

Problem Solving,
Human-Centered Design,
and Strategic Processes

Paul Brest, Nadia Roumani, and Jason Bade



Problem Solving, Human-Centered Design, and Strategic Processes

Paul Brest, Nadia Roumani, and Jason Bade¹

Table of Contents

Introduction: Two Complementary Approaches to Solving Problems	3
The Elements of Problem Solving and Strategic Planning	3
The Elements of Human Centered Design	4
The Essay's Structure and Assumptions.....	5
The Decision Maker.....	5
Problem Solving as a Nonlinear Process	5
Institutional Constraints	6
Decision Making in Teams	7
Define The Problem.....	8
Step 1. Describe the problem	8
Step 2. Identify the relevant stakeholders, understand their motivations, behaviors, and needs.....	9
Step 3. Identify whose problem it is—i.e., who are the potential beneficiaries of a solution .	10
Step 4. Describe why the problem is important to the decision maker	10
Step 5. Describe the ideal world in the absence of the problem.....	13
Step 6. Reconsider your statement of the problem and ask what strategies may best achieve your goals.....	14
Step 8. Identify the beneficiaries' needs	15
Step 9. Learn whether other organizations are addressing the problem effectively	18
Frame the Problem	19
Step 10. Articulate and prioritize the needs that you will address	19
Step 11. Revisit key stakeholders to understand their motivations, behaviors, and needs and the systems in which they operate	20
Step 12. Identify barriers to moving from the present state to the ideal state	20
Step 13. Articulate “design mandates” and posit strategies that could transcend barriers, address needs, and facilitate change.....	22
Step 14. Brainstorm questions emerging from the design mandate	22
Step 15. Select several promising strategies from those generated	24
Step 16. Turn the selected strategies into logic models and compare them to one another	25
Implement, Observe, Learn,.....	27
and Evaluate.....	27
Step 17. Prototype the selected solutions to test for their viability.....	27
Step 18. Implement and evaluate	30
Conclusion.....	32

¹ This essay is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).

See creativecommons.org/licenses/by/4.0

Illustrations by Olivia Vagelos

Paul Brest is a professor emeritus (active) at Stanford Law School and former president of the William and Flora Hewlett Foundation. Nadia Roumani is a lecturer at the Stanford Hasso Plattner Institute of Design and the Walter and Esther Hewlett Fellow at the Stanford University Center on Philanthropy and Civil Society. Jason Bade is a lecturer at Stanford Law School and co-author of *More Human: Designing A World Where Humans Come First* (2015).

We are grateful for comments from Barbara Chow, Marc Chun, Margot Fahnestock, Patrice Martin, and Olivia Vagelos

Introduction: Two Complementary Approaches to Solving Problems

This essay sets out a framework for integrating conventional problem solving and strategic planning techniques with human centered design (HCD) to help foundations improve their understanding of the problems they are trying to solve and increase their creativity in developing solutions.² Here, we briefly describe both approaches to problem solving.

The Elements of Problem Solving and Strategic Planning



A problem is a situation in which something is wrong or less than ideal. Problem solving consists of trying to correct or improve the situation. An important step in the problem-solving process is articulating what the ideal world would be³ or at least exploring the various ways in which different approaches could

ameliorate the situation. Allen Newell and Herbert Simon define the conceptual area between the existing and desired (or less undesirable) states of affairs as the problem space. To solve a problem is to navigate the problem space—the virtual area between the two.⁴

Solutions to a problem may take different forms. Sometimes the solution is simply a decision to do or refrain from doing something. Sometimes it is the adoption of a policy. And sometimes it is a strategy—a set of activities to be performed to achieve the desired state. A strategy is often usefully represented by a logic model— a linear description of the assumptions, inputs, activities, and outputs leading to a desired outcome.

A problem does not exist abstractly, but always from someone's point of view. What one person may regard as a problem may be a satisfactory state for someone else: Alice is unhappy with the existing situation where she is subject to second-hand smoke on the street; her ideal world is completely smoke-free. In Joe's ideal world, there are no constraints on smoking at all.⁵

Even in the simplest case of an individual seeking to solve her own personal problems, the nature of the problem and her underlying needs or interests are not always self-evident.

² Our description of the conventional approach to problem solving draws largely on Paul Brest and Linda Krieger, *Problem Solving, Decision Making, and Professional Judgment* (2010), which attempts to encapsulate the conventional approach (and was written in ignorance of HCD). For HCD we on Stanford University's Hasso Plattner Institute of Design's Bootcamp Bootleg (2010) and IDEO's *Field Guide to Human Centered Design* (ed. 2015), as well as on Nadia Roumani's own professional experience in design.

³ Gerald P. Lopez, *Lay Lawyering* 32 *UCLA Law Review* , 2 (1984). In reality, people sometimes sense that something is wrong without being able to describe what the ideal state of affairs might look like.

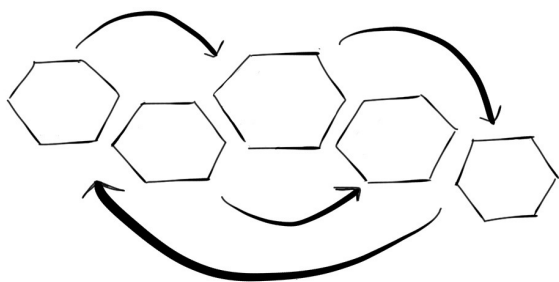
⁴ See Allen Newell and Herbert A. Simon, *Human Problem Solving* (Englewood Cliffs, NJ: Prentice Hall, 1972).

⁵ <http://www.mm Gazette.com/wp-content/uploads/2014/05/Second-hand-smoke.jpg>

Fashioning a robust solution requires getting at the essence of the problem and identifying the individual's needs and interests even when they have not been explicitly articulated.

Understanding these matters is likely to be especially difficult for policy makers, foundations, and nonprofit organizations, whose missions involve solving other people's problems. These problems are often messy—sometimes described as “complex” or “wicked.” because they often include multiple stakeholders, various causes, and interconnected systems.⁶ The very definition of the problem may be obscure and possible solutions are fraught with uncertainty.

The Elements of Human Centered Design



HCD in its contemporary form was elaborated by David Kelley, co-founder of IDEO and the Hasso Plattner Institute of Design (“d.school”) at Stanford, and it is practiced and taught by an increasing number of organizations and schools. For most of its roughly forty-year history, HCD has focused on the design of products (for example, Apple’s first mouse) and a range of services and experiences (for example, riding Amtrak’s Acela Express). More recently, HCD

has been used to design interventions in the social sector—the focus of this essay.

As described by the d.school, the design thinking process is comprised of five core practices:

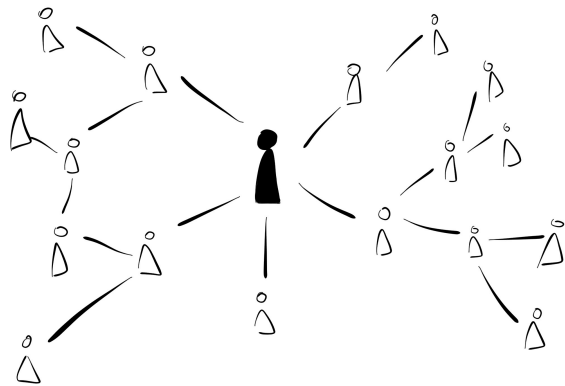
1. *Empathizing* with the intended beneficiaries and other stakeholders using *ethnography*—i.e., observing, interviewing, and immersing oneself in their experiences—to uncover their deep, often unstated, needs. (In the context of HCD, “empathy” means cognitive empathy—knowing how a stakeholder feels, thinks, behaves, and perceives the world—as distinguished from compassionate empathy.⁷)
2. *Defining* key stakeholders, identifying their needs, and narrowing the number of needs to be addressed.
3. *Ideating*, including brainstorming solutions; and then selecting from among possible solutions.
4. *Prototyping*, using inexpensive, readily adjustable, low-resolution versions of selected solutions.
5. *Testing* a prototype to explore particular aspects of proposed solutions and test underlying assumptions

⁶ John Kania, Mark Kramer, & Patty Russell, Strategic Philanthropy for a Complex World, http://www.ssireview.org/articles/entry/strategic_philanthropy

⁷ See, e.g., <http://www.danielgoleman.info/three-kinds-of-empathy-cognitive-emotional-compassionate/> See generally, Boston Review forum, Against Empathy, <http://www.bostonreview.net/forum/paul-bloom-against-empathy>

The Essay's Structure and Assumptions

The Decision Maker



In this essay, we will focus on decision makers who have some level of autonomy and who are trying to improve the wellbeing of a specific set of beneficiaries. These beneficiaries, and the other groups of people and institutions that might contribute to the problem or to its solutions, are stakeholders.⁸

Although the basic approach described in this essay applies to decision making by any institution, we focus on foundations.

Foundations' resources, flexibility, relative autonomy, absence of political or market

accountability, and their freedom to think, study, and plan, allow them to engage in problem solving with fewer constraints than, say, for-profit and operating nonprofit organizations and government agencies, make them an ideal venue for examining problem-solving processes.

Problem Solving as a Nonlinear Process



For purposes of conceptual clarity, we describe the problem-solving process in a sequential framework, but the actual process is often nonlinear and recursive. This is especially true when addressing complex problems.

Consider cybersecurity,⁹ where concerns range from individuals' privacy, identities, credit cards,

and bank accounts being compromised; to businesses being disrupted and losing revenues; to communications, utilities and transportation systems being shut down or destroyed. The stakeholders who can influence and be affected by solutions include individuals, governments, and businesses throughout the world. The ideal state of affairs is by no means self-evident, partly because virtually every solution involves tradeoffs among important values, with no

⁸ Some readers may find it annoyingly patronizing or hubristic for a foundation to make decisions on behalf of beneficiaries, especially when the decisions may affect other stakeholders. But, like public policy makers, foundations do not unconditionally accept people's characterizations of their own interests. Consider, for example, efforts to reduce obesity and smoking by people who do not manifest an interest in doing so themselves. And policies or foundation programs having those goals will inevitably affect other stakeholders, such as families, vendors, and health and insurance providers.

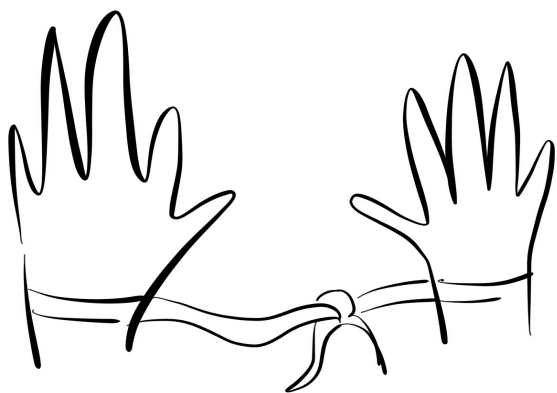
⁹ <http://blogs.fedsmith.com/wp-content/uploads/2015/06/CyberSecurity.jpg>

optimal set of solutions in sight. For example, there are significant tensions between some consumers' desire that their communications be encrypted in ways that government agencies cannot breach and some governments' desire to have encryption keys to aid in identifying terrorist threats.

Addressing the cybersecurity problem may call for policies adopted by businesses and governments, changes in individuals' behaviors, and institutional strategies. Getting to effective solutions may involve plenty of wandering rather than a direct path through the problem space. A foundation addressing cybersecurity may make grants to support research, sharing knowledge, and building fields; it may support "social labs" and other collaborative processes.¹⁰ Arriving at anything close to a solution may require trial and error—letting a hundred flowers bloom or (to use a less elegant cliché) throwing spaghetti against the wall and seeing what sticks. We believe that the systematic problem-solving processes of human-centered design, outlined in this essay, can often enhance the process of seeing what works.

Cybersecurity is a particularly difficult problem. But even seemingly simple social problems have messy qualities when examined in the context of the social interactions and systems that surround them. Thus, although we believe that the problem-solving framework described below is a useful heuristic for approaching any problem, it does not provide a recipe even for quotidian ones.

Institutional Constraints



Especially in the early stages of the problem-solving process, it is helpful to ignore constraints in order to foster creativity both in defining the problem and in coming up with potential solutions. Realistically, however, every decision maker is subject to some institutional constraints, not to mention finite resources. A government agency will have limited authority and jurisdiction; a business or nonprofit enterprise will be invested in human or physical capital and pre-committed to performing particular activities; a foundation's mission may be constrained by its donors'

intentions, and the foundation may be committed to existing programs or strategies.

The decision scientist Ralph Keeney gives an example of how the "decision context" limits a government agency's consideration of potentially valuable solutions to problems:

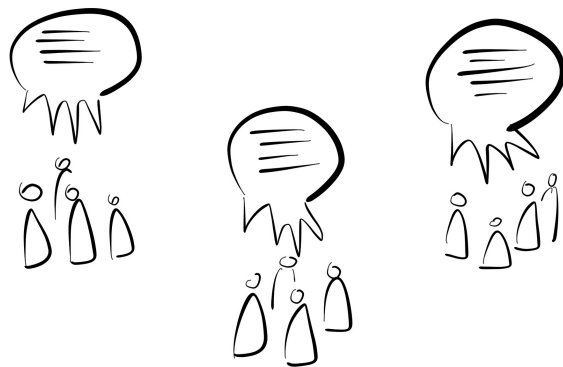
Suppose that a utility company is required to spend \$1 billion to reduce the probability of a major accident at a nuclear power plant in the event of a large earthquake. The main reason is to minimize radiation danger to the residents of a nearby town. But suppose there is evidence that such an earthquake would probably destroy the town. Indeed, it may be the case that parts of the town would be destroyed by earthquakes or other events that would not damage the nuclear plant with its

¹⁰ See Zaid Hassan, *The Social Labs Revolution: A New Approach to Solving our Most Complex Challenges* (2014).

current protection standards. An alternative that used \$200 million from the utility to improve safety in town and the town's ability to respond to disasters might be much better for the town's residents than the \$1 billion spent on the plant. It would also lead to lower utility rates for the company's customers.¹¹

Keeney goes on to make the point that the limited jurisdictions of agencies—granted that the limitations serve legitimate ends—are likely to frustrate such tradeoffs. The authority to regulate nuclear power plants and the authority to take other means to ensure the town's safety reside in different agencies — perhaps even different governments.

Decision Making in Teams



The responsibility for a foundation's strategic plan is sometimes left to a program officer, who consults a range of experts and practitioners but ultimately develops her portfolio's strategy in isolation and then shares the strategy with the foundation's staff, president, and board for feedback. Yet the problem solving that underlies strategic planning is often most effectively done by teams, which can include people with a variety of skills, knowledge, and experiences.

In addition to foundation staff, the team may include people outside the organization. For example, beneficiaries typically have direct experiences with the problem that can lead to a more robust and nuanced understanding of both the problem and plausible solutions. The grantee organizations that will ultimately implement the strategy have subject-matter expertise and tend to be closer to the ground than their funders. Although a foundation has to determine its goals before it can know which beneficiaries and grantees to include, the earlier they are engaged in the problem solving process, the better. There's trouble ahead if the foundation's understanding of the problem and ideas of its solutions diverge from those of key stakeholders. A foundation may wish to include other partners as well—most obviously, other foundations, agencies, and organizations working toward the same goals.

¹¹ Ralph Keeney, *Value-Focused Thinking: A Path to Creative Decision Making* 30 (Cambridge: Harvard University Press, 1992). p 205.

Define The Problem

Step 1. Describe the problem



The process of defining the problem typically begins with a description of the current state of affairs and what the decision maker finds wrong with it. Even when someone's sense that something is wrong is inchoate, she may be able to use stories of hardship, conflicts, or frustrations to describe the problem. Her description sometimes may include data indicating the magnitude of the problem. For instance, the problem might be as global as "1 billion people in the developing world are living on less than \$1 a

day" or as local as "it takes two months for the utility company to respond to consumer complaints."

Throughout this essay, we will use two examples to illustrate the problem-solving framework: addressing teen pregnancy in developing countries and providing American students with a deeper learning education. Each is ultimately concerned with a particular group of beneficiaries. In order to illustrate the application of HCD to quite different kinds of problems, however, our teen pregnancy example focuses on the beneficiaries themselves, and the deeper learning example focuses on stakeholders, such as school officials, who may play an important role in meeting the beneficiaries' needs.

Teen pregnancy

7.3 million teenage girls in developing countries become pregnant each year. The United Nations Population Fund (UNFPA) writes that, of these, "2 million are girls who are 14 or younger, many of whom suffer grave long-term health and social consequences from pregnancy such as obstetric fistula, and an estimated 70,000 adolescents in developing countries ... die each year from complications during pregnancy and childbirth."^{12 13}

Deeper learning

The majority of American elementary and secondary school children are not exposed to "deeper learning," which includes the skills of problem solving, critical thinking, communication and

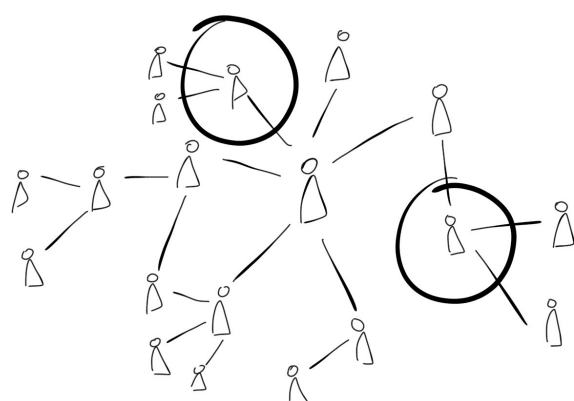
¹² <http://www.un.org/apps/news/story.asp?NewsID=46373#.VQSReeHR-iw>

¹³ https://www.google.co.uk/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=0CAcQjRxqFQoTCKiE8OLOis cCFULTFAodw-ELbg&url=http%3A%2F%2Fwww.psh.org.za%2Ffiles%2Fprojects%2Fteen-parenting-teenage-pregnancy-project.html&ei=_ym-VeilM8KmU8PDr_AG&bvm=bv.99261572,d.d24&psig=AFQjCNFmrxtgftHSGaH293R4837mHN1WGog&ust=1438612324367760

collaboration.¹⁴ Yet it is widely believed that these skills will be important to their participation in the 21st century polity and economy.¹⁵

In the essay, we posit two separate foundations, one concerned with each of these issues.

Step 2. Identify the relevant stakeholders, understand their motivations, behaviors, and needs



The relevant stakeholders include the beneficiaries themselves—to be determined—and others who are affected, for better or worse, by the problem or potential solutions to it. Identifying these stakeholders and understanding their perspectives and needs can contribute significantly to defining the problem from the outset.

Teen pregnancy

In the teen pregnancy case, the stakeholders include a girl's the boyfriend or the father of their child, their child, their parents, churches, schools, communities, and government agencies.

Deeper learning

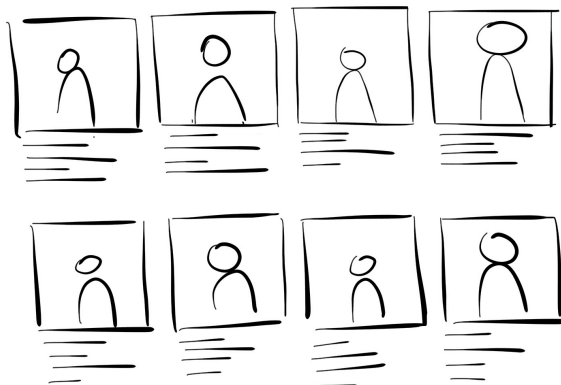
The deeper learning problem may involve many stakeholders in interrelated systems: students won't receive deeper learning education in classrooms unless the teachers know how to provide it; teachers won't get trained unless school districts support the training; school districts won't do this unless they are required or permitted to teach deeper learning skills, and have access to well-developed measures that will guide any improvement strategies; textbook and test publishers won't develop appropriate materials unless they foresee or can help create a market for them. Relevant stakeholders include parents, employers, teachers, school administrators, textbook and test publishers, local and state boards of education, legislatures, and officials in the U.S. Department of Education.

We'll say more about the processes for learning about stakeholders' interests and needs in Step 8, which focuses particularly on beneficiaries.

¹⁴ <http://www.hewlett.org/programs/education/deeper-learning>

¹⁵ http://www.cnlimmigration.com/images/Federal_Skilled_Workers.jpg

Step 3. Identify whose problem it is—i.e., who are the potential beneficiaries of a solution

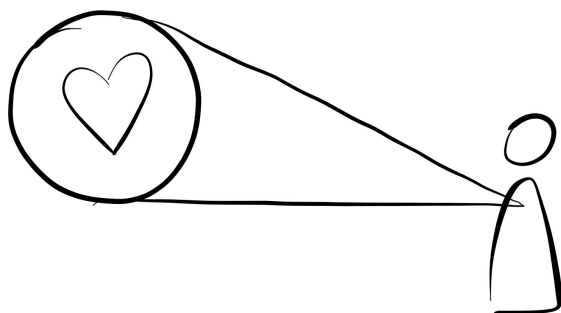


When an individual is addressing his own problem, the intended beneficiary is typically himself. In contrast, a policy maker or foundation is supposed to be concerned with other people's problems—often multiple beneficiaries. The possible beneficiaries of a strategy for addressing teen pregnancy include the potential mother herself, the father, their child, their parents, the health care system, and the communities that may bear the costs.¹⁶ The beneficiaries of a strategy for teaching deeper learning skills may include the students themselves, businesses and other organizations to which they can contribute

as adults, and the society in which they will participate.

A particular foundation's mission may lead it to focus on some beneficiaries and exclude others from consideration. At this early stage of the process, however, it is wise to err on the side of inclusion.

Step 4. Describe why the problem is important to the decision maker



This step specifies why this issue is a problem in the decision maker's eyes, thus revealing her values and interests. In the case of a foundation, the answer reflects the donor's, board's, or staff's values. Asking the question helps ensure that the solution will address both the beneficiaries' needs and the foundation's interests. It also helps get at the essence of the problem rather than define it in terms of the first solution that comes to mind.

The core method is to repeatedly ask, why is this problem important to the foundation? or why does this problem matter? with respect to each description of the problem, until the foundation's deepest goals and objectives are made explicit. Ralph Keeney provides a good example from the realm of public policy, concerning the decision of how to transport hazardous material to a distant waste dump.¹⁷ The initial stated objective was to minimize the distance that the trucks must transport the material.

The question should be asked, "Why is this objective important?" The answer may be that shorter distances would reduce both the chances of accidents and the costs of transportation. However, it

¹⁶ Although the foundation's grantee organizations are essential stakeholders, they are not beneficiaries but rather partners or agents in serving the beneficiaries.

¹⁷ Ralph Keeney, *Value-Focused Thinking: A Path to Creative Decision Making* 66 (Cambridge: Harvard University Press, 1992).

may turn out that shorter transportation routes go through major cities, exposing more people to the hazardous material, and this may be recognized as undesirable. Again, for each objective concerning traffic accidents, costs, and exposure, the question should be asked, “Why is this important?” For accidents, the response may be that with fewer accidents there would be fewer highway fatalities and less exposure of the public to hazardous material. And the answer to why it is important to minimize exposure may be to reduce the health impacts of the hazardous material. To the question, “why is it important to reduce health impacts?” the response may be that it is simply important.

At this point, we have reached the decision maker’s fundamental objective—the basis for the next phase of the problem-solving process. Note that stopping with the first stated objective—minimizing the distance that the material is transported by trucks—would have significantly narrowed the range of possible solutions and, indeed, led to a “solution” that might have exacerbated rather than solved the underlying problem.

Teen pregnancy

For a foundation concerned with reducing teen pregnancy, the dialogue might go:

Q: Why is addressing teen pregnancy important?

A: It interferes with teenage girls’ health, lives, and educations.

Q: Why is that important?

A: Pregnancy and motherhood threaten their lives and health and force them to enter adulthood prematurely. And by compromising their educations, it will limit their opportunities as adults.

Q. And why is that important?

A. Because all children should have the opportunity to experience childhood in good health without undue burdens and should have equal opportunities as adults.^{18 19}

Another series of “why” questions reveals a different concern:

Q: Why is addressing teen pregnancy important?

A: It’s harmful to the children of teenage girls because their mothers are not prepared for motherhood. They usually do not have enough information about child development nor the capacity to provide adequately for their children’s needs.

Q: Why is that important?

A: Children of teen mothers are less likely to develop the educational and other skills necessary to succeed in life.

Q: Why is this important?

A: We believe that all children deserve equal opportunities in life.

The dialogue might well focus on other issues as well—for example, the likelihood that teen pregnancy increases the chances that the mother and child live in poverty or the burden that teen pregnancy places on relatives and communities. However, we will focus on the two distinct problems that we already articulated above, one concerned with the welfare of the potential

¹⁸ Of course, there are myriad other factors that compromise girls’ lives. But for purposes of this essay, we’re assuming that the foundation has decided to focus on pregnancy rather than, say, providing a living wage.

¹⁹ https://www.google.co.uk/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=0CAcQjRxqFQoTCLysqMveis cCFUO_FAodP7kE7Q&url=http%3A%2F%2Fwww.gettyimages.com%2Fdetail%2Fnews-photo%2Fsomalian-mothers-with-their-sick-children-at-the-gift-of-news-photo%2F120275654&ei=ITq-VfyNGMP-Ur_ykugO&bvm=bv.99261572,d.d24&psig=AFQjCNFq1yDBB-cB62ettYdeKPqlsbZO3A&ust=1438616588962550

mothers, the other with the welfare of their children. The foundation might ultimately address one, the other, or both.

One important function of the “whys” is to press the decision maker—say, a foundation program officer—to articulate her values. As we’ll see in Step 6, this may lead to reconsidering her statement of the problem and perhaps modifying it to better describe the problem that she wants to solve, given the foundation’s interests and capacities.

Deeper learning

For the foundation committed to promoting deeper learning competencies in public schools, the series of questions may include:

Q. Why is that important to the foundation?

A: Students are being taught mainly through rote memorization.

Q: Why is that a problem?

A: Because rote learning doesn’t teach students to think for themselves.

Q: Why is that important?

A: Because people need to think for themselves in order to participate effectively as citizens.

Q: Why is that important?

A: Because we strive for a democratic society in which all citizens participate fully and are critically engaged.²⁰

Or the same questions might lead down a different path:

Q. Why is promoting deeper learning competencies in public schools important?

A: Students are being taught rote memorization.

Q: Why is that a problem?

A: Because they are not learning collaboration and problem-solving skills, which are increasingly required for higher paying jobs.

Q: Why is that important?

A: Unless we empower students with deeper learning, we will see an increasing divide between those who have these skills and those who do not.

Q: Why is that important?

A: Because the divide will lead to increasing inequality.

Q: Why is this important?

A: Because we strive for a society of economic mobility and shared prosperity, and in order to achieve this goal, we need to better equip students to be competitive in a changing job market.

Note that, as in the teen pregnancy example, the two paths reflect two different goals. In this particular case, it is likely that the same solution—deeper learning—may serve both. But that is not inevitably so.

²⁰

<https://www.google.co.uk/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=0CAcQjRxqFQoTCKCYtI3giscCFUeyFAod0PsAAA&url=http%3A%2F%2Fblog.reidreport.com%2F2011%2F05%2Fleague-of-women-voters-to-halt-voter-registration-in-florida-due-to-restrictive-new-law%2F&ei=LDy-VaDSGsfkUtD3Aw&bvm=bv.99261572,d.d24&psig=AFQjCNFxtng5mCecrNfULkQMiBts54hFg&ust=1438616945242532>

At the same time that this questioning process homes in on the underlying goal, it also identifies empirical questions that will eventually be critical to any solution. Each answer to “Why does it matter?” implies a causal connection. Does pregnancy disadvantage teen mothers? Does rote learning inhibit children from thinking for themselves? Does acquiring deeper learning skills conduce to civic participation and better job possibilities? While the goals may be self-evident, the answers to these questions often are not. Later in the process, after defining the goals with greater clarity, the decision maker will look for evidence that the particular strategies will or won’t achieve them.

Step 5. Describe the ideal world in the absence of the problem



As part of articulating the problem clearly, it is helpful to describe the “world as it should be” — the ideal state that would result if the problem were solved. For example:

Teen pregnancy

- Imagine a world where all teenage girls can grow up in good health, free from the responsibilities and economic and emotional burdens of parenthood.
- Imagine a world where all children’s physical, emotional, and basic material needs were met, so that they have the opportunity to flourish.

Deeper learning

- Imagine a world where all people are able to participate in the polity as thoughtful and independent-minded citizens.
- Imagine a world where all young adults enter the workforce with the problem-solving and collaborative skills necessary to have well-paying jobs.

Step 6. Reconsider your statement of the problem and ask what strategies may best achieve your goals.



One's framing of a problem often implies certain strategies for solving it and tends to place other strategies beyond the frame. A common error in problem solving is to frame the problem in terms of a particular solution. There's an anecdote about a farmer who drives to a neighbor's house to pick up some bags of chicken feed. Finding no one home and the feedbags left neatly stacked by the neighbor's barn door, the farmer drives up beside the barn and loads the feed into the truck bed. As he is about to get back into his truck's cab, he sees that his front left tire is flat — and then remembers that he has no jack in the truck.

Feeling no small measure of exasperation, the farmer begins the long walk to the nearest gas station, without noticing that the barn's hay-lift pulley was perfectly positioned to lift the front of his truck. The farmer erred in framing his problem too narrowly. Specifically, he confused the problem ("How can I lift my truck?") with one particularly salient solution ("Find a jack!").²¹

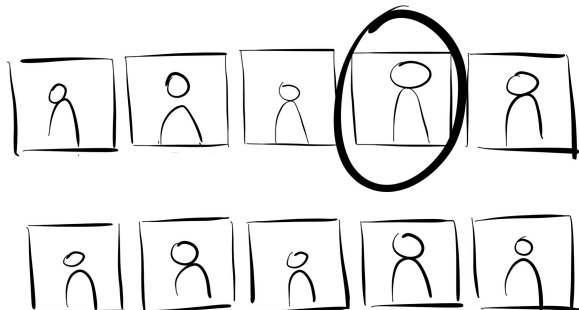
The preceding descriptions of the "world as it should be" with respect to teen pregnancy and deeper learning provide an opportunity to review the initial articulation of the problem statement and ask whether it includes an embedded solution. There are multiple ways to achieve the foundations' goals described above, and the program officer will want to ensure that she is lifting the truck rather than just finding a jack.

For example, the goal of improving opportunities for pregnant teenagers might be effectively achieved by offering them safe abortions. The goal of improving their children's lives might be achieved through special welfare services. Perhaps the economic goal of the deeper learning strategy could be better achieved by advocating for living wages, and perhaps the political participation goal could be better achieved through civics classes or service learning opportunities.

Here we return to the matter of institutional constraints, even if self-imposed. A foundation with existing programs related to family planning or education will have staff with expertise in these areas and not in some of the others mentioned; the programs may be more or less deeply embedded in the organization's structure. A foundation's donor and board may find abortions immoral or may be uncomfortable with advocating systems or policy change because they have a low tolerance for the risks of failure, or because they lack the resources or capacity to engage in such strategies, or just because they dislike advocacy. Absent a reasonably good fit, it is counterproductive to shoehorn a solution into a foundation's fundamental values and institutional structures.

²¹ Brest & Krieger 37.

Step 7. Prioritize and narrow the range of your intended beneficiaries

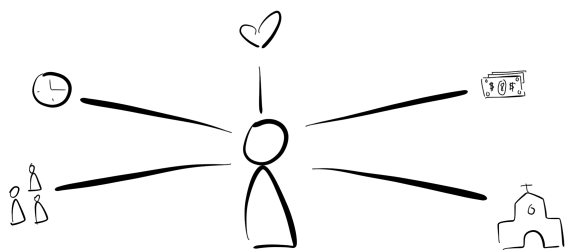


For the remainder of this essay, we will assume that, having made the inquiries in the preceding step, the two foundations have respectively decided to devote their resources to reducing teen pregnancy for the benefit of the teenage girls themselves and providing deeper learning for the sake of the students' future economic prospects.

The business guru Michael Porter famously said, "The essence of strategy is choosing what not to do."²² Our first foundation's decision means that it will not treat the children of teen mothers as its intended beneficiaries—though, of course, there will be fewer such children if the program is effective. In the case of deeper learning, it may well turn out that the same educational strategies that improve the children's economic prospects also improve citizen participation, but our focus will be on the former.

Even with a narrower focus, it is seldom possible to meet all the needs of all potential beneficiaries. The decision maker has to decide which to give the highest priority. Although girls in Africa are not the only ones who suffer the consequences of teen pregnancy, this particular foundation may give them primacy because of a general concern with poverty in those countries and because it has a geographic focus on Africa. Our other foundation may wish to provide deeper learning to disadvantaged students—though it may turn out that the same strategies will benefit students across socio-economic lines. Decisions of these kinds will ultimately reflect the foundation's values and interests, as well as their resources and capacity.

Step 8. Identify the beneficiaries' needs



Having narrowed the scope of intended beneficiaries, the foundation can now examine the needs of the selected beneficiaries in depth. In the original HCD context of product design, needs are what make a product useful or delightful to consumers. In our examples, the equivalent of "products" are services, policies, or programs designed to help a teenage girl avoid

becoming pregnant or to help a student acquire deeper learning skills. A foundation or other decision maker may be willing to press a solution on its beneficiaries for their own good.

There are two fundamentally different ways to gain information about beneficiaries' needs: social science research and ethnography.²³

²² Michael Porter, What is Strategy?, <http://www.hbs.edu/faculty/Pages/item.aspx?num=10698>.

²³ See text at footnote 4, *supra*.

For many of the problems that foundations and policy makers address, social scientists—in fields such as sociology, psychology, anthropology, economics, and political science—have conducted relevant research that bears on their solutions. For example, since its inception five decades ago, the Alan Guttmacher Institute has engaged in research on teen pregnancy. Because research in deeper learning does not have as venerable a history, foundations concerned with this issue have commissioned studies on the subject.

HCD examines the beneficiaries' needs through ethnographic analysis. The ethnographer observes the beneficiaries, engages them through empathy interviews, and, where useful, immerses herself in their experiences. Ethnography is intended to reveal insights that may not be uncovered in conventional interviews and surveys. Stanford's d.school's Bootleg guide explains: "You need to understand the people for whom you are designing. The problems you are trying to solve are rarely your own—they are those of particular users; in order to design for your users, you must build empathy for who they are and what is important to them."²⁴ IDEO's Toolkit explains:²⁵

Building empathy for the people you serve means understanding their behavior and what motivates them. Understanding behavior enables us to identify physical, cognitive, social and/or cultural needs that we can meet through the products, services and experiences we create. ...

Creating solutions through empathy is a way for the design team to blend their expertise with the on-the-ground needs of people. Empathy means deep understanding of the problems and realities of the people you are designing for. It is important to do research across many different groups of people and to "walk in their shoes."

Teen pregnancy

In the teen pregnancy example, the foundation staff (and/or their grantees) would conduct ethnographic interviews with a range of teenage girls, including those who have avoided becoming pregnant as well as those who are raising their children themselves or with the help of relatives, or who have given their children up for adoption. Foundation staff will try to learn about the girls' experiences, understanding their feelings, behaviors, and motivations by soliciting stories about their lives. The goal is not mainly to get the beneficiaries' intellectual perspectives, but rather their lived experiences. The stories will surface insights about the girls' needs and motivations, ultimately providing the foundation staff with enough information to formulate hypotheses about how to address the problem.

Conventional problem-solving approaches tend to focus on average users, on the theory that the intervention or program developed to solve the problem must satisfy their needs. Data from "extreme users" are often thrown out as "outliers," and their significance is not incorporated into the analysis. By contrast, HCD emphasizes the importance of learning the perspectives of extreme participants:

Extreme participants help to unearth unarticulated behaviors, desires, and needs of the rest of the population, but are easier to observe and identify because they feel the effects more powerfully than others. By including both ends of your spectrum as well as some people in the middle, the full range of behaviors, beliefs, and perspectives will be heard even with a small number of participants.

²⁴ Bootleg.

²⁵ <http://www.ideo.org/stories/hcd-method-spotlight-peers-observing-peers>

Including this full range will be important in the later phases, especially in constructing good frameworks and providing inspiration for brainstorming.²⁶

Thus, in addition to interviewing girls who the foundation believes have more or less typical experiences, foundation staff would look for subjects who, for example, are extremely reckless or extremely careful in their use of contraception. The former may provide insights into the motivations and behaviors underlying the problem, while the latter may provide examples of “positive deviance,” leading to creative solutions to addressing the problem.^{27 28}

The ethnographic inquiry may consider relationships, sex, pregnancy, child rearing, and school, but also go well beyond these matters. You may learn that some girls become pregnant intentionally, looking forward to caring for a baby. In some instances, they are happy with their choices. But many may not make informed choices and may view their pregnancies as major catastrophes. Some girls may want to avoid becoming pregnant but lack the resources to buy contraceptives or feel awkward going to a free clinic, or feel that using condoms is uncool or inhibits spontaneous moments of intimacy, or are embarrassed to discuss contraception with their boyfriends.²⁹ Their boyfriends may have similar views or believe that contraception is for adult men and not for teenagers. It is often valuable to understand the girls’ lives more broadly: what are their near- and long-term aspirations? Who are their friends and mentors? How do they spend their days?

Observing the girls’ lives may also provide insights. Although their intimate activities are entirely private, one might, for example, observe their behavior in schools, venues where they congregate to chat with each other, or in clinics. Any number of contextual factors might exacerbate or mitigate the behaviors contributing to the problem.

The insights from ethnography should be combined with insights from other sources. As mentioned above, there is much valuable social science research about the consequences of teen pregnancy in various demographic groups.³⁰ Indeed, decades of research in the psychology of judgment, as well as behavioral economics indicate that people are often poor self-reporters of their motivations and poor predictors of their own wellbeing. For example, we often value immediate gains over long-term benefits and mispredict how an event will affect our future welfare; and we are highly susceptible to the ways in which choices are framed.³¹ Behavioral research can alert the decision maker to situations where individuals, despite the value of ethnographic interviews, are likely to have an inaccurate understanding of their own interests and motivations.

Deeper learning

²⁶ IDEO.

²⁷ Positive deviance is based on the observation that in every community there are certain individuals or groups whose uncommon behaviors and strategies enable them to find better solutions to problems than their peers, while having access to the same resources and facing similar or worse challenges. <http://www.positivedeviance.org/> See Richard Pascale, Jerry Sternin, and Monique Sternin, *The Power of Positive Deviance: How Unlikely Innovators Solve the World's Toughest Problems* (2010).

²⁸ <http://globalhealth.unc.edu/wp-content/uploads/2012/03/mother-and-children-malawi-CK.jpg>

²⁹ At this stage, the purpose of ethnography is not to ask the beneficiary to solve the problem at hand. Nonetheless, anticipating later stages of the problem-solving process, you may also seek the beneficiaries’ views of the barriers to solving the problem as they see it and their ideas for solutions. Ideally, you might return to the interviewees at several stages; but this is inefficient and, in reality, you often only have one shot.

³⁰ Indeed, in this particular example, ethnography may not uncover much that is not already known about the foundation’s beneficiaries.

³¹ Brest & Krieger, Chapters 13 and 14.

The foundation concerned with providing deeper learning may engage in two quite different inquiries. The first, which parallels that in the teen pregnancy problem, involves understanding the intended beneficiaries' needs for deeper learning and their experiences with and without it. This might involve ethnographic interviews with students, their families, and teachers and with young adults of the same demographics now in the job market and their employers. Interviews might uncover learning deficiencies arising from their earlier educations that inhibit acquiring problem solving or collaboration skills, or they might uncover systemic reasons that preclude students from occupying the jobs the foundation imagines preparing them for.

In addition to these interviews, the foundation will likely also need to understand the interests of the various other stakeholders who could facilitate the provision of deeper learning or who could stand in its way. This would lead to the second set of inquiries, described in Step 11 below.

Step 9. Learn whether other organizations are addressing the problem effectively

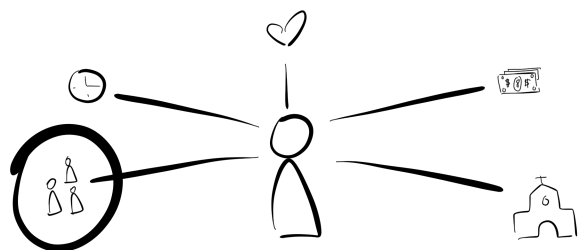


The chances are that neither foundation is the first to address its chosen problem. This is certainly true in the domains of teen pregnancy and much of K-12 education. The cliché about not

reinventing the wheel is apt here. The foundation should learn if others have designed successful approaches to solving the same problem. If so, it can adapt their strategies or, better yet, collaborate with them. This will save the time and expense of many of the next steps—though the foundation may still need to do some prototyping and testing to ensure that the other strategy works in the foundation's particular context. Otherwise, it continues the exploration.

Frame the Problem

Step 10. Articulate and prioritize the needs that you will address



In Step 7, the two foundations significantly narrowed the focus of their interventions—in one case, deciding to focus on teenage girls (rather than the children that might be born to them), and in the other, deciding to focus on the economic benefits deeper learning can provide students (rather than improving their civic participation). Now, the foundations will reach another major

decision point: determining which needs to prioritize as they move forward.

Step 8 may well reveal that a beneficiary has a number of needs. It is often difficult to design an intervention that can fulfill multiple needs simultaneously. Therefore, just as the foundations narrowed the range of potential beneficiaries, they also may limit which of the potential beneficiary's needs it will address.

Teen pregnancy

Although our foundation has decided to focus on the interests of the girls rather than those of their potential children, it has not yet addressed whether its priority should be preventing pregnancy or to helping the girls who become mothers manage caring for their children. Even if the foundation had the resources to address both, they would involve radically different interventions. The decision ultimately should be based on the strategies' comparative effectiveness, consistent with the foundation's values.³²

The core of the decision faced here is essentially an empirical question: what strategy will most cost-effectively achieve the foundation's goals? The foundation staff's intuitions may suggest that preventing the pregnancy in the first place is the more effective strategy. But it could be that well-designed and well-implemented prevention strategies are already reaching most of the targeted beneficiaries with mixed results, and that the foundation could play an important role in helping those girls who do become pregnant. The foundation must determine whether it will adopt upstream or downstream strategies, or both. A foundation's values may also constrain the decision. In our example, a foundation whose donor and main decision maker believes that contraception is immoral would either pursue a strategy of counseling abstinence or focus on helping the young mothers care for the children rather than preventing their conception.

³² Referring back to Ralph Keeney's hypothetical nuclear power plant problem, the achievement of any one objective should never be maximized without considering its interaction with strategies aimed at other objectives. In a forthcoming essay considering systems thinking, we will discuss the positive and negative contributions one strategy might incidentally have on another, including how the high-level strategy of a decision maker solving more than one problem might be optimized even when none of its sub-strategies are maximized.

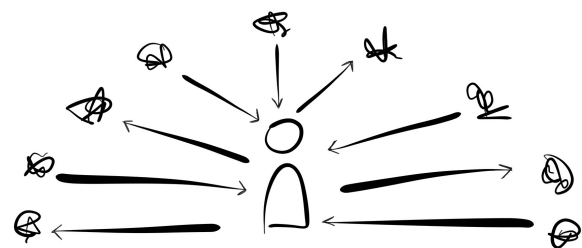
We will suppose that, after due consideration, our foundation has decided to focus on preventing teen pregnancies.

Deeper learning

As described in Step 8, our second foundation has discovered two quite different needs related to using deeper learning to advance the economic opportunities of students. On one hand, the foundation could fund improvements in the deeper learning curriculum for schools inclined to offer it. On the other hand, because many teachers, school boards, and other stakeholders are skeptical about the value of adopting a deeper learning curriculum, there is a need to persuade them to do so. Both strategies are valuable, but the foundation's staff and board conclude that others are adequately funding the first. Especially given the foundation's experience with policy advocacy, the foundation decides to work on the advocacy agenda.³³ Solve the Problem

The next phase of the problem-solving process begins by understanding the landscape or context in which the problem occurs, and then examining the barriers to achieving the desired outcomes and opportunities for transcending those barriers.

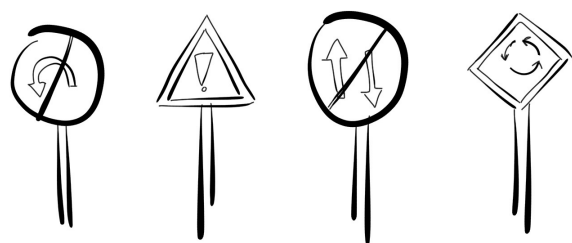
Step 11. Revisit key stakeholders to understand their motivations, behaviors, and needs and the systems in which they operate



As mentioned earlier, there are many stakeholders, in addition to beneficiaries, who can affect outcomes for better or worse. These stakeholders are situated in systems, including complex bureaucracies, that you must understand in order to have a chance of solving the problem. It will be important to understand their needs in order to consider how to overcome the barriers to

your solutions.

Step 12. Identify barriers to moving from the present state to the ideal state



Imagine the problem space as a physical landscape that you need to traverse. The barriers might be steep cliffs, rivers, swamps, and dangerous beasts. In addressing social problems, the barriers may be technological, financial, political, psychological, or social. They may be created by external forces or by the beneficiaries themselves.

Teen pregnancy

³³ <http://www.jillstaneck.com/wp/wp-content/uploads/2014/11/nea-aft.jpg>
Revised 10/19/2015

We have already identified many potential barriers to avoiding teen pregnancy. They include teenagers' ignorance about the experience and consequences of teen motherhood, lack of access to contraceptives, poor planning for contraception, the glamorization of motherhood, pressures from boyfriends, and embarrassment in raising the issue.

The foundation staff will want to assess the extent to which these barriers actually contribute to the problem. This is fundamentally an empirical question. The ethnographies will have provided some insights that can serve as hypotheses for moving forward. But the staff must assess whether particular needs were expressed frequently enough and by a large enough number of interviewees, to generalize from the interviews. If not, surveys could expand their knowledge beyond the interviews.³⁴ In any event, it would be an error not to consult social science research in the field.

We'll suppose that the foundation concludes that teen age girls encounter three major barriers to using contraception:

- Taking candidly about contraception with their sexual partners
- Understanding their contraception choices
- Accessing contraception

Deeper learning

The barriers to providing students with deeper learning skills might include school boards' and politicians' conservatism or the absence of appropriate materials or of teachers prepared to teach those skills. Barriers sometimes may emerge unexpectedly. For example, deeper learning skills are synergistic with, if not required to satisfy, the "Common Core" standards.³⁵ When the Hewlett Foundation launched its deeper learning initiative, there was widespread support for the Common Core, with all but a handful of state school superintendents endorsing the standards. Several years later, in events that took everyone by surprise, the Common Core became highly politicized, with PTAs, politicians, and departments of education passionately expressing divergent views. As of this writing, the politics of the Common Core present a barrier to mainstreaming deeper learning in public schools.

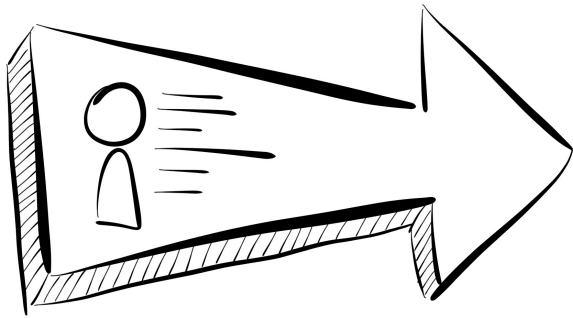
Our second foundation concludes that there are several major barriers to offering deeper learning skills in public schools:

- School officials or their constituents believe that teaching deeper learning skills comes at the expense of core competencies in reading and math.
- School officials or their constituents believe that teaching deeper learning skills will require excessive testing, which they associate with requirements of the Common Core.
- Teachers and teachers' unions fear that they will be penalized for their students' performance on new curricula.

³⁴ With respect to personal issues like reproductive health, teens are likely to be more forthcoming about their beliefs, behaviors, and needs in a conversation where they trust the interviewer and feel respected than in responding to a conventional survey.

³⁵ <http://www.corestandards.org/>

Step 13. Articulate “design mandates” and posit strategies that could transcend barriers, address needs, and facilitate change



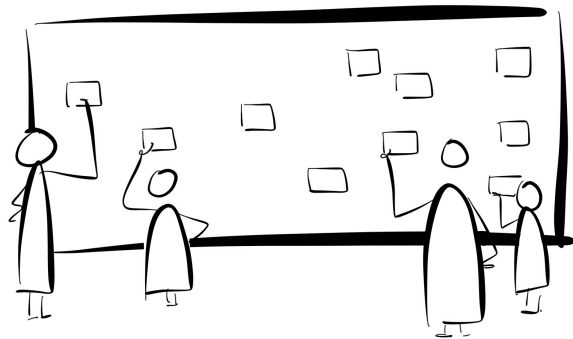
Notice that each of the barriers in the preceding step can be described in terms of the specific needs of a beneficiary or stakeholder—e.g., “teenage girls need to find a way to talk candidly about contraception with their sexual partners,” or “school officials need to find a way to separate deeper learning from the controversy around Common Core testing.” The problem-solving process begins by formulating what HCD terms a design mandate—a description of one particular

need and its source:

- “An African teenage girl needs to be able to have a conversation about contraception with her partner because the conversation might lead to the use of contraception.”
- “Proponents of deeper learning need a way to demonstrate to key decision makers that deeper learning does not require excessive testing.”

Although the foundations may consider multiple barriers, it is generally best to focus on one at a time as they move through the following steps in this essay.

Step 14. Brainstorm questions emerging from the design mandate



HCD employs a particular form of brainstorming³⁶ that centers around the question, “how might we (HMW) satisfy the need” outlined in the design principle. The HMW statement sets up the process for developing many possible solutions. The HMW process incorporates divergent thinking (“ideation” or “flaring”) to create a wide range of possible solutions. This step will be followed by converging (“selection”) on a small set of strong candidates.³⁷

To move from research to real-world solutions, you will go through a process of synthesis and interpretation. This requires a mode of narrowing and culling information and translating insights about the reality of today into a set of opportunities for the future. This is the most abstract part of the process, when the concrete needs of individuals are transformed into high-level insights about the larger population and system frameworks that the team creates. With defined opportunities, the team

³⁶ The IDEO Toolkit states: “Brainstorming with rules like Defer Judgment and Build on the Ideas of Others is a proven method for coming up with unexpected innovations. Brainstorming makes us think expansively and without constraints. The practice of generating truly impractical solutions often sparks ideas that are relevant and reasonable. It may require generating 100 ideas (many of which are mediocre) in order to come up with three truly inspirational solutions.”

³⁷ Brest & Krieger 76.

will shift into a generative mindset to brainstorm hundreds of solutions and rapidly make a few of them tangible through prototyping.³⁸

Teen pregnancy

Starting from the premise that a teenage girl needs to find a way to talk about contraception with her sexual partner, the foundation staff might ask:

- How might we give her more confidence in broaching the subject?
- How might we help her make the conversation seem exciting and sexy?
- How might we help her develop less awkward ways to communicate?
- How might we help her choose a partner with whom she can talk or who shares her views about contraception?

Deeper learning

Foundation staff interested in promoting deeper learning would also engage in the HMW process, but here, by contrast, the beneficiary is not at the center of inquiry:

- How might we motivate test publishers to develop simple tests for deeper learning skills?
- How might we disentangle deeper learning from the political controversy over the Common Core?
- How can we assist school boards, superintendents, and principals who appreciate the value of deeper learning skills in addressing the political problems they face?

The answers to many of these questions involve techniques of advocacy and systems change. They require as deep an understanding of the systems in which these stakeholders operate as the teen pregnancy inquiries demand an understanding of the world of teenage girls and boys.

There are helpful HCD brainstorming practices that allow a team to reach more creative solutions rather than going for the most obvious or the “lowest hanging fruit.” The practices include:

- Separating idea generation from evaluation using techniques like “yes,... and” rather than “no, but...” This allows the team to think creatively and expansively about a solution space in order to arrive at surprising and new places.
- Building off the ideas of others in the design team.
- Sharing the ideas using simple headlines (one to three word ideas or visuals on Post-its³⁹). This allows for easy visual recognition to facilitate the later re-organization of ideas.
- Encouraging wild ideas, some of which may inspire practical ideas and some of which may turn out not to be so wild after all.

After going through the process of imagining solutions to one need, the foundation staff might repeat the process with several others. How often they iterate the process depends on their assessments (1) of the extent to which addressing the need would solve the problem and (2) of the likelihood that the proffered solution would actually work.

³⁸ See step 17 below.

³⁹ Post-its are so ubiquitous in the design process, that a cynic might believe that HCD was invented by 3M.

Step 15. Select several promising strategies from those generated



The foundation staff will select a few strategies to move forward. The fundamental selection criterion is the strategy's potential effectiveness in solving the problem, considering the foundation's capacity, the benefits achieved for the costs of implementing the strategy, and also taking into account the positive and negative impacts on

other stakeholders.

Each strategy is, in effect, a causal hypothesis that if we do X, then Y is likely to happen, and that Y is likely to lead to the better state, Z. As the foundation staff moves forward, they should not get too wedded to any particular strategy. Indeed, they should continue to test the hypotheses as they implement strategy, being alert to the possibility that any particular strategy is ineffective or even counterproductive.⁴⁰

Teen pregnancy

In the teen pregnancy case, plausible strategies for meeting different needs might include:

- Providing adult or peer counseling for the girls and/or their boyfriends to help them understand contraceptive choices and talk candidly about contraception.
- Creating an inviting space where girls can get information and free or subsidized contraceptives, and where they can support each other in dealing with their boyfriends and family.

Deeper learning

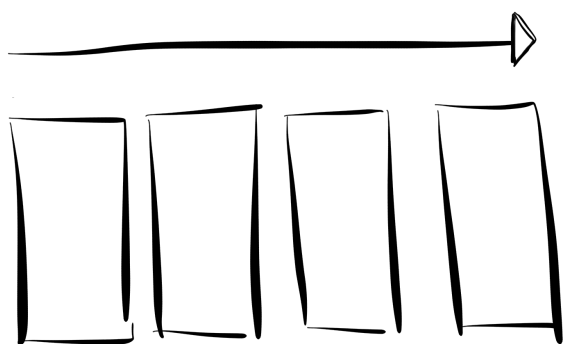
In the deeper learning case, plausible strategies might include

- Providing incentives for test publishers to develop simple and inexpensive tests for deeper learning skills.⁴¹
- Supporting consortia of state superintendents in their efforts to provide deeper learning
- Meeting with relevant policy makers to advocate deeper learning skills.

⁴⁰ For a particularly vivid example, the "Scared Straight" programs for bringing at-risk teens to prisons in an effort to deter them from potential criminal behavior, not only had no positive effect but actually led to a greater likelihood of offending actions. <https://www.americanprogress.org/issues/open-government/news/2012/02/08/11108/doing-what-doesnt-work/>; https://www.ncjrs.gov/html/ojdp/news_at_glance/234084/topstory.html. In considering multiple strategies, the foundation might predict that it is more likely to be effective with certain sub-populations of beneficiaries than with others. This requires either choosing among beneficiary groups or developing several strategies aimed at different sub-populations.

⁴¹ Cf. <http://gettingsmart.com/2012/10/the-hewlett-foundation-announces-asap-competition-winners-automated-essay-scoring/>

Step 16. Turn the selected strategies into logic models and compare them to one another⁴²



Now comes the time to assess the relative merits of the selected strategies. A useful approach to doing this is to sketch a logic model for each one, describing its inputs, activities, outputs, and intended outcomes. Then, the foundation should evaluate one strategy at a time:⁴³

- Describe its intended outcome—what success would look like.
- Ask how much confidence you have in the empirical underpinnings—sometimes called the “theory of change”⁴⁴— of each step. (This might call for more formal research and ethnography.)
- Mentally simulate carrying out the activities necessary to implement the process.
- Consider what might go wrong in implementing each step—including possible resistance by other stakeholders or inertia in the systems—the likelihood of problems arising, and what you would be reasonably able to do to mitigate the risk.
- Do a rough calculation of costs and benefits of implementing the strategy.
- Eliminate the least effective strategies.
- Identify several of the most promising strategies and select one or more of them to prototype.

Teen pregnancy

Service delivery programs lend themselves readily to logic models. For example, in addressing the problem of teen pregnancy in Zambia, IDEO.org and Marie Stopes International developed an imaginative approach by introducing “pop-up” nail salons, which appealed to the girls’ spontaneity and provided a place where they could congregate, gossip, and get contraceptive counseling in a very different atmosphere than a clinic.⁴⁵⁴⁶ The activities and outputs included creating the venue, distributing flyers or using other means to attract girls to the nail salon, and ensuring that the girls received appropriate contraceptive information. The underlying theory of change included the hypothesis that the girls would use this information to avoid becoming pregnant.⁴⁷

Activities	Outputs	Intermediate Outcomes	Ultimate Outcomes
<ul style="list-style-type: none"> • Create venue • Distribute flyers 	<ul style="list-style-type: none"> • Nail Salon • Staff members provide 	<ul style="list-style-type: none"> • Girls come to the nail salon 	<ul style="list-style-type: none"> • Girls avoid pregnancy

⁴² The logic model is a specific approach to problem solving, and one not generally contemplated in the HCD process, largely, we believe, because of its roots in product design rather than ongoing social interventions.

⁴³ See, e.g., Kellogg manual

⁴⁴ See Brest, The Power of Theories of Change, http://www.ssireview.org/articles/entry/the_power_of_theories_of_change

⁴⁵ <http://www.ideo.org/projects/bringing-family-planning-to-zambian-youth>

⁴⁶ <http://www.ideo.org/stories/gals-n-swagg>

⁴⁷ The IDEO.org team also gave each of the contraceptive methods a personality type (e.g., the Pill for the Perfectionist, IUD for the Superwomen, etc.), based on the insight that young women in urban Zambia enjoy taking personality quizzes in teen magazines and might better relate to the contraceptive products if framed in this way.

<ul style="list-style-type: none"> • Train staff 	contraception information and devices	<ul style="list-style-type: none"> • Girls provide information and support for each other • Girls acquire contraception information and devices • (As a result) Girls use contraception 	
---	--	--	--

Deeper learning

Advocates must bob and weave to deal with changing political contexts and markets in ways that cannot be captured by a relatively static logic model.⁴⁸ Each component of a deeper learning strategy—teacher training, textbook development, gaining political support in various venues—may have its own sub-strategy, with the individual components rolled up into an overarching plan to coordinate their interactions. Large-scale systems change often requires a combination of strategies—policy advocacy, marshaling evidence, and providing practical approaches—in order to solve the problem.

⁴⁸ Teles and Schmidt, *The Elusive Craft of Evaluating Advocacy*
Revised 10/19/2015

Implement, Observe, Learn, and Evaluate

Step 17. Prototype the selected solutions to test for their viability



While a conventional problem-solving approach involves mentally simulating the implementation of a strategy, HCD favors “getting ideas and explorations out of your head and into the physical world”⁴⁹ through rapid prototyping.⁵⁰ “Prototypes are a powerful form of communication and force us to think in realistic terms about how someone would interact with the concept.”

Prototyping is a methodology for making solutions tangible in a rapid and low-investment way.... Prototyping is about building to think, acknowledging that the process of making ideas real and tangible helps us to refine and iterate the ideas very quickly.

Creating many different prototypes that highlight different aspects of your product or service not only enables people to give honest feedback, but also prevents the team from getting attached to an idea prematurely. Feedback is critical to the design process. It brings the constituents directly back into the design process. Feedback inspires further iterations to make solutions more compelling for constituents.⁵¹

A prototype seldom addresses the entire problem, but is designed to test a specific part of the solution. In terms of a logic model, it may test an assumption or activity that is particularly critical in leading to the outputs and ultimately to the outcomes of the strategy. The purpose of a prototype is to learn as much as possible with as little investment of resources as possible. Prototypes should readily lend themselves to changes and redesign based on feedback. Potential beneficiaries or others who are asked to evaluate the prototype will provide more candid responses when they are shown an idea that is still in development, so that they believe their feedback will be useful and are not worried about disappointing expectations or hurting anyone’s feelings.

Teen pregnancy

Here’s IDEO.org’s description of how it prototyped and tested strategy for preventing teen pregnancy in Zambia:⁵²

⁴⁹ Bootcamp.

⁵⁰ Some solutions are more readily prototyped than others, with products often lending themselves to quick changes and policies sometimes being difficult to prototype at all. Service delivery strategies may lie between.

⁵¹ IDEO Toolkit. The d.school Bootcamp guide writes that a “prototype can be anything that takes a physical form – be it a wall of post-it notes, a role-playing activity, a space, an object, an interface, or even a storyboard.” Bootcamp

⁵² <http://www.ideo.org/stories/gals-n-swagg>. IDEO also prototyped a party, where girls played a game that taught them about birth control, and group workshops that depended on peer-to-peer engagement.

[We were] trying to find the best way to talk to young girls about safe sex and the options they have to protect themselves. Our first instinct told us that we would get people's attention when they were out dancing so we designed a few prototypes for clubs, dressed the part and went on a night out. Fairly quickly we discovered that although it was a good place to find congregations of teenagers, it was also an environment where conversations would never reach the depth and engagement we were looking for. As usual, finding out what didn't work was half the battle and we were pleased to prove our hypothesis incorrect and move on to the next.

It so happens that "the next" included a crash course in fine manicuring to be able to give free services to teens at our newly opened nail salon. We rented out a space and set up a pop up nail salon in the middle of the Kamwala street market, a place where hundreds of people shop and loiter around on sunny Saturday afternoons. Part of the team advertised through the little market streets while [others] perfected the art of simultaneous manicuring intertwined with girl talk.

The nail salon was a great setting to gather teenage girls and talk about the different types of contraceptives available to them through casual conversation. The girls were comfortable sharing their experiences, had hundreds of questions and were eager to take referral cards and more information back to their friends. There is something special about looking down at your nails, not having any eye contact and throwing in a hard question wrapped inside superfluous comments. "Is this the shade of red you wanted?" "Oh, so the injection made you gain weight?" "Do you also want white tips or just glitter?"

The prototype went well, but as always, it also opened up new questions for us. We believe the way and pace with which we tell the story about contraceptives has a huge weight on their likelihood of adopting a method. It's not only about side effects, but also about how they fit in with every girls' lifestyle. The impact that myths have on decision making is also both fascinating and heart breaking but we haven't found the right way to communicate truthful and trustworthy information. Our next step is to take everything that worked well and make it better, while also questioning everything that didn't work, ask ourselves why it didn't and try again.

Deeper learning

The Hewlett Foundation's work with IDEO and Stanford's d.school to replicate or scale the success of schools teaching deeper learning competencies provides a good example at the same time as it illustrates the importance of continuing to question problem framing. The Foundation had identified ten school networks that sought to prepare students for college and careers by focusing on outcomes similar to the deeper learning competencies.⁵³ To this end, the schools offered extensive internships, or interdisciplinary classrooms focused on real-world projects, or required students to complete dissertation-style defenses of their work. Subsequent research⁵⁴ undertaken by the American Institutes for Research found that students attending these schools outperformed their counterparts at comparison schools with respect to skill development, test scores, high school graduation rates, and four-year college attendance.⁵⁵

Unlike conventional public schools, these network schools were designed with deeper learning in mind, and they were small compared to most public schools—for example, a high school might have fewer than 400 students. Policymakers, experts, and other educators who visited the schools could not easily conceive of a means for other schools to replicate their success.

⁵³ <http://deeperlearning4all.org/deeper-learning-in-schools>

⁵⁴ <http://www.air.org/resource/evidence-deeper-learning-outcomes>

⁵⁵ <http://www.hightechhigh.org/> (check if this is one of the network schools)

In response, the Foundation approached IDEO with the idea of creating a toolkit of “do it yourself” approaches that any school could adopt to use its existing resources (current staff, building, school schedule) to achieve deeper learning outcomes. Hewlett provided IDEO with a planning grant.⁵⁶ But in contrast to many planning grants, which support piloting an identified solution in preparation for scaling it, this grant asked the IDEO team to continue exploring how best to frame the problem. Through ethnographic work focused on school administrators, the team concluded that the problem might not be: “how might we find more affordable and accessible ways to replicate Deeper Learning Network practices in other schools?” but rather: “how might we provide school principals with leadership development and a process for change to achieve deeper learning objectives?” In retrospect, the Foundation’s staff concluded that this type of planning grant avoided the Foundation’s solving the wrong problem.

In a second phase of the work, IDEO collaborated with the Stanford d.school to prototype a number of discrete leadership development approaches, including in-person workshops, a hack-a-thon, on-line learning experiences, and in-person coaching. In parallel, IDEO identified 22 “big ideas” from the Deeper Learning Network, and brainstormed creative ways school principals could “hack” the ideas that might be too big to implement right away. IDEO and the d.school learned that it was important for principals to start small and, through coaching, to connect small steps with their ultimate goals for their schools. IDEO and the d.school also learned that accountability was essential, and that this could be operationalized by building a local cohort of school principals and promoting positive peer pressure to action.

They also experimented with developing the “uncommon measures” approach—a process for identifying simple, observable behavior metrics that could serve as a proxy for the ultimate changes that the principals were seeking to achieve⁵⁷. Examples of uncommon measures include what happens when student work is posted in public spaces at the school, which can reveal how students see themselves as learners and the degree of respect they gain in the community.

During this second phase, the team didn’t prototype the entire leadership development experience, but rather specific features, with the strategic goal of testing out these ideas. As described above, because the ideas were rapidly prototyped, it was easy to discard ideas that did not seem to be as efficacious. For example, the team tried a number of ways to connect and collaborate with principals after a workshop. They found that one-on-one coaching (between the principals and the IDEO/d.school team) was effective and appreciated. By contrast, attempts at cohort-wide interaction had only limited successes: prototypes of a group Facebook page and group videoconference calls had low participation. Reasons cited for this low participation included scheduling difficulties and the lack of interest in joining what they saw as yet another online platform. For the pilot, the team has therefore focused on one-on-one coaching and extremely simple modes of group communication such as a group email list.

IDEO and the d.school have now embarked on a third phase of the project, called School Retool.⁵⁸ This phase is a complete pilot test of the fully designed, three-month leadership

⁵⁶ Gabe Kleinman, who at the time worked at IDEO and initiated the planning grant for the Deeper Learning project, effectively captured this idea in his essay: <https://medium.com/@gabekleinman/a-dose-of-innovation-in-grant-making-6d4a06b87b56>

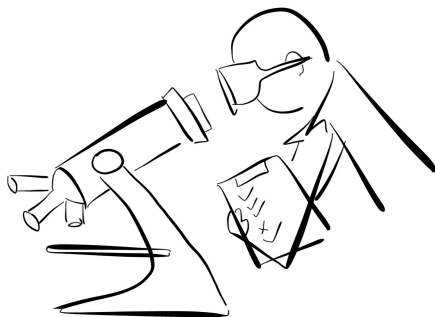
⁵⁷ This video provides information about uncommon measures in the School Retool project: <https://vimeo.com/119362803>

⁵⁸ For more information, visit www.schoolretool.org.

experience, targeting principals in schools serving students typically underserved by the system (e.g., students from poor communities, as well as students of color and English Language Learners). By explicitly applying an HCD approach to this work, IDEO and the d.school were able to re-frame the problem and quickly generate and test solutions to the reframed problem.

Step 18. Implement and evaluate

The final stage of the process of strategic design is implementation. Ideally, one would carry out what IDEO calls “mini-pilots,” testing aspects of the strategy on a limited number of users before investing in a full pilot project:



Implementation is an iterative process that will likely require many prototypes, mini-pilots and pilots to perfect the solution... Piloting an idea before it goes to market not only allows you to understand the solution better, but also helps you identify what it will take for your organization to deliver that idea to the community.⁵⁹

IDEO.org likely characterized the nail salon in the example mentioned above as a “prototype” because it was just one of a number of possible venues for attracting girls to receive contraceptive counseling. One can also think of it as a pilot because it created an entire experience that might eventually be replicated. A prototype of the nail salon might have tested different assumptions on which the project was built—for example, whether Zambian girls would be attracted by flyers advertising the salon, or whether the physical layout of the salon was conducive to candid talk about contraceptives.⁶⁰

At whatever level a strategy is implemented, it requires continual monitoring and openness to modification based on what actually happens. Especially, but not only, at the outset of a new strategy, one needs to be in a test mode: Stanford’s d.school writes:

Testing is the chance to refine our solutions and make them better. ... Testing informs the next iterations of prototypes. ... Testing is another opportunity to build empathy through observation and engagement—it often yields unexpected insights.... Sometimes testing reveals that not only did we not get the solution right, but also that we have failed to frame the problem correctly.⁶¹

There is a conventional distinction between monitoring and evaluation.

- Monitoring involves tracking progress along the various steps necessary to implement an intervention. In the IDEO.org Zambia example, monitoring would include tracking activities and outputs, such as how many flyers for the nail salon were distributed, how many girls came, and whether they received contraceptive information. Every service delivery organization can engage in monitoring its activities.

⁵⁹ IDEO Toolkit.

⁶⁰ http://ecx.images-amazon.com/images/I/51-o02nWB4L._SY344_BO1,204,203,200_.jpg

⁶¹ Bootcamp

- Evaluation is concerned with intermediate and ultimate outcomes—i.e., did the girls use contraceptives and did the program actually reduce their pregnancy rates?⁶² Evaluation tends to be more difficult and expensive and is often beyond the capacity of the organization implementing a program. A strategically-inclined funder must be willing to pay the costs of appropriate evaluation

⁶² Evaluation asks whether a program made a difference compared to the counterfactual in which the program did not exist. See, e.g., Paul Gertler, et al, *Impact Evaluation in Practice* (2011), <http://web.worldbank.org/WBSITE/EXTERNAL/EXTABOUTUS/ORGANIZATION/EXTHDNETWORK/EXTHDOFFICE/0,,contentMDK:2796485~pagePK:64168445~piPK:64168309~theSitePK:5485727,00.html> Beyond this, lies the further ultimate outcome or impact of improving the girls' lives over the long term. But such evaluation may lie beyond the scope of the project.

Conclusion

The non-linearity of the problem-solving process is nicely captured by a sentence from the d.school quoted above: “Sometimes testing reveals that not only did we not get the solution right, but also that we have failed to frame the problem correctly.” At each stage of the process, you should be open to reframing the problem and learning about hitherto unnoticed interactions among stakeholders or, indeed hitherto unnoticed stakeholders.

Of course, you must come to a provisional rest at some point. A teen pregnancy program or education strategy takes time to implement, and it then develops its own inertial forces. But monitoring and evaluation must continue even after a program has been brought to scale, both to check if it is being properly implemented and to learn whether it is actually making a difference. For better or worse, that’s the nature of social change.

Although many designers, social scientists, and strategic planners view each other with some skepticism, we believe that the integration of HCD and conventional problem solving and strategic planning processes can significantly improve the way foundation and public policy makers address complex problems. While we have no doubt that this essay contains errors of omission and commission, our hope is that it can provide a beginning framework for this integration.