INTEGRATING SYSTEMS THINKING AND DESIGN THINKING

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As readers of this newsletter are aware, systems thinking is evolving as an alternative to the old paradigms. Richard Mattessich wrote that "systems thinking is first and foremost a point of view and a methodology arising out of this viewpoint" ("The systems approach: Its variety of aspects," *Journal of the American Society for Information Science*, 33(6), 1982). It is a lens through which you can look at the world. That lens determines what you see and often influences what you do about it.

Systems thinking replaces *reductionism* (the belief that everything can be reduced to individual parts) with *expansionism* (the belief that a system is always a sub-system of some larger system), and *analysis* (gaining knowledge of the system by understanding its parts) with *synthesis* (explaining its role in the larger system of which it is a part). According to Russell Ackoff, analysis is useful for revealing *how* a system works, but synthesis reveals *why* a system works the way it does.

Many methodologies are derived from the systems thinking worldview, including interactive planning, soft systems thinking, and system dynamics. Regardless of the approach, the essence of systems thinking is encapsulated in the concept of systemic wholeness, which is grasped by looking at the whole instead of the parts. A system involves an interconnected complex of functionally related components. Failing to consider the systemic properties as derived from the interaction of the parts leads to sub-optimization of the performance of the whole.

With systems thinking, managers and designers learn how the parts of their organization interact, not how they perform independently. Otherwise, unintended consequences may emerge as changes made within one part of the system may adversely affect other parts. Often, these new problems are much worse than those addressed initially. Ackoff suggested that, for this reason, many performance-improvement initiatives fail and actually throw fuel on the fires they seek to extinguish.

Design Thinking Defined

In recent years, a great interest in "design thinking" has developed. But design in management is not something new. Design philosophy has its roots in Egyptian and Mesopotamian bureaucracies. Even Taylorism was considered a new design philosophy in the early 20th century! Currently, many contrasting concepts of the design process and what makes someone a designer exist. Additionally, many organizations are cited as examples of companies promoting a design thinking culture (for example, P&G). What does this mean?

In 1971, designer and educator Victor Papanek wrote: "All men are designers. All that we do, almost all the time, is design, for design is basic to all human activity. The planning and patterning of any act towards a desired, foreseeable end constitutes the design process. Any attempt to separate design, to make it a thing-by-itself, works counter to the inherent value of design as the primary underlying matrix of life. . . . Design is the conscious effort to impose meaningful order."

He further asserted that the general design function must incorporate considerations of Methods (tools, processes); Use (does it work?); Need (real vs. evanescent requirements); Telesis (reflection of the times and conditions surrounding the project); Association (psychological connections with aspects of the project); and Aesthetics (shaping colors, textures, etc. into pleasing forms). More than 30 years later, professor of design studies Nigel Cross pointed out that designers have specific abilities to "produce novel unexpected solutions, tolerate uncertainty, work with incomplete information, apply imagination and forethought to practical problems and use drawings and other modeling media as means of problem solving."

The term "design thinking" now generally refers to applying a designer's sensibility and methods to problem solving, *no matter what the problem is*. IDEO's Tim Brown explains that, from this perspective, it is not a substitute for the art and craft of

TEAM TIP

Shift away from assuming that only "creative types" can contribute to innovation to knowing that everyone in your group can do so.

designing, but rather "a methodology for innovation and enablement." Lately, some in the management sciences think that a lot can be learned from the way designers think and "know" that could help us with innovative solutions.

American philosopher Charles Sanders Peirce made the case that when new data exists, and that data doesn't neatly fit into a currently understood model, the first activity the mind performs is to wonder. Wondering, as opposed to observing, is the key to *abductive* reasoning, as opposed to deductive or inductive reasoning. Abductive reasoning is the act of creatively thinking about what can be done with the data in order to orient it to the current environment. Since the data is new, practitioners have no method of reliably determining the appropriate method of dealing with it; therefore, they must rely on a "logical leap of the mind" to make sense of it.

In a recent interview, Roger Martin described design thinkers as "willing to use all three kinds of logic to understand their world." He explained that neither analytic nor intuitive thinking alone is enough to sustain competitive advantage since each, while providing tremendous strength, also creates systemic weakness if applied in isolation. He also made clear that the goal of abductive reasoning is not to declare a conclusion to be true or false. Instead, it is to posit what could *possibly* be true. It is this mode of thinking that allows a designer to seek out new ways of doing things, challenge old approaches, and infer what might be possible. It offers the careful, balanced application of the reliable lessons of the past and the logically valid leaps of what might be in the future.

Design thinkers bridge these two worlds and work to make the abductive logic explicit so they can share and refine it. Information systems and cognitive science professor Fred Collopy recently wrote in *Fast Company:* "If thinking is at the center of the activity that we want to encourage, it is not the kind of thinking that doctors and lawyers, professors and business people already do. It is not a feet up, data spread across the desk to be absorbed kind of thinking. It is a pencil in hand, scribbling on the board sort of thinking." While that depiction may be obvious to those close to the design thinking process already, it is not what folks conjure up when they first hear the phrase. Our institutions provide little or no formal training in the creative design process.

The appeal of design thinking lies in its human-centered heuristics and growing track record of success. We can cite numerous examples, such as those produced by IDEO, a California company that has designed many successful products. As we read about the application of design thinking in the business world, we find that it is most often applied to product-oriented problems despite its value to services, systems, and processes. While successful applications do exist in these areas, they are less commonly highlighted. And while the strengths of taking a design approach are seen in the successful outcomes, the term is so common that it risks becoming yet another meaningless, fashionable concept without true business value.

The Role of Design in Systems Thinking

Design in systems thinking is not the same as design in design thinking. Many divergent views exist on design within the systems process; however, there is agreement on a number of underlying principles that systems thinkers follow when planning toward a desired future. While a full explanation of these principles goes beyond the scope of this article, systems thinkers generally aim to do something today to improve the system tomorrow.

In systems thinking, design is a creative act that attempts to estimate how alternative sets of behavior patterns would serve specified goals. In the systems community, design has become the preferred approach to problem solving and planning for a variety of reasons: the belief in the synthetic mode of thought, the idea that the future is subject to creation (design being the creative process), the concept that you need to dissolve problems (and not solve them) through redesign of the system, etc.

To understand the role of design in systems thinking, let's look at Ackoff's view on planning. Ackoff describes four orientations to planning: Reactivism, Inactivism, Preactivism, and Interactivism. *Reactivist* planners embrace the past. *Inactivist* planners are generally satisfied with the way things are in the present and want to avoid making mistakes within the current system; they seek to avoid errors of *commission*. *Preactivist* planners are unsatisfied with the past as well as the current environment and seek change. They attempt to understand all aspects of the future that may affect the success of their intervention; they want to avoid errors of *omission*. Finally, *interactive* planners believe the future is subject to creation. They think the best means of revealing a desirable future is by enabling the stakeholders to do it themselves.

Not surprisingly, Ackoffian systems thinkers embrace the interactive planning perspective. They believe our failures are often due to misguided assumptions made when planning for how our future *ought* to be. They think knowledge of the past does not enable us to solve complex problems, and they seek to avoid both errors of commission and omission. We can say that interactive design is the execution of design thinking with a systems worldview.

On Designing, With and Without the Systems Worldview

Kenneth C. Bausch said that: "To accomplish its goals, system design cannot be a top-down operation

nor can it be expert driven. It must actively involve the stakeholders of the design in shaping a shared vision that represents their ideas, aspirations, values and ideals." Taking this view, someone who plans, redesigns, manages, and organizes social systems must embrace a systems worldview. And given this reality, it is the role of the stakeholders in the design process that separates the systems thinkers' approach to design from that of the design thinker.

We believe we have identified the core differences in the systems thinking and design thinking approaches to problem resolution:

• Design thinking methodologies arose from the consideration of *products and artifacts*. The problems are ultimately resolved by people identified as **designers by trade. The design team observes and studies the stakeholders.**

• Systems thinking methodologies arose from the consideration of *social systems*. **The stakeholders *are* the designers.**

The good news is that design thinkers are moving away from the "First Generation of Design," where the act of designing is the prerogative of a certain talented group called "designers." The First Generation Design methods rely heavily on the idea that professionals hold knowledge that is critical to the design and inaccessible to the user. Professionals create a design and are under no obligation to go further. This approach is the one typically taken in the past in the design of operating systems. The designer developed an operating system design on paper, and supplied all the documentation and blueprints to a contractor, who converted the paper design to a physical system. The designer figuratively threw the design over the "wall" that separated the professional design organization from the contractor or user.

Designers today more often operate from the "Second Generation of Design." They recognize the need for collaboration among designers and external perspectives to guide them. For example, IDEO's Deep Dive methodology made it standard practice for designers to gain input from many different stakeholders, including the end user. The design team observes and interacts within the larger system before going back to the design table to piece the data together and design a solution. Such ethnographic and anthropological studies have added tremendous value to the solutions that are generated. This is where design thinking today seems to incorporate some aspects of systems thinking.

This approach still has its risks, however. Even though there are many perspectives involved in parts of the design process, the stakeholders give input solely from their individual experiences and never see how it fits into the whole system. The designers' role is still to piece it all together. They need to get into the heads of the stakeholders and attempt to interpret what they think. Because neither the organization nor the end user has been involved in the entirety of the design process, the designers need to elicit their buy-in. They also risk missing a key stakeholder group. We caution that unintended consequences often occur when interdependent pieces of the larger system have not been consciously considered in the context of the whole system. It is in the use of what Tim Brown describes as the "designer's sensibility…to meet people's needs" where this form of design thinking strays from the systems thinking worldview.

In a recent blog post, designer Kevin McCullagh said, "Let's forget about design thinking as a magic process, and focus on how designers and managers should best work together to deliver great quality outputs." The systems thinking worldview offers a method of doing just that. We propose that by taking this approach, design thinkers can move into a "Third Generation of Design," which builds in a purposeful consideration of systems thinking principles. It addresses many of the challenges of trying to get into the heads of others. A successful design is therefore not one that is imposed on or provided to the organization from a source external to the system. The best way to ensure that the design will serve the organization's purpose is to include the stakeholders in its formulation. Hence, the success of a design is directly related to the *level of stakeholder participation in its development.*

In the "Third Generation of Design," *the stakeholders are the designers.* They are not external sources of input. Instead, they are the concept generators and implementers. An underlying principle of interactive planning is that people must be allowed to plan for themselves. The process involves the interaction of groups of individuals with diverse values. The design facilitator creates an environment where these differing views are honored within the context of the larger system. Creating a shared vision of the future can also be described as finding "common ground," a place where participants are able to get past the current situation and make decisions based on what is good for the system. In fact, designing creative solutions becomes much more straightforward if the practitioner is able to address the conflicts that arise due to differing stakeholder values, beliefs, and worldviews.

By empowering all stakeholders from the beginning, it is possible to tap the creative energy of every participant so that innovative ideas emerge from the collective of the differing perspectives. One thing that design practitioners using a systems approach bring to the table is the ability to help an organization take ownership of the ideas that emerge through the design process. This is a critical consideration for today's designers. It is much more

likely that the ideas generated will be implemented and maintained if the stakeholders involved are the ones who came up with the solutions in the first place. When people within an organization have had input throughout a change process and believe they have influenced its direction, the resistance to new ideas dissipates.

Designers must help participants uncover their underlying assumptions about the problem they think needs to be solved. Often, cultural assumptions and traditions contribute to the dilemma. Cultural assumptions include those specific to leadership, both formal and informal, which can have an effect on how people approach the assumed problem. Designers applying systems thinking principles can support participants in recognizing the assumptions they and the organization hold. In this way, they can provide them with the means to develop a new framework and shared worldview.

An Integrated Approach to Problem Resolution

In 2009, leaders at the Johns Hopkins Hospital anticipated its 2011 relocation to new multi-billion dollar quarters. Hospital administrators could have enlisted "design thinking" folks to look at the needs of the different units, gather ethnographic data, and then lay out a plan with recommendations for the relocation. Instead, the Johns Hopkins team took a different tack. Members looked at the move as an opportunity to redesign their current situation into a more desired future. The hospital would upgrade its system as it upgraded its physical environment. Their change would be systemic and not purely geographic.

Championed by a number of VPs, the hospital formed design teams comprised of the hospital's stakeholders. They defined stakeholders to mean anyone who could either impact or be impacted by the decisions made in the design teams, including not only administration and management, but representatives from all of the hospital's units, such as doctors, nurses, technicians, customer services representatives, and custodial staff. Most important, the design teams included the end users: the patients.

Before starting, the teams attended a short course on systems thinking. The orientation created a shared understanding of how the hospital operated as a system. Facilitators also shared information and data from research that had been done across different hospitals with the goal of finding out how patients thought about and described the care they received. The trends showed that patients valued more in a hospital stay than the level of care they received. In some instances, patients who had successful procedures with high-quality medical care stated they would never return to that hospital again. Some of the reasons provided included poor treatment by diagnosticians; multiple room switches; unsanitary bathroom conditions; and long waits for transportation for tests.

The patients' evaluation had nothing to do with the quality of the medical care provided by the doctors and everything to do with how they perceived their experience with the hospital as a whole.

These early steps in the design process gave people who had never communicated before a common language and point of reflection. They also removed the risk of blame and finger pointing by redirecting the focus to patterns that were happening in the larger environment of hospital care in general. Even though people came to the table with different experiences and frameworks, they shared an understanding that any design created and implemented had to meet two systems thinking criteria:

• Identify and consider the **essential parts** of the system

• Decide the design based on the amount of improvement to the system as a **whole**, not just to individual parts or units

Once these criteria had been determined, the group considered the next question:

*If John Hopkins is a **system**, what does the hospital do to support the patient experience versus simply considering patient care?*

As doctors, janitors, technicians, and other hospital staff interacted with patients, the interdependence of their contribution to the hospital as a whole began to emerge. This analysis led to what can only be described as an "A-HA!" moment. The participants realized that two essential components of the hospital were traditionally overlooked, yet had a great impact on the patient experience: *Patient Transportation* (responsible for moving patients from one part of the hospital to another) and *Environmental Services* (responsible for cleaning throughout the hospital). This realization had significant implications for the new design. The additional awareness that these functions directly affected both the hospital experience *and* the bottom line produced exciting designs. But most important, all of these considerations resulted in a new approach to recruitment, training, and compensation for employees within these key departments.

Within Patient Transportation, an innovative and effective design resulted from measuring how long it took to move patients between various locations in the hospital in a pleasant and timely manner. Additionally, this consideration helped the design team determine a logistically optimum location to place the wheelchairs in the new buildings. The increased ability of Patient Transportation to move patients quickly improved other departments' performance; for example, diagnostics will no longer stay idle waiting for patients to arrive. Furthermore, the design team was able to improve the internal communication system, eliminating the

additional work and time lost when nurses tried to contact patient transporters.

In the Environmental Services team, one solution improves the bed turnaround time, which also means that patients won't be left waiting in the hall for a room at the new facility. The design team also became aware that the Environmental Services unit does more than simply change over the rooms; it also affects the overall quality of care in the hospital, specifically as it relates to infectious diseases. This was an epiphany for everyone.

The Johns Hopkins example shows the instrumental role that taking a systemic worldview can play in design. It also highlights how important design is to any consideration of the system. By starting with an overview of systems thinking principles, everyone was operating from a shared mindset. By hearing trends collected from the larger healthcare environment within which they operated, the Johns Hopkins team was able to develop a shared understanding of the current situation.

Moreover, by bringing everyone to the design meetings, the facilitators ensured that stakeholders who rarely had a voice were heard. For the first time, a level power dynamic existed, which was a monumental shift from the traditional hierarchy with surgeons and doctors at the top of the ladder. Johns Hopkins achieved its goal of a system redesign with the ownership of those most impacted by it.

If Johns Hopkins' administrators had simply brought in designers to look at the problem, interview various stakeholders, and design recommendations based on the compiled feedback, they would not have achieved such a rich redesign. It was only by having everyone in the same room, under the same shared context of hospital trends in the larger environment, using the same systems language throughout the *entire process* that the resulting design had the input and ownership of the entire system.

Conclusion

In today's business world, design thinking and systems thinking are considered separate things. The challenge remains how the design thinking community can learn from the systems thinking community and vice versa. We believe that practitioners should intentionally integrate systems thinking with design thinking to enhance the chances of creating the right designs! We have shown that systems thinking can help designers better understand the world around them. Furthermore, designers can achieve more sustainable designs by following systems principles. Design can be greatly enhanced if it improves the performance of the system as a whole, even if you are redesigning the part. Being aware of the principal of unintended consequences can also enhance design thinking.

Yet the most valuable principle that systems thinking can add to design thinking is the need to bring the whole system to the discussion from the beginning. The stakeholders within the system must plan for themselves. If problem formulation is the first step in the design process, then adopting a systems mindset can help with framing and especially reframing the problems.

We have proposed that the two approaches complement each other and each incorporates components of the other *implicitly*. We believe it is possible—and necessary—to create an approach that *explicitly* incorporates the strengths of both, thereby addressing the gaps and increasing the chance of creating sustainable solutions to the wicked problems facing organizations and society today. ◘

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NEXT STEPS

In a presentation at the 2011 *Systems Thinking in Action* Conference, IDEO's Peter Coughlan and Seattle University professor Colleen Ponto proposed a process that integrates systems thinking and design thinking:

Define the Challenge:
1. Tell the story.
2. Sketch trends.
3. Name variables.
4. Set system boundaries.

Ground Understanding:
5. Share personal experiences.
6. Explore analogous situations.
7. Identify themes.

Identify Places to Intervene:
8. Make the system visible.
9. Determine leverage points.

Move Insights to Action:
10. Brainstorm many solutions.
11. Prototype promising solutions.
12. Experiment to test solutions.

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