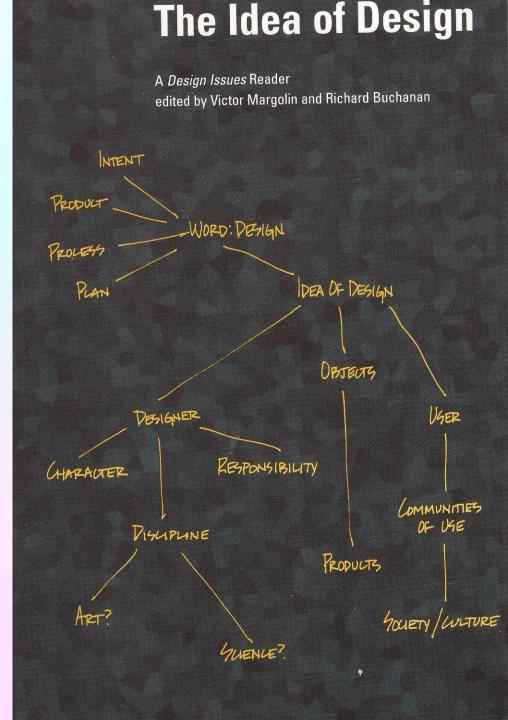
Wicked Problems IN Design Thinking

Social Theory &
Design Thinking (2410302)
PGS, Fall 2025
Keerati Chenpitayaton

## "Wicked Problems in Design Thinking"

By Richard Buchanan

Design Issues, Vol. 8, No. 2 (Spring, 1992), pp. 5-21.



# A New Trend of Design Thinking

and Its Context

- Although there is no single definition of "design," "design" could be understood as a new liberal art of technological culture (a new trend of design thinking in the 20th Century and beyond).
- Design has grown from a <u>trade activity</u> to a <u>segmented profession</u> to a <u>field for technical</u> <u>research</u> to a <u>new liberal art of technological</u> <u>culture</u>.

A New
Trend
of
Design
Thinking

and Its Context

The Context of the Emergence of the New Trend of Design Thinking 

The Fragmentation of Liberal Art Knowledge

As the <u>number of subject matters has grown</u>, each body of knowledge has become <u>more specialized and progressively narrowed in scope</u>.

The search for new integrative disciplines has become one of the central themes of intellectual and practical life in the twentieth century.

The new trend of design thinking has emerged from this context.

# A New Trend of Design Thinking

and Its Context

- This, however, does not mean that design thinking will become a new science, or can be reduced to one of the sciences.
- The new trend of design thinking lies in a concern to connect and integrate useful knowledge from the arts and sciences that suit the problems and purposes of the present as well as to combine theory and practice for new productive purposes.

- The "wicked problems" approach in design/design thinking was formulated by Horst Rittel in the 1960s.
- It has begun as an alternative to the linear, step-by-step model of the design process.

The Wicked Problems

Theory of Design

### Linear, Step-By-Step Model

## Wicked Problem Approach

 The <u>linear</u>, <u>step-by-step model</u>, though with many variations, suggests that the design process is divided into two distinct phases.

### Problem Definition

Analytic Sequence; "... designers determine all of the elements of the problem and specifies all of the requirements that a successful design solution must have," (pp. 13-14).

### Problem Solution

Synthetic Sequence; "... the various requirements are combined and balanced against each other, yielding a final plan to be carried into production," (p. 14).

# Wicked problems are a "class of social system problems which are ill-formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing" (p. 14).

 Wicked problems approach suggests that design problems are indeterminate (NOT undetermined).

## Linear, Step-By-Step Model

### Wicked Problem Approach

- The model is based on <u>determinate problems</u> that have definite conditions.
- The designer' job, then, is to identify such conditions, then coming up with solutions.
- There are no definitive conditions or limits to design problems.
- Q: Why are design problems indeterminate and, therefore, wicked? (p. 15)

A: Because design has no specific subject matter of its own apart from what a designer understands it to be.

- The Bottom Line: Design Thinking as an Integrative Discipline → The Design Professionals Helping to Establish the Principle of Relevance (p. 16)
- The problem for designers is to conceive and plan what does not yet exist ..." (p. 17)
  → Design as a Science of the Artificial (p. 17)

## The Wicked Problems

Theory of Design

- Richard Buchan's Article as a Bible for "Design Thinking"
- No single definition of "design" or branch of professional practice adequately covers the diversity of ideas and methods.
- Theory of "Design Thinking" in the 20th Century: Design
   Thinking Growing from a Trade Activity → A Segmented
   Profession → A Field for Technical Research → A New
   Liberal Art of Technological Culture

- As the liberal arts grew, they became more specialized, fragmented, narrowed in scope, more numerous, and have lost "connections with each other and with the common problems and matters of daily life. ..." (p. 6).
- Theory of "Design Thinking" in the 20th Century: Integrative Discipline Are Called for → Combining Theory with Practice for New Productive Purposes

- John Dewey's The Quest for Certainty: Beginning of "Design" as a Liberal Art in the Early 20th Century → Perception of a New Center of the Universe → "Integrative Thinking"
- Old vs. New Liberal Arts: Specialization in the Facts of a Subject Matter vs. The Use of New Disciplines of Integrative Thinking
- Science vs. Art (Science as Superior to Art) >
   Science as Art

The Wicked Problems

Theory of Design

- John Dewey's Experience and Nature: Science, Art, and Practice → Knowledge is no longer achieved by direct conformity of ideas with the fixed orders of nature. → Knowledge is achieved by a new kind of art directed toward orders of change. → Science is art. Art is practice.
- "Art": Crucial to Understanding the New Role of Design and Technology in Contemporary Culture

- "Technology": NOT as "Knowledge of How to Make and Use Artifacts or the Artifacts Themselves" BUT as an "Art of Experimental Thinking"
- "Technology": "Intentional Operations Carried out in the Sciences, the Arts of Production, or Social and Political Action"
- "We mistakenly identify technology with one particular type of product-hardware-that may result from experimental thinking, but overlook the art that lies behind and provides the basis for creating other types of products" (p. 8).

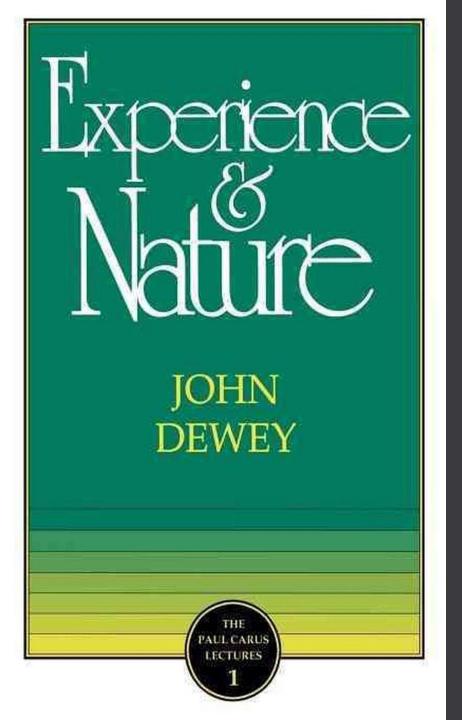
- "Design" (p. 6) → The Plan, Project, or Working
  Hypothesis which Constitutes the "Intention" in Intentional
  Operations
- Producing Integrations → Clarifying the Basis of Communication for All the Participants

## The Wicked Problems

Theory of Design

## Quest for Certainty

John Dewey



Herbert A. Simon



THE SCIENCES OF THE ARTIFICIAL

reissue of the third edition with a new introduction by John E. Laird

Herbert Simon's The Sciences of the Artificial: Four Broad Areas of Design Explored by Professional Designers and Many Others Not Regarding Themselves as Designers:

- 1) Design of Symbolic or Visual Communications (Signs)
- 2) Design of Material Objects (Things)
- 3) Design of Activities and Organized Services (Actions)
- 4) Design of Complex Systems or Environments for Living, Working, Playing and Learning (Thoughts)

These FOUR areas are interconnected.

Part-Whole Relationships Going Both Ways → Ascending Orders (Part → Whole) and Descending Order (Whole → Part)

- The Doctrine of Placements: Categories (Fixed Meanings as the Basis for Analyzing What Already Exists) vs.
   Placements (Have Boundaries to Shape and Constrain Meaning BUT Are Not Rigidly Fixed and Determinate)
   → Placements as Sources of New Ideas and Possibilities When Applied to Problems in Concrete Circumstances (pp. 12-13)
- "Design" + Reflective/Philosophic Dimension
- The Central Problems = The Communication between Scientists and Design Professionals (p. 14)

The "Wicked Problems" Theory of Design (pp. 14-19):

Horst Rittel (1960s): Most of the problems addressed by designers are "wicked problems."

"A class of social system problems which are ill-formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing" (p. 15).

"Wicked Problem" as a Fundamental Problem in Design Thinking

Alternative to Linear, Step-By-Step Model of Design Process with TWO Distinct Phases: (1) Problem Definition (Analytic Sequence) and Problem Solution (Synthetic Sequence)

## Linear Model vs. Wicked-Problems Approach: Relationship between Determinacy and Indeterminacy

Linear Model	Wicked-Problems Approach
Determinate Problems with Definite Conditions	NO Definite Conditions or Limits to Design Problems in
Designer's Task → Identifying Those Conditions and Calculating a Solution	All Problems  Designer's Task →  Understanding the Indeterminacy and Wickedness

- Why are design problems indeterminate, and therefore, wicked? (p. 16)
- "Design" as a Radically Indeterminate Subject Matter
- "However, the answer to the question lies in something rarely considered: the peculiar nature of the subject matter of design. Design problems are "indeterminate" and "wicked" because design has no special subject matter of its own apart from what a designer conceives it to be. The subject matter of design is potentially *universal* in scope, because design thinking may be applied to any area of human experience. But in the process of application, the designer must discover or invent a *particular* subject out of the problems and issues of specific circumstances.

- Designers conceive their subject matter in two ways on two levels: general (Philosophies and Proto-philosophies) and particular (Quasi-Subject Matter).
- "Placement" as a Tool for Designer → Allowing Designers to Position and Reposition the Issues at Hand
- "Design" as Integrative Discipline >> Establishing a Principle of Relevance for Knowledge from the Arts and Sciences
- "Design" → Planning What Does NOT Yet Exist → Once Planned, the Object Can Become the Object for Study by Arts and Sciences (Herbert Simon's The Science of the Artificial)
- "Design" IS NOT an Applied Science BUT a Liberal Art of Technological Culture (p. 19)

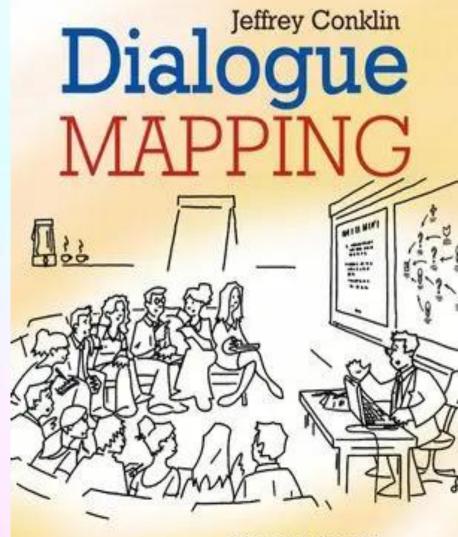
- "Technology" NOT as Things or Products BUT a Discipline of Systematic Thinking
- "Design" > Deliberate Action = Making Arguments = Concrete Interplay and Interconnection of Signs, Things, Actions, and Thoughts (pp. 19-20)
- Different models of argument employed by different design professionals. (p. 20)

- "Design" functions as an integrative discipline, as the liberal art of technological culture by uniting them all through "arguments." → "Modality of Impossibility" (p. 20)
- "Argument" = A Synthesis of THREE Lines of Reasoning:
- 1) The Ideas of Designers and Manufacturers about Their Products
- 2) The Internal Operational Logic of Products
- 3) The Desire and Ability of Human Beings to Use Products in Everyday Life in Ways that Reflect Personal and Social Values

## "Wicked Problems and Social Complexity"

By Jeff Conklin

<u>Chapter 1</u> of Dialogue Mapping: Building Shared Understanding of Wicked Problems (2005), By Jeff Conklin



Building Shared Understanding of Wicked Problems <u>Jeff Conklin's Article</u>: "Wicked Problems and Social Complexity"

[NOTE: Richard Buchanan's "Wicked Problems in Design Thinking" is a much more difficult, philosophical, and abstract article about "wicked problems." This one is highly accessible and brining the "concept" closer to the ground.]

- Conklin begins with two kinds of natural forces: 1)
   <u>collective intelligence</u> and 2) <u>the forces of fragmentation</u>.
- <u>"Collective intelligence"</u> is, for him, the "creativity and resourcefulness that a group or team can bring to a collaborative problem" (p. 2).

- He believes that this kind of forces exists naturally. It implies that it is already "there" or can be cultivated. We, human beings, have this property. We can work together. We can solve problems together. We are social animals.
- But, the problem arises when the other kind of natural forces comes into play. Conkling calls this "the forces of fragmentation" (Again, in Organizational Settings and Projects) (p. 2).
- The concept of fragmentation provides a name and an image for a phenomenon that pulls apart something which is potentially whole. Fragmentation suggests a condition in which people involved see themselves as more separate than united, and in which information and knowledge are chaotic and scattered. ..." (p. 2).

- Fragmentation = Wickedness X Social Complexity
  - "Wicked Problems" = "Part of the pain fragmentation) is a misunderstanding of the nature of the problems at hand. More precisely, the pain is caused by working on a special class of problems-wicked problems-with thinking, tools, and methods that are useful only for simpler ('tame") problems. Most projects today have a significant wicked component. Wicked problems are so commonplace that the chaos and futility that usually attend them are accepted as inevitable. Failing to recognize the 'wicked dynamics' in problems, we persist in applying inappropriate methods and tools to them" (p. 3).

"Social Complexity" = "Another force of fragmentation is social complexity, the number and diversity of players who are involved in a project. The more parties involved in a collaboration, the more socially complex. The more different those parties are, the more diverse, the more socially complex. The fragmenting force of social complexity can make effective communication very difficult. Social complexity requires new understandings, processes, and tools that are attuned to the fundamentally social and conversational nature of work" (p. 3).

"Social complexity means that a project team works in a social network, a network of controllers and influencers including individual stakeholders or those peripherally involved, must be included in the project. To put it more starkly, without being included in the thinking and decision-making process, members of the social network may seek to undermine or even sabotage the project if their needs are not considered. Social complexity can be understood and used effectively, but it can be ignored only at great peril" (p. 3).

- Let's tie these concepts together.
- First, there are <u>TWO classes of problems</u>: wicked and tame problems.
- <u>"Wicked Problems," Coined by a Mathematician</u> Horst Rittel in the 1960s, with Following Characteristics (p. 7-8):

The Wicked Problems

Theory of Design

- 1. You don't understand the problem until you develop a solution. (Understanding the big picture and specific context; doing research)
- 2. Wicked problems have no stopping rule. (You only stop when you run out of time, money, or energy.)
- 3. Solutions to wicked problems are not right or wrong. (Only 'good', 'good enough', 'better', or 'worse'.)

## The Wicked Problems

Theory of Design

- 4. Every wicked problem is essentially unique and novel. (Every problem emerges in a historically and socially specific context even though it is about the same thing. Every problem is concrete.
- 5. Every solution to a wicked problem is a 'one-shot operation'. (You have to take risk. You have to make a decision. And every decision had a consequence.) ["The Catch 22" Problem]
- 6. Wicked problems have no given alternative solutions. (Everything depends on your creativity to devise solutions and judgment to see which one is valid or not.)

## A "Tame Problem" (p. 9-10):

- has a well-defined and stable problem statement,
- 2) has a definite stopping point, i.e. when the solution is reached,
- 3) has a solution which can be objectively evaluated as right or wrong,
- 4) belongs to a class of similar problems which are all solved in the same similar way,
- 5) has solutions which can be easily tried and abandoned,
- 6) comes with a limited set of alternative solutions.

- <u>SECOND</u>, there are also <u>TWO</u> processes of solving complex problems: 1) traditional 'waterfall' (or linear, top-down) process and 2) opportunity driven problemsolving process.
- <u>Traditional 'Waterfall" (or Linear, Top-Down) Process</u>:

  Understanding Problems by Gathering and Analyzing

  Data → Formulating Solutions → Implementing Those

  Solutions
- Opportunity Driven Problem-Solving Process: Non-Linear as Represented by the Jagged-Line Pattern of Cognitive Thinking → Experimental (Trial and Error Process) → New Problems Create More Problems, and You have to go back and forth between them!

- 2. Conventional Thinking = Technology Is "Neutral" → as External Objects, Just There!!!
- We're the Users. Objects Don't Have Meanings or Impacts without Us.
- <u>Thinking Against Convention</u> = Technology Has More Implications. It Is Part of Our "Life-Worlds
- Technology is complicated.
- The "design thinking" and "process" behind a creation of any technological forms or systems are also complicated.
- Thus, the first step is to understand the sense of complexities around it.