

Design Patterns
VS
Design Models

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Design Patterns and Design Models

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Author's Note:

In interaction design domain, there are significant amount of literature about design patterns and design models. They are both very important and influential concepts, both in design practice and design thinking. However, rare work has been done to explicitly present their relationships, their similarities and differences, and the potential that they can support and reinforce each other in design process to achieve better design goals. In this paper I'll touch those areas, explain what they mean to each other, how they might be used in design, and why it matters. This argument is based on Christopher Alexander's framework about design patterns, and Hugh Dubberly's idea about design models.

Design Patterns

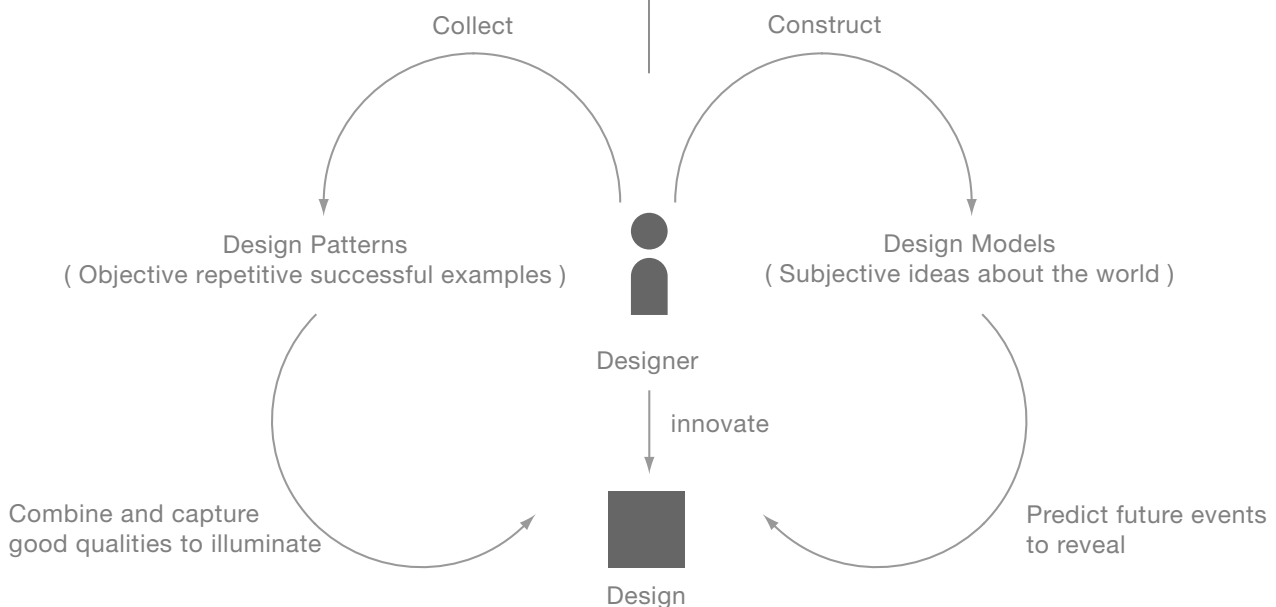
Introduce Design Patterns

Design patterns are design conventions about the world. It is a way to capture optimal solutions to recurring problems. It describes best practices, explain good designs, and capture experiences so that other people can reuse these solutions in similar situations. Design patterns describe facts.

Design Models

Introduce Design Models

Design models are designers' ideas about the world—how it might be organized and how it might work. Models are created in order to view, manipulate, or test the thing they represent without having to build the real thing. Models help designers recognize new situations as similar to others we have encountered, in that way it helps reframe problems, capture essential structures and predict likely solutions. Models describe relationships.



This model represents a designer's usage of patterns and models.

Design patterns and design models are both very useful tools for designers. Designer collects existing design patterns, combine and manipulate them to illuminate new design solutions; Designer constructs mental models to design problem, predict future events based on the model system, and models reveal new solutions to solve existing problems. Notice design patterns are more objective conventions, while design models are more subjective speculations.

Examples

Design Patterns

This idea was introduced by the architect Christopher Alexander for use in urban planning and building architecture, and has been adopted by software development and interaction design community.

Here's an example from Alexander: he recommends using the "Entrance Transition" pattern with homes or any other building that "thrives on a sense of exclusion from the world." The pattern describes what one must do to a doorway so that someone entering it feels as though they are coming into a private, safe space:

"Make a transition space between the street and the front door. Bring the path which connects street and entrance through this transition space, and mark it with a change of light, a change of sound, a change of direction, a change of surface, a change of level, perhaps by gateways which make a change of enclosure, and above all with a change of view." (From A Pattern Language, pg. 552.)

Note that the pattern is not just proscriptive. It describes something positive, something you can try to build, even though you would naturally vary it according to the particular situation. It doesn't simply say, "Never build a doorway without a change of level." Note also that it carries values - the value of a private space, the value of emotional comfort. Alexander's goal is to seek ways to create a genuinely good experience for people, via their built environment.

Alexander argues that design pattern idea has three essential parts.

- First, it originates from collective intelligence of inhabitants(users), it's the participation of users, rather than designers, create these patterns.
- Second, it has a moral component, meaning the system built upon patterns are inherently good, and life enhancing.
- Third, design pattern has a generative nature.

A design pattern has a rigid structure.

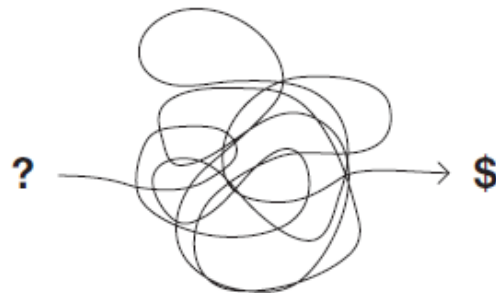
- * Pattern Name
- * Pattern Description
- * Problem Statement
- * Use When
- * Solution
- * Rationale
- * Examples

Design Models

Stafford Beer wrote, "Now in trying to account for the behaviour of a complicated system, the scientist has first to represent it in the formal terms he knows how to manipulate. . . . The formal representation of the system that he builds is called a model. Alan Kay noted, "Models are our voodoo dolls. We do most of our thinking in models." Models help designers to make sense of things.

Interaction design modelling is usually the process of generating abstract, conceptual, graphical representation for ideas, processes or systems. People can discuss values of those models. Here's an example of Apple Computer's Creative Services department formal director, Tim Brennan's design process model:

"Here's how we work," he said. "Somebody calls up with a project; we do some stuff; and the money follows."



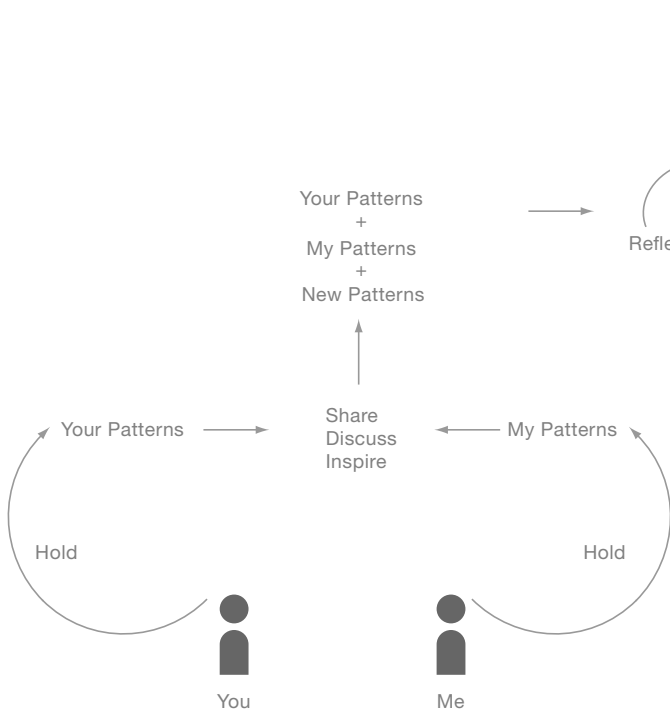
Brennan captures important aspects of the process:

- The potential for play
- Its similarity to a "random walk"
- The importance of iteration
- Its irreducible "black-box" nature

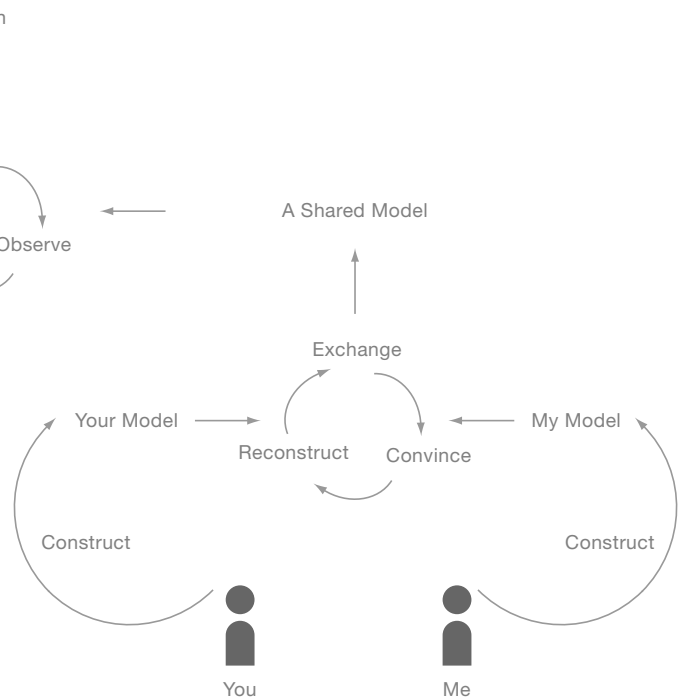
Based on these values this model reveal to us, we can make decisions, thus guide the design to a controlled direction.

Chris Argyris wrote, "Although people do not [always] behave congruently with their espoused theories [what they say], they do behave congruently with their theories-in-use [Their mental models]." Under this frame, models lead to action, and help us to predict future.

Design Patterns



Design Models



This model represents how design patterns and design models support collaboration in the innovative process.

Each designer hold a pool of patterns - existing successful examples. When they collaborate, they tend to put the patterns they have on that table to form a open discussion, during the process, they share part of their individual patterns, the more patterns they share to each other, the better understanding they will have to illuminate further innovation.

Notice during the process, they inspire each other and bring about other existing patterns, or new patterns. The generating of new patterns is undeterminable, so people also view it as a black box.

This model also tells the overall quality of design may depends on the quantity and quality of the design patterns individuals have, and the

The designer's background also counts, the more similar background or experiences they have, the more similar patterns they will produce as shared patterns, and less time to make an agreement. But that's not usually a good thing because that leads a smaller pool of shared patterns. That explains why people came from different background may produce more innovative designs, and the longer time will be cost during the rationale process. In sum, designers should balance the time and energy they have to generate shared patterns.

People view this world differently, so even for the same problem, they have different mental models.

When two designers collaborate to solve one problem together, they tend to spend time on reframing the problem to a point that they both agree. That involves an iterative process, to exchange mental models, to convince and negotiate with each other, and based on each other's feedback, reconstruct their individual's mental model, or compromise to each other in a certain point, at the end, they will reach a shared model that can be used as the ground to start design ideation.

Not like patterns, which is more explicit and straightforward to understand and talk about, design models are abstract ideas, oftentimes designers don't know what their mental models are, and need time to construct their models during the discussion. So the dialogue between designers is also a process of forming and reforming their own mental models.

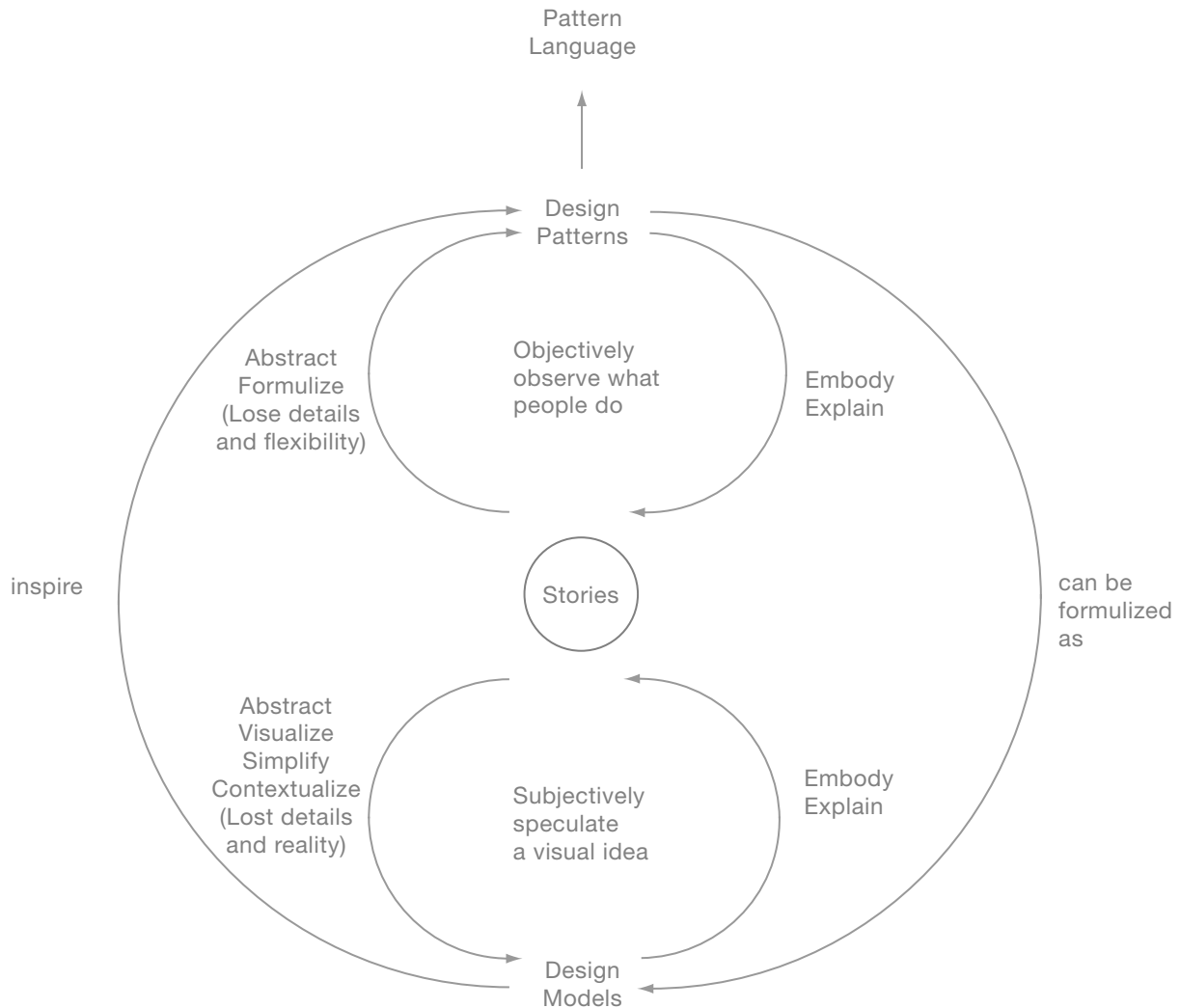
We also notice design models are very contextually dependent, meaning the form of model varies in different semantics contexts, even for the same idea. That's because in different situations designers need to highlight different details.

The shared model is still a subjective hypothesis between two designers.

Design Patterns

Design Models

There are lots of patterns and models have been documented and formalized, but in real world, there's much more patterns and models we take for granted, even use in a various design contexts, while never been formalized to a larger community. Today designers are more and more responsible for designing systems, and designers are more frequently collaborate with each other. It's very important for us to formalize implicit design patterns and design models to explicit ones, and make them shared, discussed and tested in the design community, in order to foster design learning, design thinking and designing making.



By observing, identifying and examining recurring stories, we can find a hidden pattern, and we can formalize it according to a set of rules.

Notice a good design pattern comes from an objective understanding of the reality.

During the formulation process, lots of details and flexibility will be inevitably lost, but the essence of the success should be preserved. Design patterns are aimed to direct future solutions, so designers should make it as explicit as possible.

Smaller patterns construct bigger patterns, all the patterns intertwine each other and form a pattern language.

Stories may suggest a hidden model, this model can vary according to different designer's backgrounds and experiences. It's generally suggest a subjective idea of a problem, but in order to benefit a larger audience, design models should reveal the reality as much as it could be.

Design models is usually more abstract than design patterns, so the formalizing process leads to a reduction of reality and a significant lost of details. Design models are goal-oriented: The Final models can be a overall understanding of the complex system, or just capture a piece of details to highlight an argument, it all depends on what the designer need in that specific situation.

By definition, a design pattern can always be drawn as a diagram, which makes it a design model in a sense. Recurring models can be seen as patterns.

Formalization requirements

Design Patterns

Design Models

Design activity is essentially a creative problem solving activity, whether the goal is to design an object, a system, or a service. The key of innovation is to seek likeness among facts that are originally not directly connect to each other, and find a orders in chaos. Design patterns and design models are useful generative tools in the creative process. The process of formalizing design patterns and design models is time-consuming, but it can also be illuminating. The formulation process itself is a creative process and requires lots of patience and imaginations.

In the process of formalization of design patterns and design models, we must make sure we never deviate our original goals, and make useful, meaningful and inspirational patterns and models, otherwise the formulation is unnecessary. They should meet following requirements.

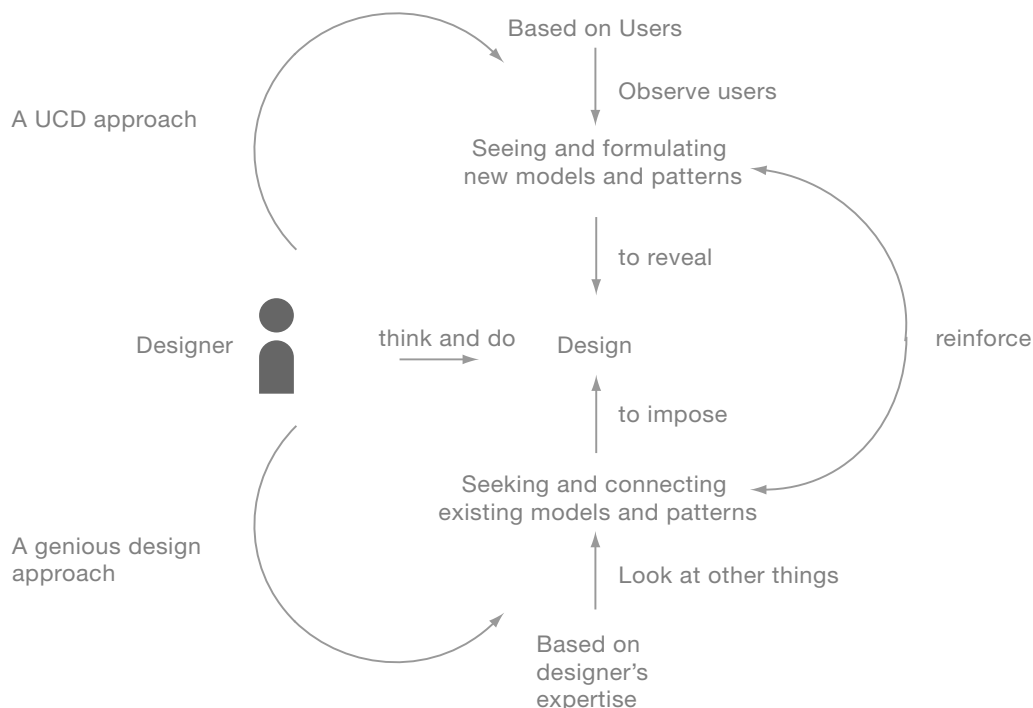
- It is clear how to implement
- Direct designers to foresee the structure of final solutions
- Adaptive to changes in requirements
- Clearly stated and visible
- At an appropriate level of detail given the objectives
- Appear to be able to accommodate reasonably expected future change
- Appears to be understandable and maintainable.
- Possibly understandable by people from different backgrounds.
- As simple as possible while still achieving the goals.

Patterns and Models in Design

Design Patterns

Design Models

There's an argument in interaction design domain about the relationship between UCD(User centred design) and genius design. UCD refers to a method and a thinking that giving users significant attentions during the design process. Genius design implies that designers use his/her own expertise to make design. By understanding existing models/patterns and creating new models/patterns, we can conclude UCD and genius design methods are not exclusive, actually they are all important parts in design process, they harmoniously coexist and enhance each other.



User centred design required designers observe user's behaviours, based on their needs and wants to conduct design. During the process designers form new models and identify new patterns, the design solution will be revealed.

Genius design allows designers to make judgments based on their own expertise, they seek and connect existing models and patterns, get inspirations and impose an idea onto the design.

To conclude, I argue design patterns and design models are all very useful tools. By thinking of them, formulating them, and practicing them, designers can possibly learn to be better designers.

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