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DESIGN THINKING FOR NON-DESIGNERS: A GUIDE FOR TEAM TRAINING AND IMPLEMENTATION

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Introduction

Design thinking provides a tremendously powerful set of tools for designers and non-designers alike. However, non-designers face the difficulty in learning the tools and mind-set of design thinking while lacking the long training period that experienced designers undertake as part of their education. For example, when General Motors began working with a design consultancy to improve their own vehicle innovation processes, they faced a challenge that some of their engineering and marketing staff were to start using design thinking methods, but these staff had little formal training in how to use design thinking techniques. The increasingly widespread training of design thinking for teams of *non-designers* raises questions of how relative novices can learn effective methods given realistic time constraints for training such teams.

Indeed, ambitious efforts are under way across firms to get more of their staff involved in design thinking approaches. For example, IBM has opened a 50,000-square-foot "Home of IBM Design Thinking" in Austin, Texas, that they described as part of a

“new approach to reimagining how we design our products and solutions,” and Infosys has plans to train 30,000 of its employees in design thinking. While non-designers can relatively quickly learn the basic concepts behind design thinking and a user-centered approach to innovation, experience shows that not all product development teams trained in design thinking are successful. While the theory can be learned easily, the actual practice of design thinking comes with many practical challenges for implementation. To counter this problem, there are three important strategies for training teams of non-designers:

1. Encourage “dual-mode debate” of not only ideas but also processes.
2. Manage design thinking transitions of key mind-sets.
3. Adapt tools under changing team membership.

For each of these strategies we provide two points of specific implementation guidance. Our guidance is applicable to those implementing design thinking training programs as well as members of design teams hoping to improve their effectiveness. Before embarking on the strategies and implementation guidance, it is important to consider what non-designers will need to learn as part of adopting a design thinking approach.

10.1 What Do Non-Designers Need to Learn?

Training non-designers in the design thinking process can take many forms, from relatively brief lecture-based overviews of the underlying concepts to more hands-on experiential training sessions built around either simulated or actual projects. In general, teams need to learn design thinking tools as well as key mind-sets to improve their performance (Seidel & Fixson, 2013). Figure 10.1 presents a broad, three-part categorization of design thinking tools that teams typically are exposed to as part of their training: need-finding tools, brainstorming tools, and prototyping tools.

Considering the specific tools in each category helps to understand the range of tools that those new to design thinking will be exposed to—one guide lists 101 tools

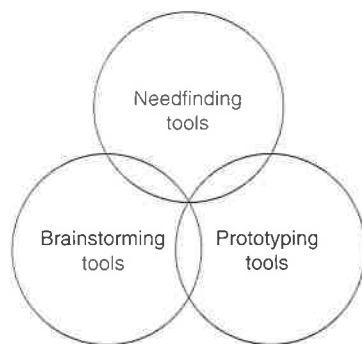


Figure 10.1: Three main categories of design thinking tools.

that aspiring users of design thinking might consider (Kumar, 2012). For example, teams being trained in need-finding tools may learn how to better interview for empathy, following a step-by-step guide to developing an interview protocol to promote wide-ranging responses. A second tool may be in how to build a “journey map” of a user experience, helping to chart emotional highs and lows across a user’s experience with current products that may trigger insight into a new opportunity for innovation. In training on brainstorming tools, teams may learn how to apply “How might we” questions as input to an ideation session that might start with a few minutes of individual ideation before proceeding to group brainstorming. Another brainstorming tool is to adhere to specific rules that promote variance in ideas. In applying prototyping tools, teams may learn how to develop “low-fidelity” prototypes using cardboard or foam core to quickly test out ideas, or they may learn how to incorporate potential users into a prototyping process. Some tools apply to multiple categories, as represented by the Venn diagram in Figure 10.1, such as a brainstorming approach that involves the use of physical prototype materials.

In addition to specific tools, non-designers need to learn key mind-sets that are typically used by designers, such as encouraging a climate of debate, developing a sense of empathy, and promoting respect of different viewpoints. Learning the formal tools of design thinking along with relevant mind-sets gives design teams a set of capabilities for innovation, but the design thinking approach can also lead to challenges for non-designers, which we discuss next.

10.2 Challenges Teams Face with Design Thinking

Design thinking provides a tremendously powerful set of tools, but teams with non-designers face three main challenges in making use of design thinking. A first challenge they face is in understanding that the use of design thinking tools is dynamic and requires adaptation over time. Design thinking tools often have to be introduced to novice teams in a linear fashion, or illustrated as a journey through well-defined phases of analysis and synthesis (Beckman & Barry, 2007), but there is no “one-size-fits-all” way for the tools to be applied in any design scenario. While this point is made in almost all publications on design thinking—including the overview of design thinking found in Chapter 1 of this book (Luchs, “A Brief Introduction to Design Thinking”)—this dynamic aspect of design thinking is particularly difficult for novice teams to adopt. Many teams may be expecting to learn a well-defined linear process, and so it is difficult for them to learn that as teams they need to decide which tools to use in an emergent, nonlinear, and iterative fashion.

The tools of design thinking are applied within phases of a product design process that can take many labels. For example, IDEO product development has described their range of tools as occupying three “spaces” of inspiration, ideation, and implementation (Brown, 2008). The d.school at Stanford University (2013) groups tools within five “modes”; Chapter 1 of this book includes four modes across two phases; and a high-level view of product development separates out two primary phases of concept generation and concept selection (Ulrich & Eppinger, 2012). A comparison of

Example Design Thinking process “spaces,” “modes” or “phases” (illustrated linearly for comparison)

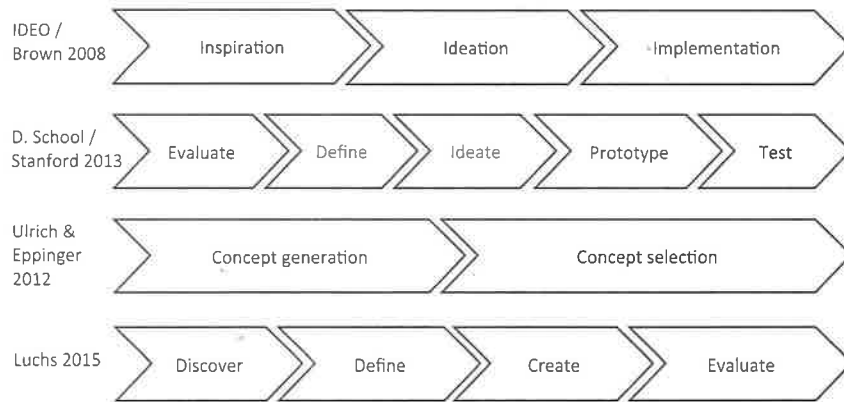


Illustration of changing emphasis of tools spanning the process:

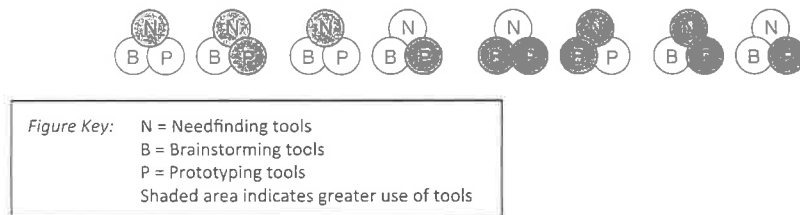


Figure 10.2: Example design thinking process phases and illustration of changing emphasis of tools over time.

these approaches is given in Figure 10.2, in which the nonlinear process of design is by necessity represented linearly for comparison purposes. This figure also includes a representation of the use of design thinking tools over time. Certain categories of tools—need-finding, for example—may have more emphasis at different points in the process (represented by shading in the figure), depending on how the innovation process has unfolded. Consider, for example, a team that was initially developing a range of concepts around new luggage. After the team presented three concepts at the end of their concept generation phase to a review panel, they realized one concept they had concerning a means to provide cell phone charging within the luggage was going to require additional need-finding activities, rather than further prototyping as they had initially planned. New data in the form of feedback reviews, technical milestones, or competitive offerings can change the decision rationale of which design tools are relevant as a next step. It can be a challenge for teams to know how to proceed in a process that is not overly prescriptive about which steps to take in every situation.

A second area of challenge for design teams is in knowing how and when to encourage different design thinking mind-sets. Debate over ideas is encouraged in a design thinking context, and once mastered this can be alluring to team members

who relish the opportunity to engage in spirited discussion over options. However, as the well-known advice to avoid “feature creep” in engineering projects illustrates, too much debate over new options can slow the progress of projects without an increase in innovation. Jeff Hawkins was famous at Palm Computer in insisting that the main challenge for devices was to know when to limit new features. Knowing when to draw on a divergent mind-set seeking out new ideas versus when to focus on executing a course of action is critical for teams.

A third area of challenge is that team membership may change over the course of a project. This is the reality of innovation in modern corporate contexts, where individuals are often moved from one project to another. This contrasts to the more stable environment in which design is taught in academic environments or in corporate team training sessions, where stable membership during the process is usually assured. Taken together, these three main challenges provide a context where teams may easily become frustrated with their progress or are prevented from realizing their full potential. How can teams of non-designers adopt the most efficient strategies for success?

10.3 Three Team Strategies for Success

While teams with non-designers face challenges in adopting design thinking, there are concrete strategies they can take and specific guidance for implementation that facilitate success. Table 10.1 presents three areas of challenges for design teams discussed above, along with team strategies and guidance for implementation, which will be addressed in turn.

Encourage “Dual-Mode Debate”

Encouraging design teams to vigorously debate ideas is well established as a means to facilitate innovation; past studies have shown that active debate of different design concepts can lead to a wider variety of ideas for teams to consider, and that more questioning and debating ideas within a team is related to more product development

| Table 10.1: Design Thinking for Non-Designers: Challenges, Strategies, and Implementation | | |
|---|--|--|
| Challenges | Team Strategies | Implementation Guidance |
| Non-designers are often unaware that use of tools is dynamic and requires adaptation. | Encourage “dual-mode debate” of both ideas and design process. | Add metrics for idea and process debate. Conduct scenario exercises to analyze process options. |
| Non-designers learn benefits of key mind-sets but not phase dependency. | Manage design thinking transitions of key mind-sets. | Enforce discussion of process phase check-ins. Specify a “contract” of ideas no longer open to debate. |
| Team membership changes can cause lack of common understanding of design journey. | Adapt tools under changing membership. | Proactively document and share past elements of design journey. Purposefully use brainstorming for onboarding of new members. |

success (Hoegl & Parboteeah, 2006). While encouraging active debate of new design ideas is common, learning to actively debate the next step of the design process is relatively rare. This process debate can focus on whether the next step is to the next phase, to iterate back to a different phase, or which specific tool to apply.

Teams that engage in “dual-mode debate,” in which they actively debate both ideas and the next step of the design process, apply a critical skill. As an example of encouraging “dual-mode debate,” one high-performing team developing a device to help facilitate spine surgery was very open not only to new concepts early in the process but also to the tools that they would use. One member commented afterward that the team was “open-minded,” stating, “We kind of thought that everything had a reasonable chance.” This team was noted for debating both ideas and which design tools to use early in the process. In contrast, a low-performing team at the same time reported they were more focused on being “efficient” than in taking the time to engage in debate over their process.

Experienced designers know that the next step of a design process is always subject to debate, but non-designers may need help learning this. Teams of non-designers may have debated ideas during brainstorming sessions, but they may not know to spend time debating whether the results of a brainstorming session should be followed by additional need-finding or with rough prototyping, for example. Learning how to debate the next step of a process can be very uncomfortable for some team members, and so executing this strategy can be helped by two points of implementation guidance, as outlined in the final column of Table 10.1: (1) add metrics for both idea and process debate and (2) conduct scenario exercises to analyze process options.

A first point of guidance is for teams to add metrics for both idea and process debate. It is important to note that what is labeled idea or process “debate” here falls within the larger category of what social sciences sometimes call conflict. While debate over ideas or processes can be beneficial, personal conflict almost always leads to poor team performance. To help teams assess their ability to foster debate while avoiding personal conflict, teams can be asked to fill out surveys at various points in the process to evaluate their team dynamics. On five-point scales, team members can be asked to what degree are they debating ideas and the design processes they are using, and team facilitators can use this information to assess whether interventions are required, as we outline in the accompanying text box (“Add Metrics for Idea and Process Debate”).

Add Metrics for Idea and Process Debate

Teams need to know how well they are engaging in active debate. One simple but effective survey tool that has been used with teams in the past has been to ask them the following two questions on a scale of 1 to 5, with 1 representing “to a little extent” and 5 representing “to a great extent”: (1) I feel that we debate ideas within our team, and (2) I feel that we debate the process to follow within our team. These metrics should be collected in at least two points. First, the survey should be run in the heart of concept generation, such as after

a team has completed at least one brainstorming session and is developing a range of potential product concepts. Second, the same survey should be conducted after concept selection, when a team has narrowed down to one main concept and is further refining the concept. How much debate is ideal? The circumstances of the industry and teams may change how individuals rate a level of debate, and so the ideal level of idea and process debate can vary by context. The scores of new teams can be compared with successful teams in the past, allowing managers to determine if teams need to be reminded of how to encourage debate in the early stages of the process. Also, if scores among individuals within a team vary greatly, that can be a signal that intervention is needed to see why team members have such disparate perspectives on the level of debate—such as debates being dominated by one or just a few members of the assigned team, for example.

A further point of implementation can be to embed exercises in debating a design process as part of team training, as we outline in the accompanying text box (“Conduct Scenario Exercises to Analyze Process Options”). For example, a case-study scenario can be given on a design process that is under way, and team members can engage in debate as to what their next step would be: Do they stay within the same phase, do they proceed, or should they iterate back to an earlier phase? Do they need to consider a different tool? Reference texts can be provided to demonstrate that many alternative tools might be appropriate (e.g., Kumar, 2012), and team members can assess and debate which might be most beneficial as well as if iterating back to a prior phase is beneficial. Rather than blindly following a process of how design was done in a textbook case, non-designers can learn how to debate and evaluate the process and the range of tools available to them.

Conduct Scenario Exercises to Analyze Process Options

When adopting design thinking, it can be difficult for teams to understand how the tools of design thinking can be applied in many different phases and that the specific order of tools can change with each project. Conducting a case-study scenario exercise where team members can learn how to debate different process options can help team members to be open to debating a range of options. Sources of case-study scenarios can include articles from *PDMA Visions* magazine, cases and articles from the Design Management Institute, and cases purposely written for training teams within a certain industry. For example, a team that is working on new service design in the food and beverage industry might be given a case write-up describing the development of a new beverage

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age bottle. The case may describe, for instance, the need-finding activities that identified the potential for a product that added recommended doses of vitamins to a water bottle of the user's own water and the initial ideation sessions that led to different means to inject and mix vitamins. However, the case may note how user reactions to initial prototypes identified a concern with cleanliness. How should the team proceed? In this scenario setting, teams can debate the merits of further brainstorming about methods, of prototyping the delivery, and of further involving users in understanding their requirements for "cleanliness," describing what further information they would need to gather to make their decision. Encouraging debate in the safety of a scenario can help teams better explore options in their own projects and help them learn the benefits of spirited debate about next process steps.

Manage Design Thinking Transitions

Even design teams that become good at debating both ideas and processes are not immune from difficulties along their design journey. Some teams are markedly better than others in managing design thinking transitions in key mind-sets, as outlined in the second row of Table 10.1. The specific "design thinking transitions" are those concerned in making the shift from a high-debate divergent mind-set to an emphasis on execution within a focus mind-set.

One high-performing team in the medical device field was very good at making the transition from debate to execution and focus. One member reflected on their decision to use a special glue instead of another attachment as part of their design, stating: "Once we knew that we were going to go ahead with glue, we did not revisit. It was not like, okay, at every meeting you are going to think about the need criteria [again]." Medtronic has been lauded as one company that has been good at controlling too much ideation in the latter stages of development. In contrast, Sony's Playstation products have at times been cited as experiencing delays due to the inability to focus on a few innovations at a time rather than trying to incorporate many last-minute additions.

Skilled designers have years of experience in how the practice of debate and a divergent mind-set needs to be moderated over time, an insight that novice teams may lack. As design teams move from concept generation through to concept selection and final refinement, it is critical for design teams to transition from active debate to a focus on design execution. This can be a great challenge for teams, and we offer two points of implementation guidance, as outlined in the accompanying text boxes.

First, team leaders or facilitators should enforce a discussion of where the team is in their process at regular points. For a project of six months' duration from initial ideation through to final prototype, there could be biweekly check-ins where members can discuss the degree to which they need to start to finalize key features of their concept, so to be able to implement a final prototype on schedule. An example "process phase check-in" guide is given in the accompanying text box ("Enforce Discussion of Process Phase Check-Ins").

Enforce Discussion of Process Phase Check-Ins

Whether called "phases," "stages," "milestones," or otherwise, the relative position of a team in the development process has implications for what behaviors will be more successful. Should a team be in a divergent mind-set or a more focused convergent mind-set? Either mind-set may have a place at different process phases, depending on whether the team needs to explore new areas or needs to focus their efforts, though as deadlines approach a focusing effort will be necessary. Many teams struggle when some members are in a divergent mind-set while others are focusing. By engaging in a process phase check-in, the team can consider whether they should be encouraging debate—and if so, what type—or if they should be focusing their effort on execution of the design. The following questions can help to inform a process phase check-in, though the specific form can be tailored to the context:

1. Where in the development process does the team view itself, and do all members agree?
2. Is the team currently needing to seek out diverse ideas and information, or does the team need to select among ideas currently at hand?
3. Would an iteration back to another process phase be helpful at this point?
4. Would an iteration of a specific design thinking tool be helpful at this point?

Second, teams should consider developing a "contract" of what ideas are decided on and no longer open to debate, as we outline in the accompanying text box ("Specify a 'Contract' of Ideas No Longer Open to Debate"). Too many teams get caught in the trap of revisiting decisions over and over again. Teams need a procedure to help them resist the urge to revisit decisions already made, unless there is compelling new information available to them. As mentioned, Medtronic has for years been very careful in documenting aspects of their designs as they proceed, working to make sure that the evolving design is well communicated among all team members. This type of commitment and discipline is especially relevant for the product development velocity of complex products, ranging from consumer electronics to automobiles.

Specify a "Contract" of Ideas No Longer Open to Debate

During an innovation project, it can be difficult to know when to narrow focus to a few ideas central to the product, as the iterative process requires holding many options open while needs are being continually reassessed. However, at a certain point, teams need to decide which new ideas that can be incorporated as product features are well enough settled to be treated as fixed. At one major

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electronics company, they referred to a set of fixed design criteria and related product ideas as being “in the box.” Once they had enough data to support a certain feature of the final product, they put this criteria metaphorically “in the box,” so all engineers and designers on the program knew these did not merit revisiting unless some fundamentally new information came up. The “in the box” listing served as their contract of which ideas were no longer open to debate. To successfully specify a team contract of ideas no longer open to debate, teams can consider the following steps:

1. Name the contract, such as “The Box,” “The Vault,” or “The Design Contract,” and make sure all design team members are aware of this contract at the start.
2. At each major milestone, be sure relevant team members can nominate ideas or features to be included in the contract.
3. Specify the voting process by which ideas or features can be added to the list.
4. Make the contract readily accessible and visible to team members.

Adapt Tools under Changing Membership

While student design teams and design consultancies may have stable team membership during a project, real-world design teams in corporate settings often face a challenge of changing membership. Sometimes people are moved midway through the project to other projects that appear to have more pressing needs; at other times, new people may join the team, coming from other projects that have ended. These shifting team compositions are challenging for two reasons. The first reason is practical, resting on a question of information transmission. Whenever a new member joins a team, this new member needs to quickly learn what the existing team already knows. The second reason is emotional, resting on a matter of trust. In other words, a relationship needs to form between existing and new members of the team that enables productive collaboration.

There are two specific points of guidance for implementing this strategy, as outlined in the third row of Table 10.1. Both points of guidance for improved onboarding of new team members make use of design thinking tools and their outcomes. First, one tenet that underlies much of design thinking is to work visually (Liedtka & Ogilvie, 2011). For example, during need-finding, using tools such as interviews and observations, design teams are expected to display their data on available work surfaces to allow for producing new associations and insights. Vertical surfaces in front of which teams can gather are particularly well suited for these activities (Doorley & Witthoft, 2013). Subsequently, these data are then transformed in visual tools such as journey maps. Since the goal of these visualizations of the user and his pain points is to create alignment within the team and between the team and other stakeholders (such as clients, executive management, etc.), these tools capture the essence of many hours of the team’s work. For that reason, these visuals are also an effective tool to help new team members quickly develop an understanding of key aspects of the project, and the resulting guidance is that it is important for teams to proactively document and share past elements of the

design journey. Design team leaders must ensure that their teams have access to appropriate workspace and materials, as outlined in the accompanying text box (“Proactively Document and Share Past Elements of Design Journey”).

Proactively Document and Share Past Elements of Design Journey

Complex situations composed of many different kinds of information are best understood and interpreted when displayed in their complexity on work surfaces sufficient in size so that they allow making connections and associations. Most industry “war rooms” have this aspect as their underlying idea, whether set up in a major design consultancy like Continuum or a major automotive manufacturer such as Toyota’s “Obeya” rooms. In ideal situations, design teams occupy project rooms whose walls they can use to lay out their data from interviews, ethnographic observations, drawings, storyboards, and findings. In situations where design teams do not have access to permanent project space, it helps to make “movable walls” available to which complex sets of information can be attached but are themselves movable. Such movable walls can range from 24” × 36” posterboard to 4’ × 8’ foamboard. The task for team leaders and managers is to make available the materials as well as the storage space for the boards (which must be very quickly accessible). For 3D materials and prototypes, project boxes (or “cubbies”) have proven very helpful, keeping items at hand that reflect the design process already undertaken.

Second, in addition to using the outcome of design tools as an onboarding device for new team members, some of the tools themselves can also take on this purpose. For example, being part of a structured collaborative brainstorming session is an intense and highly social experience, and this process can help team members learn what knowledge is available within the team and what lines of thinking have been explored. As one designer with the firm IDEO put it, “Brainstorms teach us what designers and clients know, and how to fit it together” (Sutton & Hargadon, 1996, p. 696). As a consequence, managers and design team leaders can use the tool of brainstorming not only to generate ideas but also as a way to integrate new team members faster, as we outline in the accompanying text box (“Purposely Use Brainstorming for Onboarding New Members”).

Purposely Use Brainstorming for Onboarding of New Members

Brainstorming is a particularly well-suited tool for integrating new team members. The underlying reason is that well-facilitated brainstorming sessions create a well-defined and protected space for idea exchange and generation.

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The typical rules for brainstorming such as “one conversation at a time,” “generate many ideas,” “crazy ideas are welcome,” and “suspend judgment” create such a space, and in this environment newcomers face lower entry barriers for participating. In other words, a second purpose of a brainstorming session can be to serve simultaneously as an icebreaker. One team working on the development of a medical device purposefully used several brainstorming sessions to help new team members get “ramped up to speed” with a complicated project in surgical products.

10.4 Conclusion

The three key team strategies and associated implementation guidance can help teams best adopt tools to the real-world experience of design thinking as non-designers. Members of design teams will increasingly come from ranks of professionals who do not have the luxury of academic design preparation, and it can be possible that the challenges of design could put them off a sustained use of design thinking. Design thinking encourages us to be flexible in how we view a given situation, and to that end these team strategies help teams to engage with design thinking in an adaptive way that gets to the heart of viewing design thinking as a valuable but flexible toolkit for innovation.

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