



The foundations of design thinking

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Design thinking tends to evoke strong emotional reactions in opposing directions - excitement, frustration, scepticism. We often find conflicting opinions that stem from very different notions of design thinking. With a boom of literature and case studies in design thinking, a variety of definitions are being simultaneously advocated for in academia and industry alike. Before diving deeper into how design approaches can be used in organizations, it is helpful to get on the same page in terms of how we view design thinking. In a recent review, for example, Warwick Business School professor Micheli and colleagues identified five perspectives on design thinking in the literature¹:

- 1] *Emphasizing interdisciplinary collaboration where design thinking practices are considered a starting point toward embedding design thinking across organizations*
- 2] *Emphasizing design thinking as designers' domain, highlighting the ability to visualize and use different material practices*
- 3] *Emphasizing resilience in problem solving, offering design thinking with its tolerance for ambiguity and practices of interdisciplinary collaboration as an alternative to narrow analytical approaches*
- 4] *Emphasizing the holistic and systemic perspective, focusing on the abilities of individual designers to think and visualize*
- 5] *Emphasizing learning to think like designers, using abduction and aspirationally balancing intuition and rationality*

What these different conceptualizations have in common is a view of design thinking as a user-centered approach to creative problem solving and innovation¹. We think of design thinking as a way to gather insights, reframe challenges and create effective solutions through emphasizing collaboration, diverse perspectives, concretization and

experimentation. It can be considered a “social technology” of tools and insights into human nature². Rather than relying on the logic of deduction or induction, design and design thinking build on leaps of abduction to create working hypotheses of what might be³. University of Sydney professor Andy Dong and colleagues⁴ distinguish between two types of abduction in design: explanatory abduction and innovative abduction. Explanatory abduction centers on creating plausible possible explanations for surprising observations. This can lead to innovative abduction, where the intended value for a customer or user is the only known factor in the beginning. Potential strategic options and modes of operation for delivering this value are created and tested.

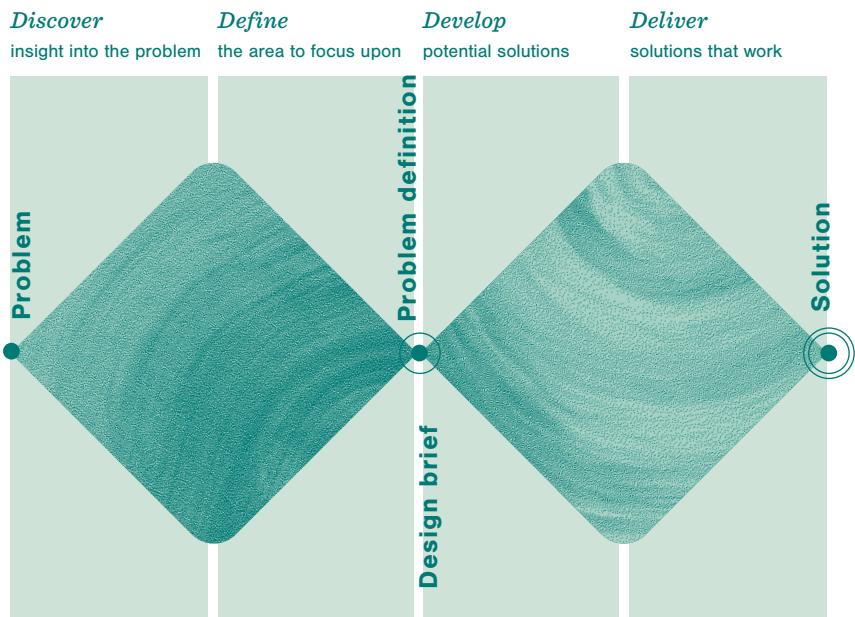
Similar to lean and agile approaches, iteration and experimentation are central in design thinking^{1,5}. However, while some practices and tools are used across these approaches, design thinking has a unique emphasis on exploration¹. While all three work toward solving problems the right way and testing preliminary insights, design thinking centers on identifying the right question to ask in the first place. In terms of problem solving terminology, lean and agile focus on the solution space, whereas design thinking is its most influential in scoping the problem space⁶. In ill-structured wicked problems, these two spaces co-evolve, and how the problem is framed guides which solutions are considered possible^{3,7}. As such, framing and reframing represent key features of design expertise and design thinking^{4,8}.



SHIFTING SHAPES OF THE DESIGN THINKING PROCESS

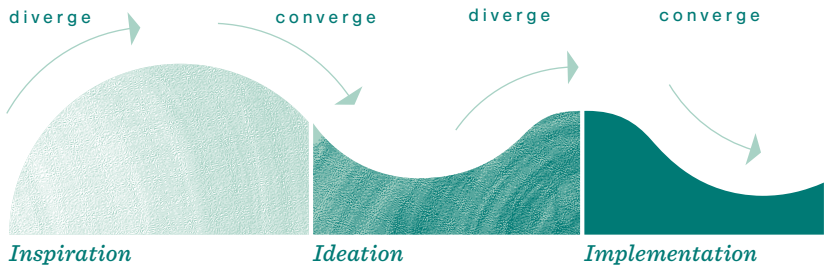
While the number of phases or steps and their names vary across different conceptualizations of the design thinking process, each builds upon data about user needs, idea generation and testing⁹. To illustrate these commonalities, we share four well-known examples of design processes from industry, the public sector, research and education:

The double diamond: Perhaps the most well-known process model is the double diamond, found in many models of human-centered design innovation. The British Design Council defines its steps as first diverging from a problem in Discovering and then converging on a design brief in Defining phases (forming the first diamond), and then diverging again to Develop potential solutions and converging to Deliver a solution (the second diamond)¹⁰.

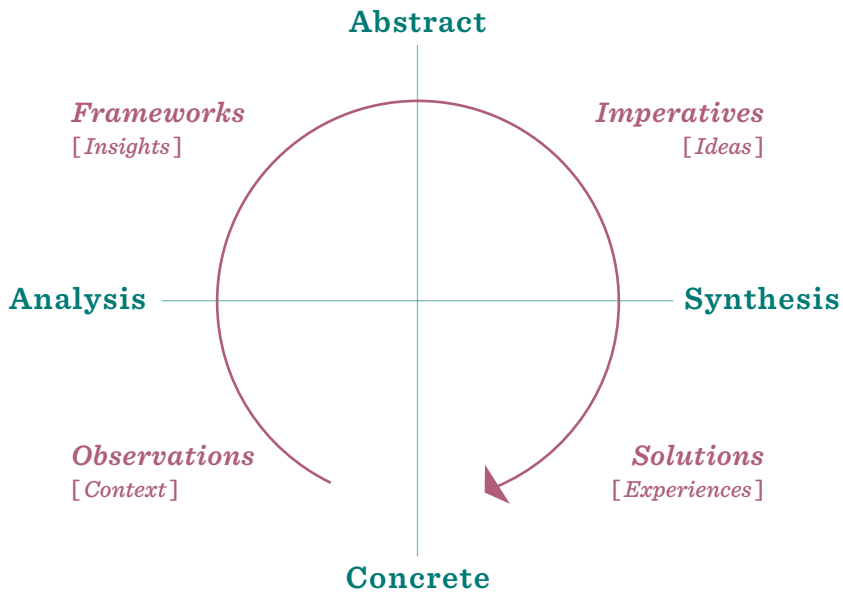


British Design Council

The wave: IDEO is one of the key consultancies behind the spread of design thinking into business¹¹ and is made up of some of the most highly regarded practitioners in design thinking. Their model has three phases; Inspiration, Ideation and Implementation. Their non-profit organization, IDEO.org depicts design thinking as a wave of alternating divergence and convergence (similar to the double diamond), its scope becoming increasingly focused moving towards the solution¹².

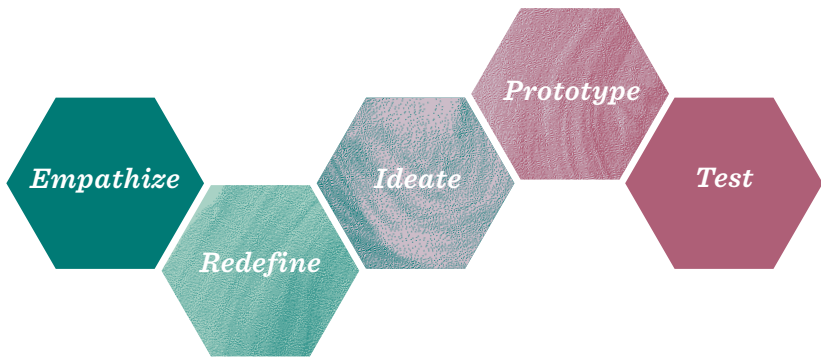


The two-by-two: In the academic realm, UC Berkeley professor Sara Beckman and Michael Barry from Stanford University have built upon the experiential learning cycle of educational theorist David Kolb¹³, drawing a parallel between the process of creating innovations and learning. Design activities iterate between four quadrants of creating observations, frameworks, ideas and solutions. These can be mapped on two continuums: abstract and concrete, and analysis and synthesis¹⁴.



Beckman & Barry

The hexagons: If IDEO is a contender for the most famous design thinking business, d.school at Stanford University is that in the educational realm. They depict design thinking in five steps: empathizing, (re)defining, ideating, prototyping and testing¹⁵. We often use this model ourselves to structure our design thinking workshops at Aalto Design Factory, as this is one of the models built around more self-descriptive, concrete activities rather than abstract phases or transitions.



Whichever process model you choose, it should be considered as a guideline and a source for shared vocabulary that smooths collaboration, rather than a depiction of reality. In practice, the design process is “messy”, with feedback loops between different phases and some customization for each problem. These models can be considered as recipes that act as reminders of important ingredients and help those newer to the approach get started¹⁶.





KEY PRACTICES AND COMMON TOOLS

How design thinking approaches and tools are used in organizations in practice is dependent on culture¹⁷. When collaboration and experimentation are valued and the norm, design thinking is easier to practice¹⁷. In contrast, cultures heavily focused on productivity, performance and siloed specialization have been found to be more resistant to using design thinking¹⁷. This does not mean design thinking is incompatible with productivity or performance: while user research, problem framing and experimentation take time and can feel like a speed bump, these early investments pay off in reducing

overall time and increasing overall effectiveness¹⁷. And while some organizational cultures can make it more difficult to practice design thinking, the good news is that using the tools can also craft culture into a more collaborative and user-centered one. The physical artifacts and emotional experiences of using the methods help organizational members understand the underlying values of design thinking¹⁸.

Reviewing literature, Micheli and colleagues¹ found 37 different methods and tools repeated in connection to design thinking. Ethnographic methods, idea generation methods, visualization, prototyping and experiments were present in most accounts¹. We offer a brief overview of key activities and a few example tools in different phases of the design thinking process: empathizing, reframing and experimenting. In each of these phases, there is a wide variety of methods, tools and approaches you can utilize (and several books exist to guide you through these, such as *This is Service Design Doing*¹⁹). No specific method is demanded, nor ensures success. Rather, the key thing is to understand why these approaches are used and then use whatever method is feasible and suitable for your own specific context and purposes.

The following pages summarize the key reasoning behind the phases of empathizing, reframing and experimenting, and offer two quick and easy exercises and templates for each phase to provide an effective starting point. Completing them will not magically turn a project into a design thinking project, but you stand very little to lose and much to gain from starting the discussion around these topics.

EMPATHIZE: Bringing in diversity in perspectives and the experiential nature of design thinking

Design thinking relies on gathering insights on the needs of stakeholders connected to the problem or idea at hand. These insights serve as the foundation for all other activities, and often a disproportionate amount of time is spent on this very first phase. Needfinding tools require designers and developers to empathetically engage in learning about the stakeholders' experiences and context¹⁸. Perspective taking - a cognitive rather than affective type of empathy - has the strongest correlations to innovation²⁰. It is prompted by exposure to different perspectives and plays a role throughout the design process²¹. First-hand involvement in the needfinding activities is preferred to both transfer a richer scope of insights into subsequent phases and an increased motivation to use these. Using needfinding methods can help to introduce more user and customer centric cultures in the organization¹⁸.

Needfinding tools range from interviews to observations, from design probes to co-creation sessions, and projects using design thinking usually combine different methods to gather a variety of insights. The focus is on answering why and how questions - what, when and who are good starting points, but need deeper understanding to provide a fruitful foundation for abduction. In this phase, diversity matters more than representativeness. If and when pressed for time, stakeholders and users who are as different from each other as possible are targeted in order to increase the odds of making a surprising observation.

In addition to gathering data on and from stakeholders, inviting stakeholders to co-create insights is a powerful approach. Working jointly to create shared, physical "boundary objects" like journey maps or empathy maps can help to reveal new questions to ask and articulate implicit knowledge on the experience and context that stakeholders might not be able to recount in isolation²².

Example tools for empathizing:

Crafting and comparing insight statements with the team

After going through user research results, have each project member synthesize data, producing 3 to 5 key insights statements each with the following template (guiding the focus on stakeholder needs and their “why”s). Compare and discuss your statements. Do you see any patterns or underlying dimensions according to which the statements can be grouped together?

[who]

need(s)

[what]

because

[compelling insight]

For example, R&D engineers

need(s)

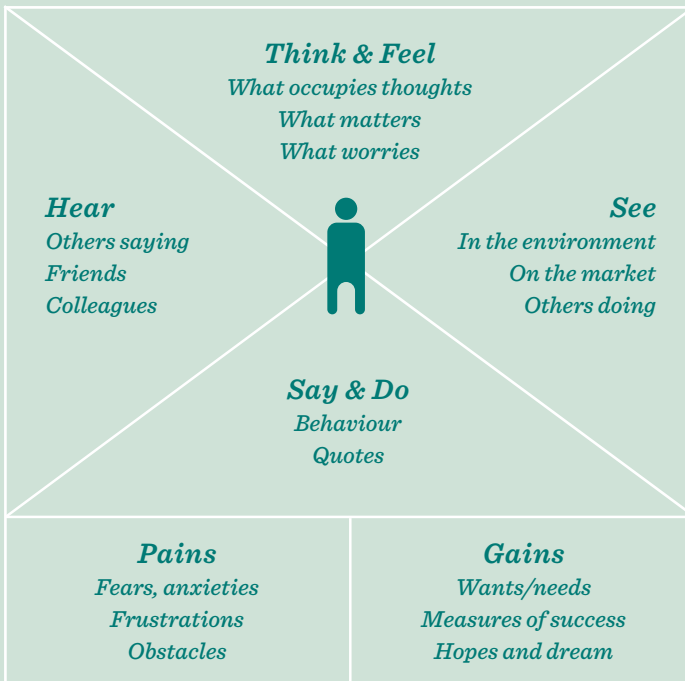
to understand the design thinking process

because

currently mismatched expectations are creating scheduling conflict between collaborating designers and engineers in our innovation projects.

Co-creating empathy maps together with stakeholders

Select a key experience or topic, and invite stakeholders along to create an empathy map together with the team in charge of the development or design project. Work in groups of approximately five around a large canvas or whiteboard, documenting different experiences and thoughts around the topic being mapped. Different sections serve as different entry points diversifying the discussion; don't worry too much about where something should be written down. The key value is in the discussions around the whiteboard, although the produced map also helps in communicating insights further to others in the organization.



REDEFINE: Surfacing assumptions and trying out different scopes

Framing is a way to make sense of problems, ideas and experiences, selecting which aspects of complex and uncertain features are attended to²³. Rather than taking design challenges as given, designers reframe them to be more fruitful and actionable²⁴. Creating a standpoint (“frame”) from which a problem can be successfully tackled is a cornerstone of design expertise and practice^{3,8,25}. Sometimes reframing can even take more time than creating the eventual solution²⁶. Frames guide what we notice and take into consideration, and thus impact the quality of the eventual design solution²⁷.

Framing and reframing can be intentional²⁸, but it can also be implicit and subconscious²⁹. Any challenge comes with assumptions and assumed requirements - some of these will be valid, while others can turn out to be ungrounded. Their accuracy will be easier to evaluate and reflect upon if these assumptions are made visible. Here again, a diversity of perspectives is helpful to identify and evaluate assumptions. Different visualizations and artifacts can prompt the discussion through exploring extremes, illuminating implications and simply creating a shared starting point for conversations³⁰. Design can be used to question the status quo³¹.

To move beyond assumptions and seek alternative frames, raising the level of abstraction can be helpful. Rather than thinking of product, services and solution areas (such as books, office cleaning or education), reframing focuses on the needs underlying them - why would someone benefit from or use such a product, service or solution⁴. High-level questions on reasoning behind goals, expectations and causation are more likely to trigger the creation of new frames than lower-level questions on definitions, specifications and judgement³². Similarly,

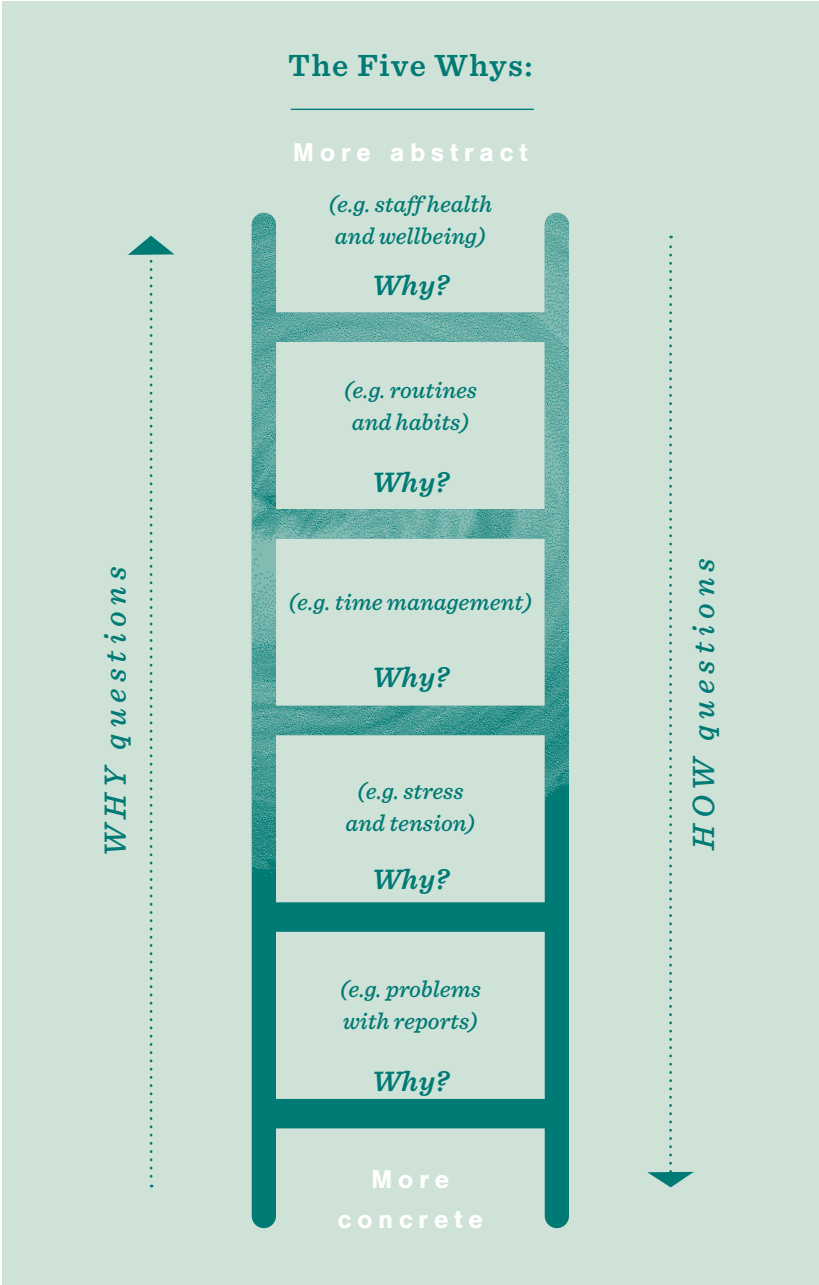
analogies and series of “what if” questions drawing potential parallels between the challenge at hand and different themes and abstract concepts can help^{4,33}. Indeed, in order to unearth some of the hidden assumptions, it is important to create multiple, parallel frames from different perspectives and “depths” to explore rather than fine-tune and validate the initial one discovered.

Example tools for reframing:

Exploring different ladders of abstraction with “why” questions

To focus on needs and explore different frames, asking the “five why”’s familiar from the Toyota Production System³⁴ can help. “Why” questions move the frame higher in the level of abstraction, whereas “how” questions help to bring the challenge into more concrete levels.

The ideal foundation is a frame that is neither too abstract (paralyzing idea generation, creativity does benefit from boundaries) nor too concrete (exhausting potential ideas quickly and running around the same circles) - the Goldilocks of frames. In our experience, moving a few steps upward in abstraction from the original challenge is usually called for in order to enable diverse ideation.



Turning stakeholder research insights into challenge frames

Similar to the insight statements that are produced from needfinding, have each project member reflect on what they have learned and discussed in the project so far and create 3 to 5 “how might we” questions with the following template (essentially flipping over the insight statements, keeping the focus on the discovered stakeholder needs and understanding). Compare and discuss your questions. Do you see any patterns or underlying dimensions according to which the questions can be grouped together?

How might we

[what: goal]

so that

[who: stakeholder]

can

[why: insight]

?

How might we

*, for example, motivate middle-managers
to try out reframing tools to understand
the design thinking process*

so that

sales staff

can

*see constructively questioning initial
project scopes as legitimate in the
organization*

?

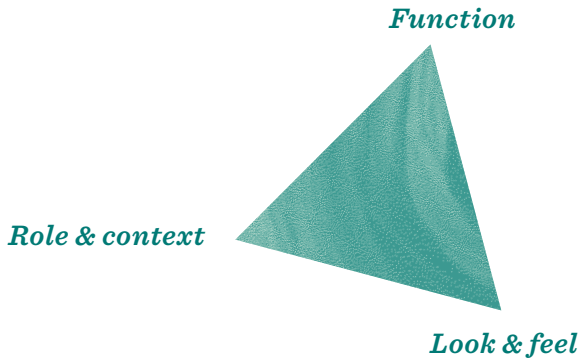


EXPERIMENT: Creating and quickly testing potential solutions to pursue

No amount of needfinding and reframing will immediately yield the perfect solution in the perfect form. In idea generation, quantity breeds quality - the aim is to extend the scope and variety of potential solutions while they are still on paper, as it costs virtually nothing. Playing it too safe will yield unsurprising, unoriginal ideas - wild, unrealistic ideas can act as stepping stones for great and feasible solutions. Using idea generation tools not only helps to create diverse ideas, but contributes towards creating organizational cultures open to ambiguity, collaboration and pursuing ambitious projects where success isn't guaranteed¹⁸.

In the initial experimentation phases, the aim isn't to validate solutions, but rather to maximize learning what does and does not work, and why³⁵. It is both more resource efficient to construct low resolution prototypes and easier to isolate what caused results when everything from an idea isn't bundled into one prototype or test from the get beginning. Rather, ideas are broken down into subcomponents and assumptions, which can be quickly tested; here, think more paper user interfaces, desktop walkthroughs with building blocks and role plays than CAD models or beta versions. The "low resolution" prototype can test either the proposed function, role and context, or look and feel³⁶ - try to add a second dimension and it becomes much more time consuming to prototype and more difficult to interpret the results. Thus, the purpose is to create a series of quick prototypes and tests in the initial exploration phases.

Prototyping to understand:



Houde & Hill

Iteration can be one of the hardest things to absorb for those new to design thinking - humans have a natural tendency to converge quickly and design thinking is used to counteract that tendency³⁷. Idea testing tools can help to create a culture of experimentation, openness to failure and strategic thinking¹⁸. In addition to pursuing parallel experiments within the project team, bringing in external stakeholders to co-design prototypes and experiments can also help to prevent fixation on a single solution. As more is learned, experimentation becomes more sophisticated and transitions more towards validation, but it is important to start small. Not only do these initial small bets keep the stakes and costs low, they help to create early wins to build momentum for the proposed solutions³⁸.

Planning experiments

Keep your eyes on the prize - what do you want to learn, and how will you know what you have learned? This template can be used to plan potential experiment plans. Again, we encourage you to plan more options that you intend to execute, so that you can mindfully select which ones make the most sense with your needs and constraints.

Experimentation plan:

<p><i>Learning goals</i> What do you aim to learn with your experiment?</p>	<p><i>When and where</i> When and where will the experiment take place? For how long?</p>
<p><i>What</i> Describe what will you test or try out?</p>	<p><i>Resources</i> What resources are needed?</p>
<p><i>Who</i> Who will you experiment with?</p>	<p><i>Measuring</i> How do you measure success?</p>

Regardless of the methods and tools you chose to use, design thinking aims to create a deeper understanding of the issue from different perspectives and to learn how these could be effectively improved upon. The approaches are certainly beneficial on an individual level, helping to open up one's thinking, but practicing design thinking alone is a tall order. Many, if not most, of the practices hinge on collaborating with others, inside and outside of the project and organization. It takes a village to raise a design thinking outcome! Getting the whole organization on board is needed in the long run (as we'll explore in the next chapter), but it is equally helpful to remember that even large changes need to start somewhere. Rather than waiting for the perfect conditions and support before acting, starting to introduce more design thinking even in your own work alone can be the spark that helps to spread a new way of creating value in your setting.

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