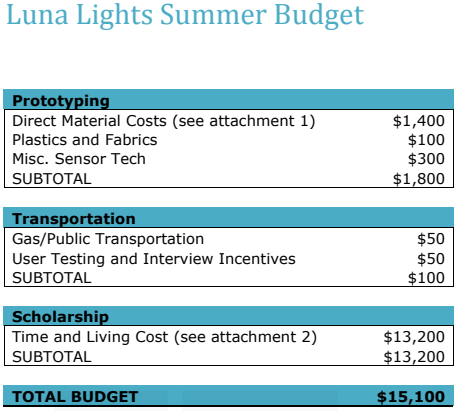
July
Design Refinement
- Continue to alter design and improve aesthetics based upon testing results
- Build 5 new prototypes
- Recruit Participants for full trial

August
Full Trials
- 1 month trial period with users
- Analyze and synthesize data and feedback from testing
- Further design iteration for both the hardware and software

September
Move Forward
- Raise capital
- Build 5 more prototypes
- Contact Manufacturers
- Finalize Business Model

That's a lot of work! Do you need help??
We do! Our main concern right now is the amount of capital we will need in order to

Project short-term timelines for the *Luna Lights* team ▶



Luna Lights Summer Budget

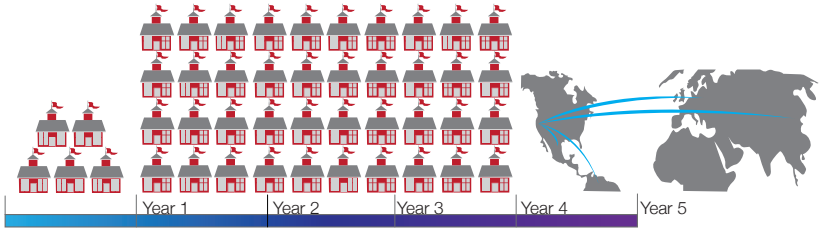
Prototyping	
Direct Material Costs (see attachment 1)	$1,400
Plastics and Fabrics	$100
Misc. Sensor Tech	$300
SUBTOTAL	$1,800
Transportation	
Gas/Public Transportation	$50
User Testing and Interview Incentives	$50
SUBTOTAL	$100
Scholarship	
Time and Living Cost (see attachment 2)	$13,200
SUBTOTAL	$13,200
TOTAL BUDGET	**$15,100**

A long-term timeline looks more at the perspective of the project than of the team, and it accounts for 1-5+ years down the line. It describes the big-picture milestones of your solution

and the future impact it will have. Oftentimes there are specific numbers projected about the quantity of locations involved, individual solutions delivered, and people impacted. It might also show plans for measuring that impact or the cycle of applying feedback. Overall, the value of this type of timeline is communicating to outsiders a greater vision that is grounded in reality.

Social Impact Baselines and Milestones

Through implementation of Melo, we hope to find that children with autism show improved interaction skills. This will be measured by professionals with backgrounds in behavioral therapy and based upon established objective criteria.



THE FIRST YEAR
During the next year we will implement our product in five local specialized schools. Each year we will evaluate our rate of impact with the aid of autism experts.

OVER THE NEXT 3 YEARS
Over the next 3 years, we will enter 40 classrooms on the west coast affecting approximately 400 children. We will continue to measure the success of Melo.

5 YEARS FROM NOW
5 years from now, Melo will have success in U.S. markets and we can look to foreign markets where autism rates are also high. Though similar technologies exist, there are no products that apply directly to autistic children in a classroom setting.

◀ Team *Melo's* "Roadmap for Success" when applying to the Dell Social Innovation Challenge

PROVE PAUSE

Have we agreed as a team on an implementation approach?

Do we have a couple of implementation models to test?

Are our timelines reasonable and understandable?

Are we excited about our next steps?


DESIGN for AMERICA

PROVE

verifying your solution adds value to the world

TOPICS IN IDENTIFY

Foundations of Prove
Gathering Resources
Pitching
Testing Your Implementation Model

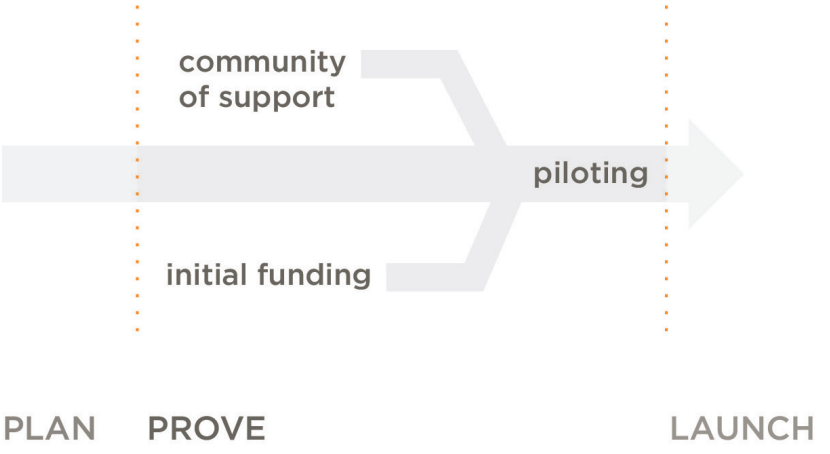
OUTCOMES OF IDENTIFY

A strategic network
Initial funding
A clear understanding of your customer
Insights from piloting and testing

◂ Aaron Horowitz of *Jerry the Bear* pitching their solution at *TEDx Providence.*

FOUNDATIONS OF PROVE

In *Prove*, the goal is to put implementation models to the test and scale prototypes through piloting. Doing so gives your team valuable insights to improve them both, and it provides the proof needed to convince others to join your cause. Such testing requires two things: a good amount of initial funding and a strategic network. Money helps with the upfront costs of testing, while mentorship and guidance help put that money to the best use. In order to apply to funding sources and win over partners, though, your team needs to tell a compelling storying. Pitching, building an online presence, and branding your solution are all important parts of engaging with the public. By the end of *Prove*, your team will hopefully have a prototype and surrounding system that is ready to launch.



GETTING INITIAL FUNDING

How-To: FUNDING
(for tips and activities)

Before starting to gather regular revenue from customers, your team likely needs some sort of initial funding to support testing your implementation model and prototype. An implementation model may not need money to buy materials like a prototype does, but it still requires precious time and effort, which may need compensation. As opposed to the revenue streams in an implementation model, initial funding lasts a finite period of time and can be classified by the duration and depth of support:

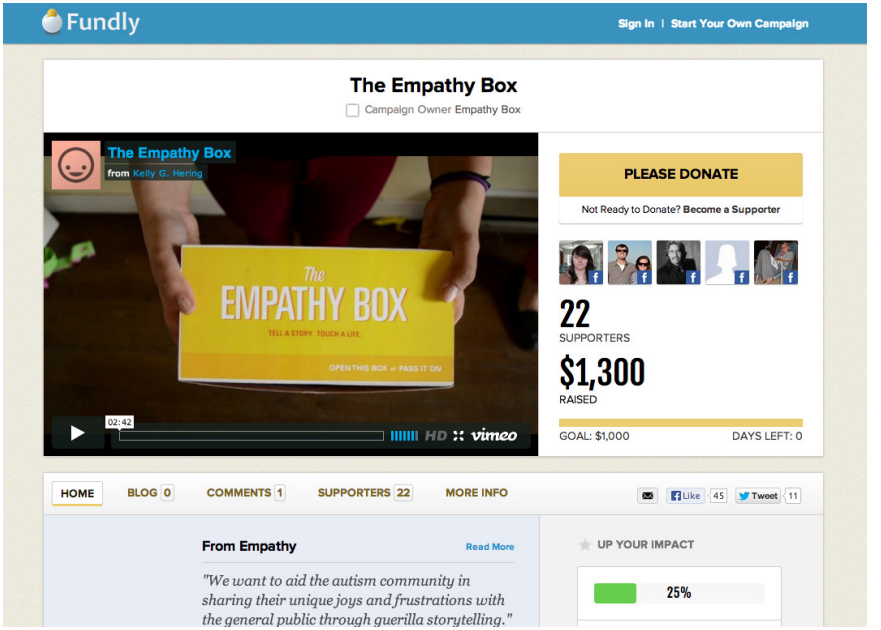
Immediate Funds
Funding that happens at one point in time and raises anywhere from a hundred to a couple thousand dollars.

Swag Sale: Selling things from t-shirts to baked-goods is an easy way to raise a few hundred dollars. Connecting what your team sells to your solution is a good way to also get free publicity.

Campus Grants: Schools sometimes offer small grants for projects that can help cover things like direct material costs or travel to an important conference.

Competitions: Online platforms, such as the *Pollination Project* or *DiabetesMine*, often call for proposals in a specific project domain and give cash prizes. Applying to competitions is also a great way to gain publicity for your team's work.

Crowdfunding: Online sites like *Kickstarter*, *Fundly*, and *Indigogo* are great for engaging a larger community in fundraising. It's good practice for projects to give small gifts to backers who donate certain amounts.



The *Empathy Box* ▶ team's Fundly profile; they raised well over their goal of $1,000

Holistic Support

Sources that give mentorship and guidance (and sometime space) in addition to money over a longer period of time.

How-To: PREPARING FOR INTERVIEWS (for detailed steps and techniques)

Incubators: Programs that provide space, mentorship, and sometimes funding for project teams to work through early stage concepts. There is often a set entrepreneurship curriculum and they may provide services such as legal, marketing, or human resources.

Seed Accelerators: High-intensity programs lasting six weeks to six months that look for concepts with market viability and end with a "demo-day" to potential investors. There is less direct support in terms of mentorship and upfront resources, but the peer pressure buzz helps projects develop quickly.

Competitions: Some online competitions, like the *Dell Social Innovation Challenge*, engage teams over multiple

competition rounds and give mentorship in addition to money.

Fellowships: Programs that support the pursuit of a research or implementation project in a particular domain. Beyond funding, they also can connect your team with a broader network of fellows.

Investors: Angel investors and venture capitalists are individuals who specifically look for teams with good ideas to give money to. In exchange for their money, they often own a part of the future success of a solution. Investors are often involved when an entity is getting ready for a product launch, but can sometimes give money before piloting if a solution is particularly promising.

A timeline of *Jerry the Bear*'s financial support

DEVELOPING A STRATEGIC NETWORK

In addition to money, mentors and partners can be a huge resource. There are likely a number of people who are already in your team's network, but in *Implement* it is especially important to formalize these relationships. There are a number of different types of supporters your team might have, from those that help with networking and gaining credibility to those that help improve prototypes and find funding. Clarifying the roles of individuals can help increase pride and accountability.

In DFA, a strategic network usually consists of the following types of people:

How-To:
FORMING COMMUNITY PARTNERS
(for detailed steps and templates)

Community Partners: These are the people who helped your team access users and experts during Understand and Create. In Implement, they can help you gather users for piloting and connect you with potential customers.

General Mentors: These are mentors that understand the design process and are good at troubleshooting and knowing what to do next.

Domain Advisors: These individuals are able to give more specific guidance in a particular area. This might include logistical aspects such as legal or technical advice, or topic-specific advice in an area like healthcare or water conservation.

Implementation Partners: With the introduction of an implementation model, there are many people that become involved in your solution's system. Sourcers, manufacturers, and distributors are integral to a solution's success and including them formally in your network can help build rapport.

Board of Advisors: A board of advisors is a group of individuals who are the official guides and visionaries of a project. They are the people who have a personal interest in your project and for who your team has the greatest respect. A board of advisors is different from a board of directors in that they hold no legal power, but there is little point in having a board if your team does not heed their advice. Beyond advice, a board of advisors can also bring credibility and respect to your project.

Building these relationships takes time and effort but can be just as important as working on a prototype. The same principles behind forming community partnerships can be applied to developing a strategic network.

How-To: NETWORKING
(for tips and activities)

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TELLING YOUR STORY

In order to actually win or be accepted to a funding source, the world must be able to learn about, and be convinced by, your team's solution. This means telling your story through a number of different outlets: verbal pitches, an active online presence, and a strong brand identity. The goal is to simultaneously explain your solution while inspiring the audience to rally in support.

pitching

online presence

branding & identity

How-To: PITCHING
(for detailed steps and templates)

Verbal Pitching

The most traditional communication form, the art of pitching is when your team uses spoken or written words to tell your story. Visuals are important to supplement what is being said, but the flow and structure of a pitch is what takes the most craft. Formal pitching takes place at events like competitions or conferences, but off-the-cuff pitching can happen at any moment (think of the term elevator pitch). Accordingly, it's never too early to plan a pitch, and there are a few key principles to keep in mind when doing so:

Design Attitude: TELL STORIES!
(in a pitch telling stories is particularly important to draw in your audience)

Tell a story: In the classic elements of a story there is a main character, a problem she faces, and a resolution. The audience builds empathy towards the character and intrinsically wants her to succeed. Similarly, a good pitch focuses on the story of your project's users, the problems they are facing, and how your solution will help them resolve

it. Good stories tend to have a hook at the beginning to draw in their reader and some sort of conclusion or call to action. With pitching, considering how to start and finish is crucial.

Share a vision: Painting a picture of a future that contains your team's solution can give the audience a lucrative taste of what could happen if they were to would help. The best method is comparing the utopic vision your solution provides to the current, unsatisfying state of affairs.

Know your audience: Just like when designing an actual solution, designing a pitch should be focused on your user, i.e. the audience. Knowing why the audience members are in the room and what their motivations are can help your team craft a pitch that will draw them in.

Include a call-to-action: When listening to a pitch, audience members like to personally connect with a project. A call-to-action is a direct ask to the audience for some form of support. Common asks include funds, mentorship, or helping to spread the word.

Don't forget:
KEEP OPTIMISTIC!
(most projects have to pitch their story dozens or even hundreds of times before reaping the benefits)

◂ The *SwipeSense* team delivering their pitch at *Common Pitch Milwaukee*

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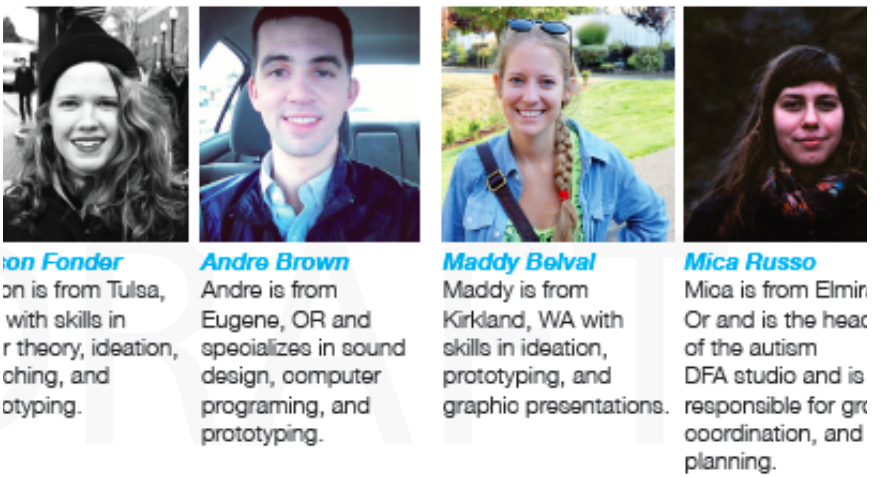
Online Presence

Project teams often keep a blog of their early stages of the design process, but in *Implement* a website and social media outlets dedicated just to your team's solution become far more important for publicity. If a person hears a great pitch of yours, they will want to be able to find out more online. As with any design, your online presence should reflect the qualities and feel of your solution. Giving off an air of professionalism and aesthetic prowess can go a long way with potential supporters.

On a website, there are a few basic elements to in mind including a basic "about" section, a place for news and updates, and a contact form. Some may even have a donate button or links to follow on social media. But, the two most important parts of a website are the descriptions of your team and a product showcase:

> **Team Description**: Highlighting your team builds credibility and increases the chance that others will help you get to where you need to go. People are looking for whether you have the appropriate skills, resources, and attitudes to pull off your proposed work. Including a brief bio may also help potential supporters find a personal connection, such as a common alma mater or hobby.



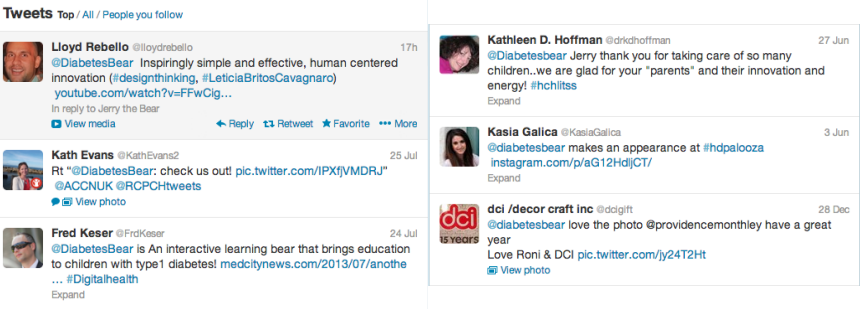
The *Melo* team lists ▶ short descriptions for each team member on their website

Product Showcase: A well-rendered or photographed image of your solution can go a long way. It helps your audience take your project seriously and communicates that the solution is very close to being implemented. Coupled with slap stats of the problem your team is trying to solve and the projected impact your solution could have, a series of compelling images can go further than a dense paragraph of text. One thing to keep in mind, however, is intellectual property. If your team is applying for intellectual protection, it may be wise hold off on publicizing the details of your concept until the paperwork is through.

◀ High-quality images on *SwipeSense* (left) and *Jerry the Bear* (right)

In the modern world, social media can be just as important as a project website. For example, *Jerry the Bear* found that their publicity rates significantly increased when they began to use the twitter handle @diabetesbear. They bear is now commonly mentioned on parenting blogs and health news sites. While it's easy to feel like its silly or that your team has more important things to do, investing in updating a Facebook page, Twitter account, and Instagram can go a long way when getting the word out about your solution. There's a fine line between self-promotion and social media use. Balancing your team's updates with useful content regarding the problem you are trying to solve is a great way to build thought leadership and attract users in an authentic way.

Tweets about ▶
Jerry the Bear



Branding and Identity

How-To: BRANDING
(for principles and further examples)

A project's brand is a visual manifestation of its identity. It usually consists of things like a product name, logo, font, color palette, and graphical style. These elements live on your team's website, business cards, t-shirts etc. Having a brand gives your project a way for others to quickly identify and rally behind it. Accordingly, a good brand conveys the personality of a solution at a glance. There are an infinite amount of ways to put together a strong brand, but here are a few examples from existing DFA projects:

SwipeSense uses a hyper-realistic rendering along with clear-cut graphics on the front page of their website (see left). It gives a no-nonsense feel while also being modern and easy to understand.

fruitbuddi

enabling children to make healthy decisions in the grocery store

The *Fruit Buddi* logo (above) calls to mind the colors of fruits like apples and oranges and uses a font that is kid-friendly but professional. This makes sense considering their solution is aimed at getting children to eat more fruits and vegetables.

Don't forget:
SEEK HELP!
(if your team doesn't have the graphic design skills to create your brand, there are many talented people in the DFA network who would be happy to help)

Jerry the Bear created these bold and adorable t-shirts (above) to wear at events and give out to supporters. The bear icon is easy-to-recognize and can be easily transferred to other items like stickers, business cards, and even tattoos.

TESTING IMPLEMENTATION MODELS AND PROTOTYPES

In *Implement*, testing goes beyond just checking that a prototype works with users; it is making sure the prototype is suited for many users over a long period of time and testing the implementation model that surrounds it. All of the principles from *Build* and *Test* are still used here; iterating rapidly and repeatedly, building at minimum fidelity, building in parts, keeping rigorous and scientific with tests, etc. (more on page 89 and page 105). What differs is the scope and scale of testing.

While your team's prototype has already been tested and iterated on, it likely has only been tested in simulations or with limited amounts of people. In order to know how your solution will survive in the real world, designers use a specific type of testing called a pilot. Pilots are test sessions that are long-term, hands-off, and large-scale. For example, *SwipeSense* piloted with local hospitals by giving their fully-functional device to

How-To: PILOTING
(for detailed steps and more suggested activities)

The *Empathy Box* ▶ team piloting their prottoypes at an *Autism Speaks* event

around 50 doctors to use for a month. They conducted interviews and collected feedback forms, but they did not have doctors perform any specific tasks other than their daily routines. What they discovered was that their devices increased the usage of sanitizing gel by 64%.

Pilots also start to put your team's implementation model to the test. With *SwipeSense*, their pilot looked at how doctors would refill the hand sanitizer in the device, and how hospitals could track its use. Creating acting prototypes good enough to hand to doctors also required sourcing manufacturers and figuring out who would assemble the devices. Even just getting the initial buy-in from a hospital showed the team there was stakeholder interest in their solution and a potential customer down the line.

Accordingly, implementation models can be tested before or during piloting. It is very similar to testing out a solution that is a service rather than a product - tests are more about talking to people and getting buy-in. Working in parts also lends itself well to implement models since they are often complex systems that are easier to tackle in smaller chunks for testing. One of the biggest challenges is being sure to articulate any assumptions your team may have about things like the willingness of a stakeholder to participate or the feasibility of a manufacturing technique. There are a variety of methods to answer such questions:

How-To:
TESTING IMPLEMENTATION MODELS
(for detailed steps and more suggested activities)

Focus Groups: Structured meetings where your team facilitates a discussion with potential stakeholders for them to give feedback. They are essentially group interviews.

Simulations: Pretend situations that your team sets up for passers-by to see how potential users or customers would react to a proposed experience.

Videos & Storyboards: Ways to dynamically communicate your team's implementation model that are centered around the journey of a particular stakeholder. They can help a stakeholder immerse himself in the solution.

SwipeSense ▶ running a focus group with nurses at a nearby hospital

Design Attitude: ITERATE FURIOUSLY!
(building and testing in Implement is just like your team's iterations cycles in *Create*)

As with any testing, your team will likely gain valuable insights that could change the direction of your project. Pivoting at this point is normal, and can even lead your team back to the *Create* phase. This is not a negative failure, but a chance to learn even more about your users.

PROVE PAUSE

Do we have enough funding to maintain our project development?

Have we formed strategic relationships with stakeholders and mentors?

Do we have a well-developed pitch and website?

Have improved our solution based on insights from testing and piloting?

SUSTAIN

having a lasting impact in the world

TOPICS IN IDENTIFY

Foundations of Sustain
Demonstrating Your Impact
Inspiring Through Impact

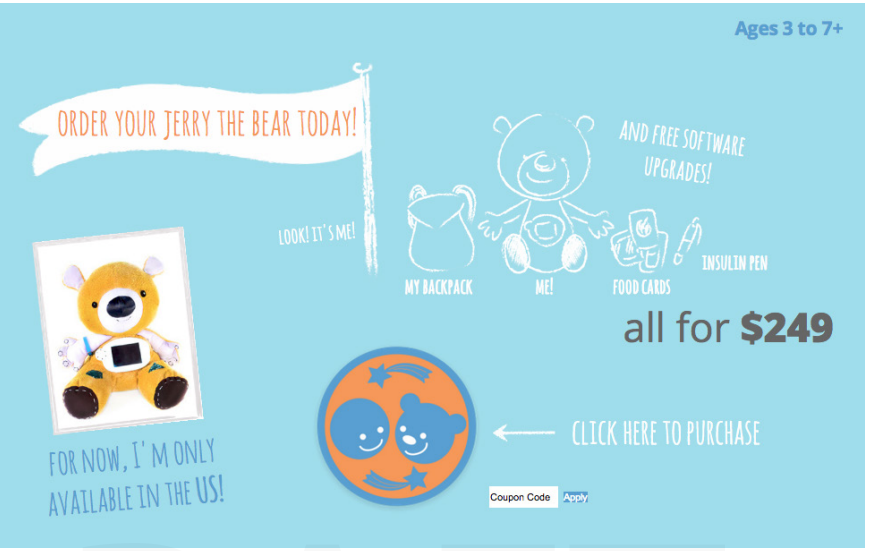
OUTCOMES OF IDENTIFY

Proof of your solution's impact
Stories and lessons to share with others
Continued involvement with your solution

◀ *SwipeSense* in use at a local Hospital.

FOUNDATIONS OF SUSTAIN

Once your team has decided on an acting design and implementation model, your solution is ready for launch. A launch is when a solution goes on the market or gets integrated into a community. It is the point where the solution goes from living in a studio to living completely in the hands of customers and users. There is usually a specified date and a lot of publicity around the launch of a solution, followed by a big sigh of relief. But, implementation does not end at the hand-off. Demonstrating a solution's impact and inspiring others to create impact of their own are vital to sustaining a solution over time. No matter type of implementation approach your team is taking, a project never truly ends as long as it continues impacting the lives of others.

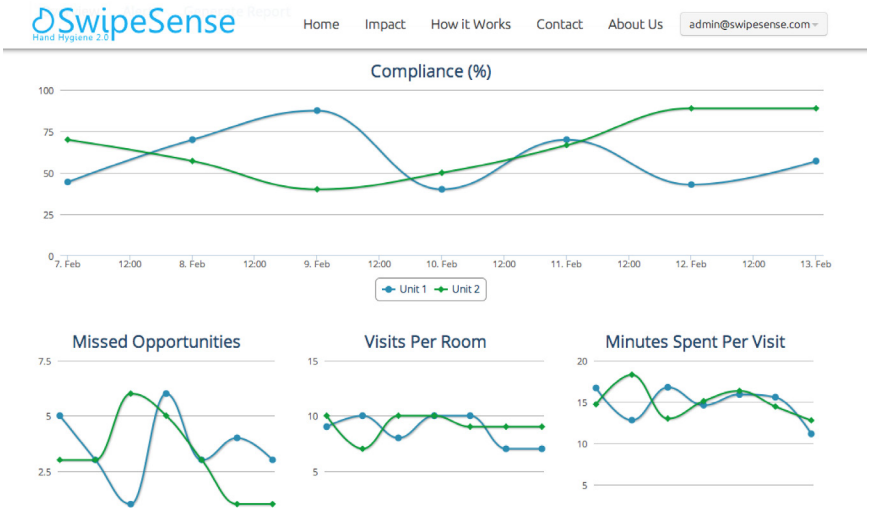


The portion of ▶ *Jerry the Bear*'s website where the bear can be bought.

DEMONSTRATING YOUR IMPACT

Once a solution is permanently in the hands of users and customers, demonstrating how it is changing lives for the better is the ultimate goal. Gathering data and testimonies will not only verify that your team's solution is working, but also help it gain traction and regard. While it may be difficult to show that any changes are a direct result of your solution, being meticulous about tests and follow-ups can lead to solid correlations (see page 105 to review good testing methods).

Don't forget:
PAUSE TO REFLECT!
(it is particularly important to look back after launching a solution to make sure it is having the intended impact)

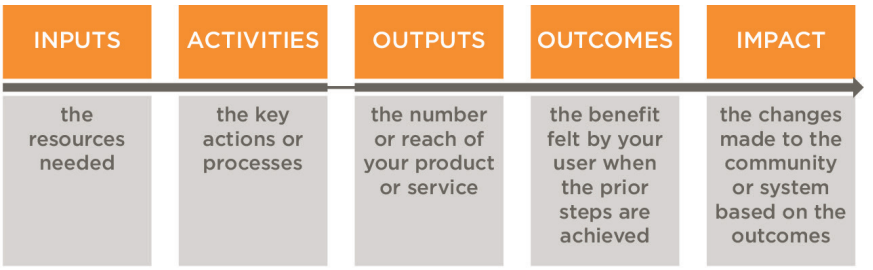


◀ *SwipeSense* uses special analytics to measures increases in hand hygiene compliance by doctors and nurses.

The difference between testing for impact and testing a prototype or an implementation model is purely in perspective. Whereas earlier testing was primarily about answering questions in order to improve something, testing for impact is about confirmation (in the non-profit world, this is commonly referred to as "Measurement and Evaluation" or M&E). It is a reflective sort of testing rather than an active one. The information gathered is about the end-value of your solution - the number of lives saved, the percentage decrease of wasted resources, an increased

quality of life, money and time saved etc. Occasionally, the data may show an unexpected gap or inefficiency, and your team may have to return to earlier steps, but the changes are minor. For example, *Jerry the Bear* has free software updates and will likely make newer editions of their bear even though their solution is already on the market.

A good way to organize impact testing is through a framework called a logic model. Logic models are graphical representations of the relationships between the resources and activities of an organization and the desired changes it hopes to see. Using these models can help your team see the connections between inputs and outputs and better know what to test for.



The elements of a logic model.

The results from impact testing are also useful to show stakeholders that their support has been fruitful. In the business world, the term return on investment is used to describe the benefits a stakeholder receives in comparison to the cost. This return may be financial, but considering the social values of a solution is just as important (this is sometimes called a social return on investment). Also important is being transparent and honest with results. If the created impact is not as high as your team had hoped for, it is an opportunity to explore the problem space even deeper and possibly create even more impact.

INSPIRING THROUGH IMPACT

The launch of a successful solution is always reason to celebrate, but your team's impact can go beyond just your solution - it can also be the number of people you inspire to follow in your footsteps. Sharing your team's experiences and lessons learned is an important aspect of the Design for America community. There are many ways to do so:

Write a Case Study: Packaging up the story of your team's journey, the questions you faced and the decisions you made in a video or document is highly valuable for other teams who want to know just how you achieved all you did.

Speak at Events: Conferences and development programs are great opportunities to spread the message about the work your team has done.

Mentor DFA Projects: DFA teams are always looking for mentorship - your team's experience and expertise can help push one to the next level.

◀ DFA co-founder Hannah Chung returning to mentor at Leadership Studio

SUSTAIN PAUSE

Do we know exactly how our solution is impacting the world?

Are we continuing to be in contact with our customers?

Are we inspiring other members of the DFA community with our story?

Are we excited to tackle other problems that exist?

PROJECT GLOSSARY

Bottleshare

2011-2013
Northwestern

How can we reduce waste generated from the use of plastic bottles?

www.bottleshare.us

Challenge

Disposable water bottles contribute to 3 billion pounds of waste per year. Many times a water bottle is used for less than a full day before it is thrown away. Reusable water bottles are a much more sustainable alternative, but are often inconvenient.

Solution

The goal of Bottleshare was to bring the convenience of the disposable water bottle to the reusable water bottle. Bottleshare users would remove a clean bottle from a machine, carry it with them and deposit the bottle in any of the machines in the system. Each machine would clean the bottle as soon as it is deposited and store it until the next customer arrives

Lessons learned

Test early and often- The team was able to gain insights during simple simulations and tests that informed their mechanical design.
Ask for resources. Bottleshare acquired brand new water bottles and two old vending machines to prototype with by reaching out to companies and asking for resources.

Recent Team Members

Andrew Griesemer, Tristan Sokol, & Lyndon Sapozhnik

Empathy Box

2012-Present
RISD/Brown

How can we create an empathetic relationship between the autism community and the general public?

empathybox.org

Challenge

Every year, 186,000 children in the US are diagnosed with diabetes. This not only means a life-long disease, but children must also quickly adapt to a new lifestyle of restricted foods and daily shots from their parents, which can be confusing and upsetting.

Solution

Recently diagnosed young diabetics feel lonely and isolated as they learn to cope with their condition. Jerry the Bear is an interactive teaching toy that prepares children for the changes they will experience. Children learn how to take care of themselves by taking care of Jerry the Bear with diabetes, giving insulin shots, monitoring his diet and measuring glucose levels.

Lessons learned

Comparing your brainstormed ideas to existing solutions is a very effective way to decide on which idea to pursue.

Never give up: As a project, Jerry the Bear was inactive for over a year.

Recent Team Members

Rawan Al Saffar, Kelly Hering, Samanthat Dempsey, Tabitha Young, Annie Irwin, Ariana Martinez, Andrew Beers

Fruit Buddi

2011-2013
Northwestern

How can we reduce childhood obesity by rewarding healthy snack choices in the grocery store?

fruitbuddi.com

Challenge
Childhood obesity has been a growing problem over the last three decades. Currently about 17% of children ages 2-19 are obese, a number that has almost tripled since 1980 and that continues to grow.

Solution
One of the many contributing factors to this is that unhealthy foods such as chips, candies, and sugary cereals are heavily marketed to children, catching their attention and encouraging them to develop poor shopping habits at a young age. Fruit Buddi is a compartmentalized shopping accessory that attaches to a shopping cart and engages young children with fruit selection. Each compartment is labeled with a unique set of fruits, which guides the children to match the color of the fruits they pick out in the store to the appropriate colored portion of Fruit Buddi.

Lessons learned
Be ready to pivot. The project was originally scoped to focus on the speed of eating as a cause for obesity, however, they didn't actually see this as a problem during user research.

Self imposed deadlines are much easier to ignore than 3rd party deadlines.

Recent Team Members
Brandon Rivera-Melo, James Kubik, Taylor Reynolds

Hot Dorms

2012
Yale

How can we reduce wasted heat energy in dorm rooms?

vimeo.com/37957412

Challenge

32% of residential energy use is used for spatial heating. 75% of the energy used in dorms during the winter months are used for heat, yet 80% of Yale dorm residents shared that they leave their windows open to regulate the temperature due to not knowing how or able to regulate their radiator heaters.

Solution

This DFA team took a multi-pronged approach to tackling this challenge. From an awareness standpoint, they developed signage that would encourage residents to think twice about opening their window to regulate their temperature. They then re-designed the radiator knob to be more intuitive and allow residents to more easily understand how much or little to adjust their knob. The team also took a technological approach by programming a system to auto-regulate the radiator once a temperature was put in.

Lessons learned

Look for existing data. This team found out that Yale already tracked and measured energy use across campus.

Parallel prototyping is a great way to get larger teams broken down into sub groups.

Recent Team Members

Kayla Matheus, Ellen Su, Levi DeLuke, Ariel Ekblaw, Ben Green et al

Jerry the Bear

2009-Present
Northwestern

How can we help diabetic children care for themselves?

jerrythebear.com

Challenge

Every year, 186,000 children in the US are diagnosed with diabetes. This not only means a life-long disease, but children must also quickly adapt to a new lifestyle of restricted foods and daily shots from their parents, which can be confusing and upsetting.

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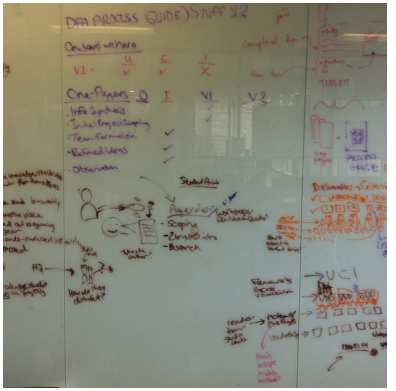
Recent Team Members

Hannah Chung & Aaron Horowitz



Luna Lights

2012-Present
Northwestern

How can we reduce the risk of falling for older adults?

Challenge

According to the CDC, one out of three adults 65 and older falls at least once per year. For these adults, falls are the leading cause of fatal and nonfatal injuries, hospitalizations, and injury death each year. The National Safety Council reports that 54% of all falling-related deaths of older adults are caused by falls at home.

Solution

The team learned that many older adults refuse to use assisting tools already available to help them that prevent falls because they made adults feel old, weak, and that they were losing their independence. Additionally, they discovered that a majority of falls occurred in the homes rather than outdoors. One of the most common reasons people were falling was because they would not, for various reasons, turn on the lights when they got up in the middle of the night. Luna Lights is an automated lighting system that guides older adults to their destination in dark rooms.

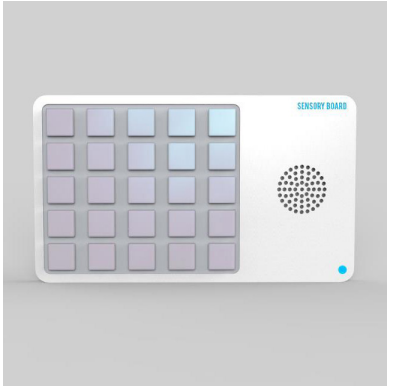
Lessons learned

Align your interests with community partners. Luna Lights received funding from their community partner to build and test.

Draw on expertise in your university community. The team had a grad student engineering team build their first working prototype.

Recent Team Members

Wesley Youman, Catherine Chung, Melissa Sobin, Matt Wilcox, and Donovan Morrison



Melo

2011-Present
University of Oregon

How can we increase play among children with non-verbal autism?

melosense.tumblr.com

Challenge
People non-verbal forms of autism find it challenging interacting in a classroom environment.

Solution
Dedicated to sharing the unique perspectives of those with autism as opposed to change them, this team is focused on increasing interaction between those with non-verbal forms of autism. Where autistic children may lack the ability to speak or effectively communicate using words, many are drawn to a collaborative language in light and sound. Melo Sense is a wall mounted touch surface board, arranged in a grid pattern, and acts as a musical sequencer. Children are able to activate certain squares on the grid, and as the sequencer loops from left to right it plays the notes that they have activated. Squares lower on the board correspond to lower pitches and squares higher on the board represent higher pitches. All notes on the board are in harmony with each other, so that it's impossible to play a wrong note. This provides an equal opportunity for everyone to easily make a beautiful phrase of music.

Lessons learned
Strategic networks are powerful things. Melo partnered with an electronics company that helped them build their prototype.

Recent Team Members
Allison Fonder, Mica Russo, Andre Brown, Maddy Belval

New Reader Valley

2012-2013
Virginia Tech

How can we reduce child illiteracy rates?

Challenge

10% of adults in Montgomery County, where Virginia Tech is located, are illiterate. Low Literacy Adults and their families are 10x more likely to live below the poverty line. Overall school success correlates with by the size of the vocabulary with which a child begins 1st grade. Parents who have low English literacy provide special obstacles for preschool teachers and elementary school teachers as they teach children how to read.

Solution

Aside from financial constraints, one of the main concerns for reading teachers of low literacy children is finding consistent ways to extend the school day so that children would be able to learn in school, at home, and in-between. New Valley readers is a user generated magazine that allows children to express their creativity and share their writing with their friends while encouraging them to read and write after school.

Lessons learned

Ideation sessions are great ways to boost moral.

Documentation is key to telling a compelling story to incoming DFAers in order to get them to continue a project.

Recent Team Members

Rob Calvey, Michelle Pannone, Lars Rasmussen, Kristina Danielyan

NUMAT

2011-2012
Northwestern

How can we improve footcare for the homeless?

Challenge

Approximately 3.5 million Americans are living in homelessness today. The average homeless person stands in lines about 4 hours a day and walks on the average of 35 miles a day. Due to these long hours on their feet and exposure to a variety of germs, homeless individuals can suffer from severe foot infections. These foot care problems for people who are homeless are a major deterrent for one to getting or maintaining a job.

Solution

In any given shelter across Chicago, a single shower may be used by up to 100 homeless clients each day. With overworked staff, sanitizing these showers is often time consuming and difficult to maintain. This exposure to unsanitary conditions leads to high rates of fungal foot infections such as athlete's foot and toenail fungus, which if left untreated often spread or cause pain. To solve this problem NUMAT developed an exfoliating shower mat that protects against infections in the shower.

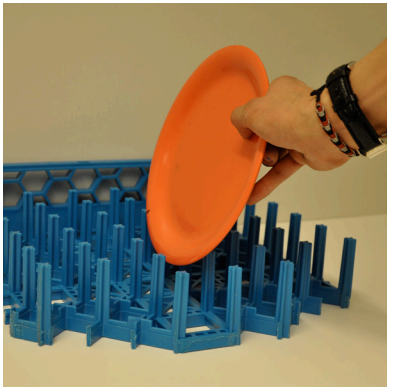
Lessons learned

Money is important - the NUMAT team struggled to move forward with no viable source of resources.

Considering manufacturability early on during idea generation is important.

Recent Team Members

Tristan Sokol, Jenny Braunstein, Hannah Hudson



Right Angle

2009-2012
Northwestern

How can we use less water to wash dishes in a cafeteria?

Challenge
Each lunch period, cafeteria staff use 300 gallons of water to remove leftover food, yet more than 1 billion people on the planet do not have access to safe drinking water.

Solution
The team found that each lunch period, cafeteria staff use 300 gallons of water to remove leftover food from plates. The Right Angle is a stacking tray that doesn't allow users to place their plates flat upon the conveyor belt dish system. Instead of placing dishes directly on the conveyer belt, leaving large amounts of food waste, the Right Angle intuitively informs the user to first remove the plates leftovers, significantly reducing the amount of water needed to clean each plate.

Lessons learned
Sometimes solution occurs externally. The cafeteria Right Angle was partnered suddenly changed their policies such that they required all plate scraping to be done by staff instead of students. This helped save water, but it also meant the project was moot.

Recent Team Members
Thea Klein-Mayer & Yuri Malina

See[K]

2011-2013
Virginia Tech

How can we reduce car pollution by encouraging commuters to walk or cycle?

Challenge

Transportation is the largest single source of air pollution in the United States. In 2006, it caused over half the carbon monoxide, over a third of nitrogen oxide, and almost a quarter of the hydrocarbon in our atmosphere. Meanwhile, bicycling for transportation is making up a growing share of all bicycling, increasing from 43% of all bike trips in 2001 to 54% in 2009. But bicycling is still very low in most suburbs in comparison to cities.

Solution

See[K] looks to raise awareness of alternative transportation options as well as help people understand how easy and convenient these options are. See[K] is a way-finding system for urban areas. By using graphic symbols and time the signs look to present the information in a simple visual format while aiming to create an unified identity for alternative transportation in Blacksburg that encourages commuters to get out of their cars and choose an active, healthy commute.

Lessons learned

Gorilla implementation can draw attention to a project. The See[K] project put up their signs without realizing it was illegal, but the press ended up helping them find a champion.

Recent Team Members

Susie Benenati, Mike Kulikowski, Therese Noonan, Rob Calvey, Joe Bruzek

SwipeSense

2009-Present
Northwestern

How can we help reduce hospital acquired infections?

swipesense.com

Challenge

Two million people a year in the United States acquire infections during hospital stays unrelated to their original condition because of insufficient hygiene, leading to 100,000 deaths each year and $2-4 billion dollars in costs to the healthcare industry.

Solution

Healthcare workers everywhere struggle to wash their hands at the point of care. To enable them to do this hospitals need to have hand sanitation systems that are intuitive to use. SwipeSense is a portable hand sanitizer dispenser that empowers healthcare workers to clean their hands wherever they go.

Lessons learned

Never give up! As a project SwipeSense was dormant for 18 months.

Iterate like crazy. To date the team has created over 200 prototypes their hand sanitation dispenser and based upon user feedback have added electronics to capture performance data.

Work hard to get honest feedback from users. For 6 months SwipeSense told the users that they tested with that they were the designers of the device. This meant that they got positive, but not always honest feedback on their designs.

Recent Team Members

Mert Iseri & Yuri Malina

GLOSSARY

A

AEIOU Framework with areas to focus on while observing: Activities, Environments, Interactions, Objects, Users.

Assumption Untested or unverified information; i.e. not based on secondary research or first hand experience with users.

B

Behavior The visible actions and reactions of individuals to a stimulus or situation.

Bodystorming Generating ideas through role-playing as users.

Brainstorm An technique to generate ideas around a particular goal.

Build The fifth step in the DFA process with the goal of making prototypes and designs tangible.

C

Card-sorting An interview technique that seeks to understand how a user relates different ideas in their mind. In this technique users are asked to organize words or pictures that a team has put on cards while explaining his/her decisions.

Challenge The active framing of the central problem of the project team.

Challenge Statement A sentence that outlines the problem that a project team is trying to solve. In DFA, challenge

statements often take the form of 'how can we...' statements, such as 'how can we reduce water usage?' or 'how can we reduce childhood obesity?' These statements are a tool for you to evaluate and reflect upon your project direction.

Champion Someone within an organization that is receptive to your team and challenge, can share his or her expertise, and put you in touch with users or other resources.

Channels The logistical pathways and partnerships needed to produce and deliver a solution to a user or customer.

Charette A brainstorming technique in which team members draw or describe ideas on paper and then pass them to the next person over multiple rounds.

Collages A method of visual expression using found or provided images and text.

Community Partner A local organization that is working on the problem your team is aiming to tackle and has committed to devote resources (esp. time) to the project.

Competitive Analysis The analysis of competing products or services to compare their important features to improve your own solution.

Concept A refined idea that has details about desired features and functions.

Converge The narrowing down of ones focus onto a particular idea or set of ideas.

Create The phase containing ideation, building, and testing.

Customer Validation Strong evidence that a potential customer will pay for a solution.

D

Decision Matrix A ranking system of multiple concepts on a number of weighted characteristics to better understand the qualities of those concepts. (Also known as a Pugh chart)

Delivery The tangible transfer of a product or service to its users.

Design v. To solve a problem in an intentional and creative way.

n. The specifications around a concept concerning form, function, and manufacturing.

n. The practice of creating new objects, environments, services, and systems to better the human condition.

Design Argument A statement of how and why a proposed solution achieve a specific goal.

Design Goal An abstract description of a property or quality that your solution should have

Design Process The proven method that is used to solve a problem in an intentional and creative way.

Diarying A technique in which an individual comes up with ideas without other team members present. Often these ideas are scribbled in personal notebooks.

Diverge Expanding ones focus to include a representative and diverse set of ideas.

E

Empathy An ability to connect with or share the perspective of someone else.

Evidence Information or data that proves indicates the validity of an assertion or decision; e.g. “what evidence do you have that shows the importance of color matching?”

Expert An individual highly skilled or knowledgeable in a given area and recognized as a reliable source of technical advice pertaining to that area.

F

Feels-like The physical interaction unit of the “Looks-Like, Feels-Like, Works-Like” prototyping model **.

Fly-on-the-wall (observations) A technique used in user research that involves observing in such a way that it does not interfere with the normal behavior or flow of spaces or users.

Form A description of the key physical and aesthetic components of a concept.

Function A description of the features and ways that a concept will ‘get the job done.’

Funding (Continued) Revenue streams and continued financial support needed to cover any costs associated with the maintenance of the organization, design updates of the product/service as well as any

costs associated with expanding operations of the organization.

Funding (Initial) Financial support to cover basic material and transportation costs associated with testing a prototype and implementation model.

H

"How can we..." Statement A type of challenge statement that takes the form of a specific question: "How can we...?" (abbrev. HCW)

Human Centered Design An approach to problem solving that stresses understanding people as one vital component to successfully innovating. (abbrev. HCD)

Hypothesis An explanation of a phenomenon that has yet to be proven. It is stated as truth so that it can be objectively tested.

I

Idea An abstract potential solution without significant details decided.

Ideate The act of brainstorming and refining potential solutions.

Identify The DFA process step where a team attempts to get on the same page and determine which problem area to focus on..

Immerse The DFA process step in which the goal is to understand the problem

Implement The DFA process phase where a team tries

	to bring their solution into the world in a sustainable way.
Implementation Model	An outline of variables and questions that need to be answered in order to understand how a team plans to implement a pilot.
Implementation Partners	Individuals or organizations that provide financial support or mentorship for your project as you try and implement your solution.
Implementation Plan	The overall time-line and game plan for moving forward and keeping the team on track towards project implementation.
Improv Games	Activities using unscripted behavior to overcome akwardness between team members and/or think up non-traditional ideas.
Insight	Tidbits of information that are surprising or powerful, and that are directly applicable to your team's future direction or solution
Interview	The act of asking stakeholders questions in order to understand their feelings or motivations.
Interview (Expert)	Questioning individuals with more knowledge of the problem in the hopes of gaining valuable information.
Iterate	To cycle or repeat steps in a process.

J

Journaling	Written or photographed records of a period of time in a users life.

K

Key Activities The necessary actions to implement a solution.

L

Laddering A user research technique that probes deep into a problem by continuously asking "why" questions.

Legalese Language used by the legal profession. In the DFA context, it refers to the legal aspects that need to be addressed when working on a project.

Loft Online platform created to support pro-social design project teams and foster a sense of community

Logic Model A graphical depiction of the relationships between the resources, activities, outputs and outcomes of a program, used to evaluate the effectiveness of a solution.

Lone Geniuses Individuals who came up with their discoveries in isolation instead of while interacting in society.

Looks-like The aesthetic, form unit of the "Looks-Like, Feels-Like, Works-Like" prototyping model.

M

Measure of Success A tangible metric that describes the end-goals of a solution and can indicate if/when that end-goal is met.

Measurement and Evaluation Common term in Non-profit world referring to the process of collecting information on an implemented solution's quantifiable outcomes and analyzing data to determine a solutions' impact. (a.k.a. M&E)

Mind Map A type of documentation that describes what a fictional user thinks or feels about a problem.

Mockups Quick, low fidelity representations of an idea or concept, often made of inexpensive supplies like cardboard and play-doh.

Modifier In the context of a How Can We statement, it adds crucial information about a given subject.

O

Observation Time spent watching a scene, scenario, setting, individual etc.

Opportunity Gaps Approaches to solve a problem that are not addressed by current solutions.

P

Pain Point Particularly clear moment in a user's or stakeholder's workflow or interaction associated with unpleasantness.

Parallel Prototyping One of the key principles of prototyping, working on multiple parts of a prototype at the same time in order to be more efficient.

Participatory Observation A user research technique that encourages direct personal experience with the process or

	place of the user to gain insight.
Persona	A generalized illustration of a group of individuals that can be a powerful empathy tool. (see Point of View)
Personal Inventories	Documentation of items that matter to the user and explain why they do.
Phase	A group of steps, *Understand*, *Create*, *Implement*.
Pivot	A change direction to an associated problem based on an insight gleaned from further research to better meet the needs of customers or users.
Place	In the context of a How Can We statement it indicates a specific location where the solution should address the problem.
Problem	A negative or harmful situation (that a design team aims to change)
Problem Domain	The categorical group (either Health, Education, Environment, or Economy) of a problem.
Problem Space	Subsets of the larger problem where you can investigate during research
Process Guide	A document introducing the design process and orienting design teams.
Product Dissections	Also called reverse engineering, this involves taking apart an existing solution to observe how another person or team has created a solution.
Prototype	A tangible manifestation of a concept, dictated

by a design, that can be tested.

Pugh Chart Also called a decision matrix, this tool is used to rank multi-dimensional aspects of a range of options.

Q

Qualitative Descriptive; captures or describes stories, experiences, feelings, or reactions.

Quantitative Indicative a quantity; numerical or statistical information.

Quick Wins A highly feasible concept that is easily implementable and can serve as a quick building block for further impact.

R

Refinement Selecting ideas and adding details about desired forms and functions (turning ideas into concepts).

Reframe A step during *Identify*, during which changes in early-stage problem solving are reconsidered and reexamined.

Role-Playing An empathy-gaining technique in which designers place themselves in the users shoes and brainstorm in a unique or different perspective.

Rules of Generation A set of mindsets to enter the ideating process that involves divergent thought and high visualization.

Rules of Refinement — As opposed to "Rules of Generation," a set of mindsets to use while narrowing the focus of ideas and considering realistic constraints and feasibility.

S

S.W.O.T. Analysis — A 2x2 matrix organized by four quadrants: strengths, weaknesses, opportunities, and threats.

Scoping — The process of defining the focus of a challenge.

Shadowing — A type of observation technique where team members closely follow a user or group of users through a specific experience or routine.

Slap Stat — A statistic shocking or surprising enough to show why a challenge is daring.

Social Return on Investment (SROI) — The non-financial benefit included in a value proposition relative to the resources invested.

Solution — A prototyped and proven concept and implementation model that could realistically solve a problem.

Solution (potential) — Concepts or ideas that could solve a problem but have not yet been tested.

Sphere of Influence — The degree of power of an individual or organization to create change in the behavior, actions, or policies of others.

Stakeholder — Individuals or organizations connected to a problem.

Step In the DFA design process, the individual segments within each Phase including: *Identify*, *Immerse*, *Reframe*, *Ideate*, *Build*, *Test*, *Plan*, *Prove*, and *Sustain*.

Sticky-Note Clustering A brainstorming technique in which teams members write their ideas of post-it notes and then share and cluster them as a group.

Surveys An interview technique that allows for widespread data sourcing and can provide quick feedback from a large population or demographic.

Synthesis The process of organizing and distilling information to gain a more complete understanding of a problem.

T

Team Charter A formal document that establishes the way individuals will work together on a project. Included could be things like roles, goals, and expectations.

Technique A method for completing a specific strategy, activity, or process.

Test A procedure intended to measure and establish the quality, performance, or reliability of a concept or prototype.

Themes The patterns among insights or ideas.

Think-aloud An interview technique that requires the interviewee to speak out-loud as they complete a task or interact with a space, interface, or

product.

Tool A tangible thinking aid made physical that helps teams in a specific part of the process.

U

Understand The first phase of the DFA design process. It involves getting situated with a problem and gaining insights from research.

User An individual highly affected by a problem who would be the primary receivers of a future solution.

User research Direct contact with potential users to gather experiential information, behaviors and thoughts from users.

W

Wicked Problems A term coined by the American philosopher and system scientist C. West Churchman in 1967 to describe problems that were impossible to solve due to their incomplete or changing characteristics.

Word-association A creativity technique that involves the rapid articulation of words most closely related a specific term. This technique explores subconscious linkages between words and can provide whole new directions for brainstorming.

RECOMMEND READING

Exposing the Magic of Design
Jon Kolko

HCD Toolkit
IDEO

Made to Stick
Chip Heath, Daniel Heath

Resonate
Nancy Duarte

The Universal Traveler
Don Koberg, Jim Bagnall

Universal Methods of Design: 100 Ways to Research Complex Problems, Develop Innovative Ideas, and Design Effective Solutions
Bruce Hanington, Bella Martin

Universal Principles of Design, Revised and Updated: 125 Ways to Enhance Usability, Influence Perception, Increase Appeal, Make Better Design Decisions, and Teach through Design
William Lidwell, Kritina Holden, Jill Butler

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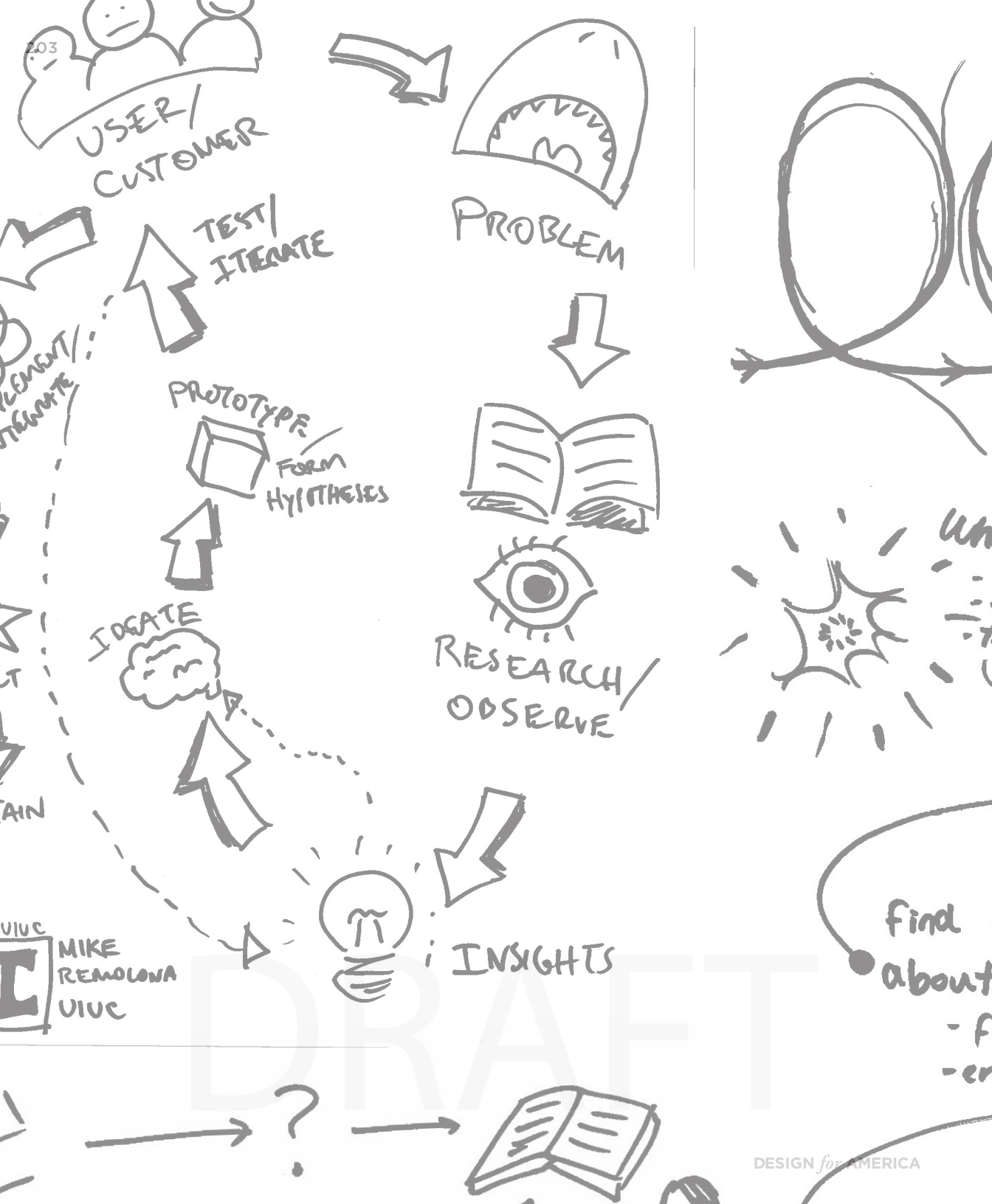
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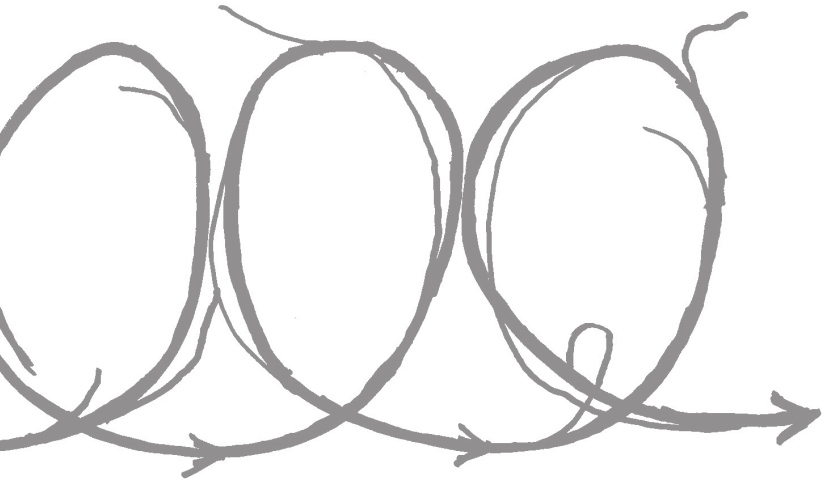

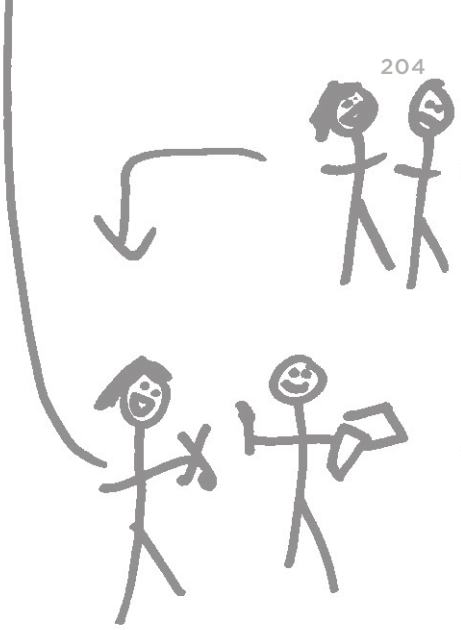

at BUGS you?
the seed
the passion
the inspiration
find your WHY

the DESIGN PROCES

a lesson in
applied optim

INSPIRE
a CULTURE of design

IMPLEMENT
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your WHY
find LOCAL partners
ngage the community