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
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 vi-
sion 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 differ-
ences in the systems thinking and design thinking
approaches to problem resolution:

- **Design thinking methodologies arose from the
  consideration of products and artifacts.** The prob-
  lems 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 mov-
ing away from the “First Generation of Design,”
where the act of designing is the prerogative of a cer-
tain talented group called “designers.” The First Gen-
eration Design methods rely heavily on the idea that
professionals hold knowledge that is critical to the
design and inaccessible to the user. Professionals cre-
ate 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 de-
veloped an operating system design on paper, and sup-
plied all the documentation and blueprints to a
contractor, who converted the paper design to a phys-
ical system. The designer figuratively threw the de-
sign 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 ethno-
graphic and anthropological studies have added
tremendous value to the solutions that are gener-
ated. 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 de-
signers’ role is still to piece it all together. They
need to get into the heads of the stakeholders and at-
tempt 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 con-
sciously considered in the context of the whole sys-

tem. 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 McCul-
lagh 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 de-
sign will serve the organization’s purpose is to in-
clude 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 stake-
holders are the designers. They are not external
sources of input. Instead, they are the concept gen-

erators and implementers. An underlying principle
of interactive planning is that people must be al-

lowed to plan for themselves. The process involves
the interaction of groups of individuals with diverse
values. The design facilitator creates an environ-
ment 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 partici-
pants are able to get past the current situation and
make decisions based on what is good for the sys-
tem. 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 be-

ginning, 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
Thinking can add to design thinking if it improves the performance of the system as a whole, even if you are redesigning the part. Being aware of the principle 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.

### 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 principle of unintended consequences can also enhance design thinking.

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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.
7. Identify themes.

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

**Move Insights to Action:**
11. Prototype promising solutions.
12. Experiment to test solutions.

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