

Claims of Knowledge in Design

CMU School of Design

Master of Design Thesis Presentation

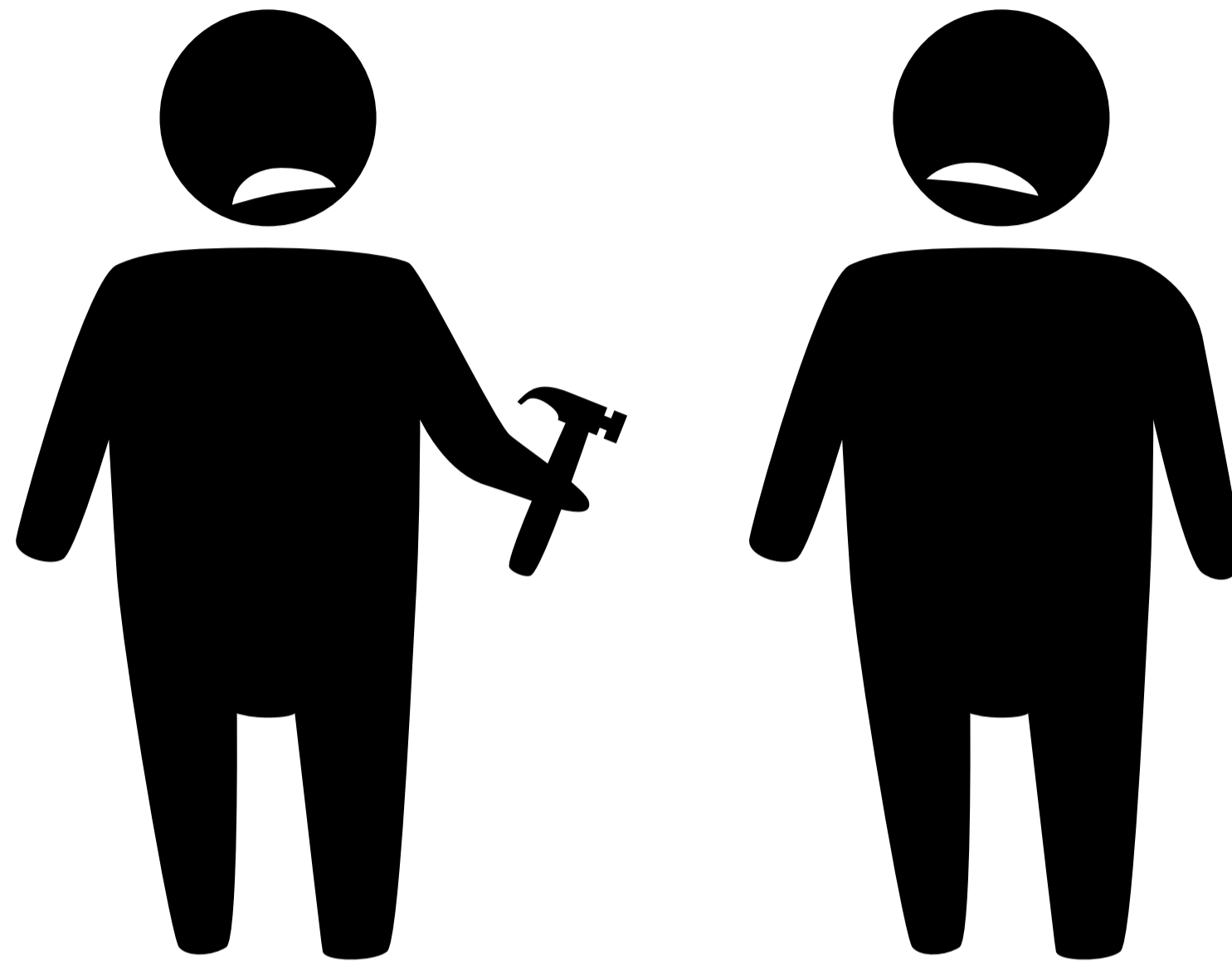
James Liu, M.Des. Candidate, IxD

Dr. Suguru Ishizaki, Advisor

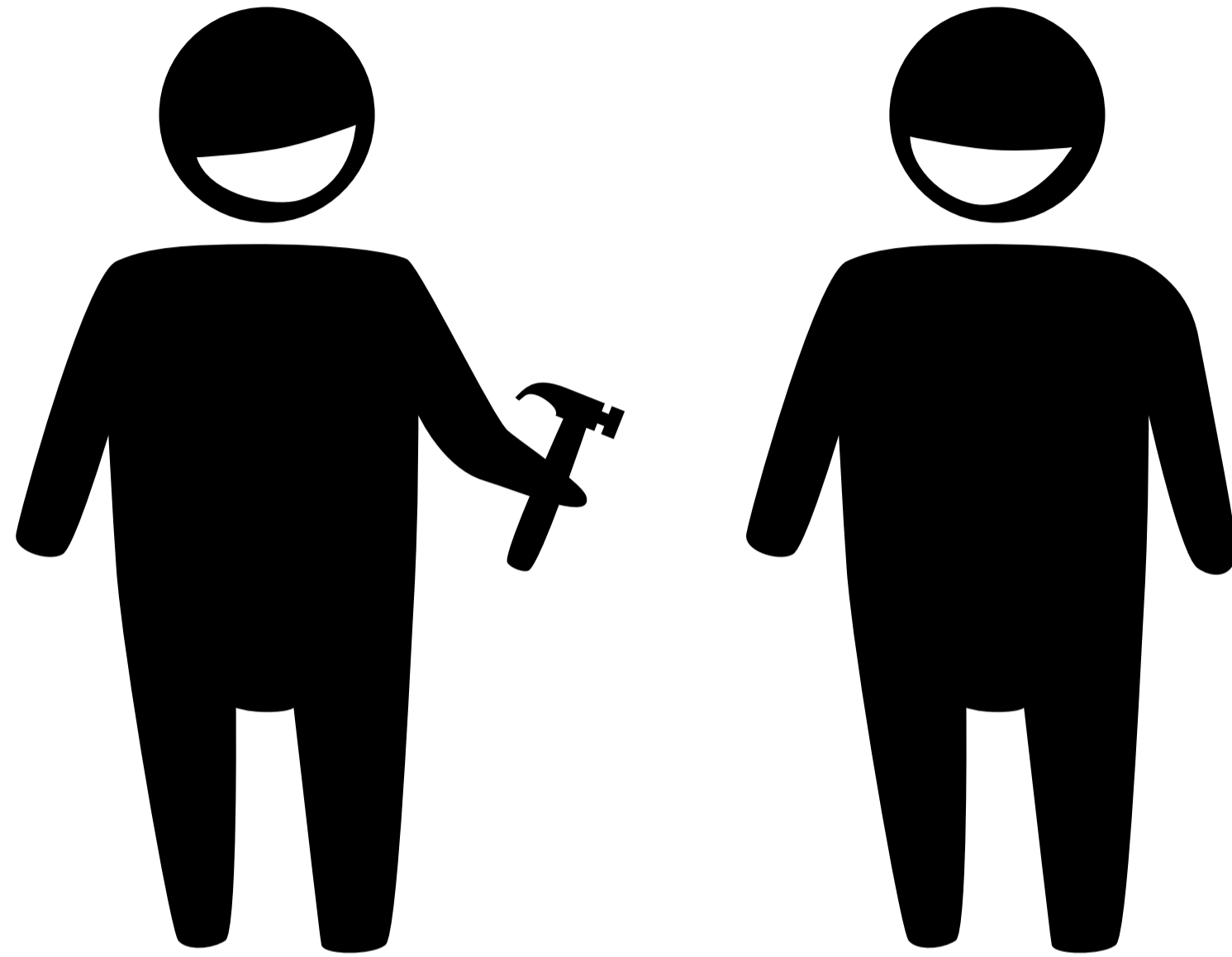
Good morning everyone, thank you all for coming to our thesis paper presentations.

My name is James Liu and I am a Master of Design candidate in Interaction Design.

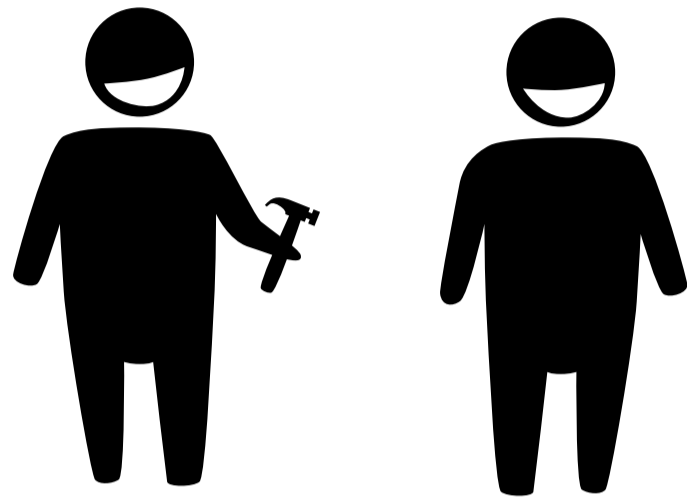
The work I am about to present was done with the immense guidance of Suguru Ishizaki, my thesis Advisor. I'm glad it's not lunchtime, because he's more critical then.



During the first semester at Carnegie Mellon Design, my classmates and I walked around, mostly in a state of confusion. We all chose to study design, but many of us came from different domains of knowledge... some in design, some outside of it.



But by the end of our first year, we would all walk around passionately identifying ourselves as Designers.



**“Domain-specific”
knowledge**



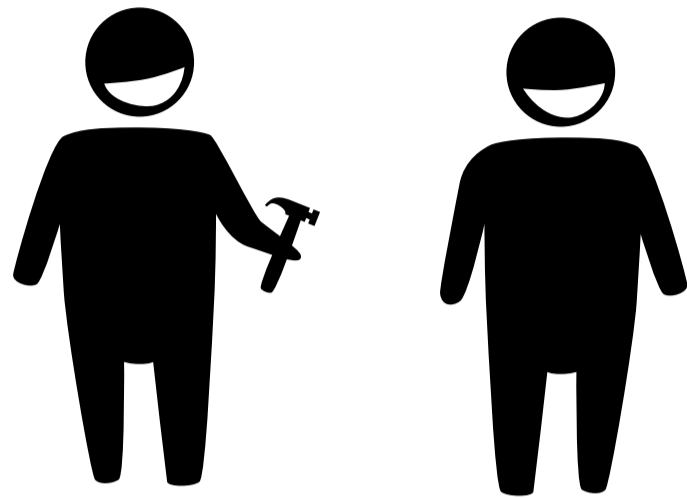
Service, Experience,
Transformational Design

We still had our own interests and knowledge in specific domains.

As we started thinking about our future—looking at Design Job postings—we saw titles such as Service Designer, Experience Designer, and even Transformational Designer.

We all felt qualified, yet all of our business cards were labeled with something else.

Much of this has to do with the popularization of Design Thinking. Design is permeating into public services, the medical sector, and even into government...



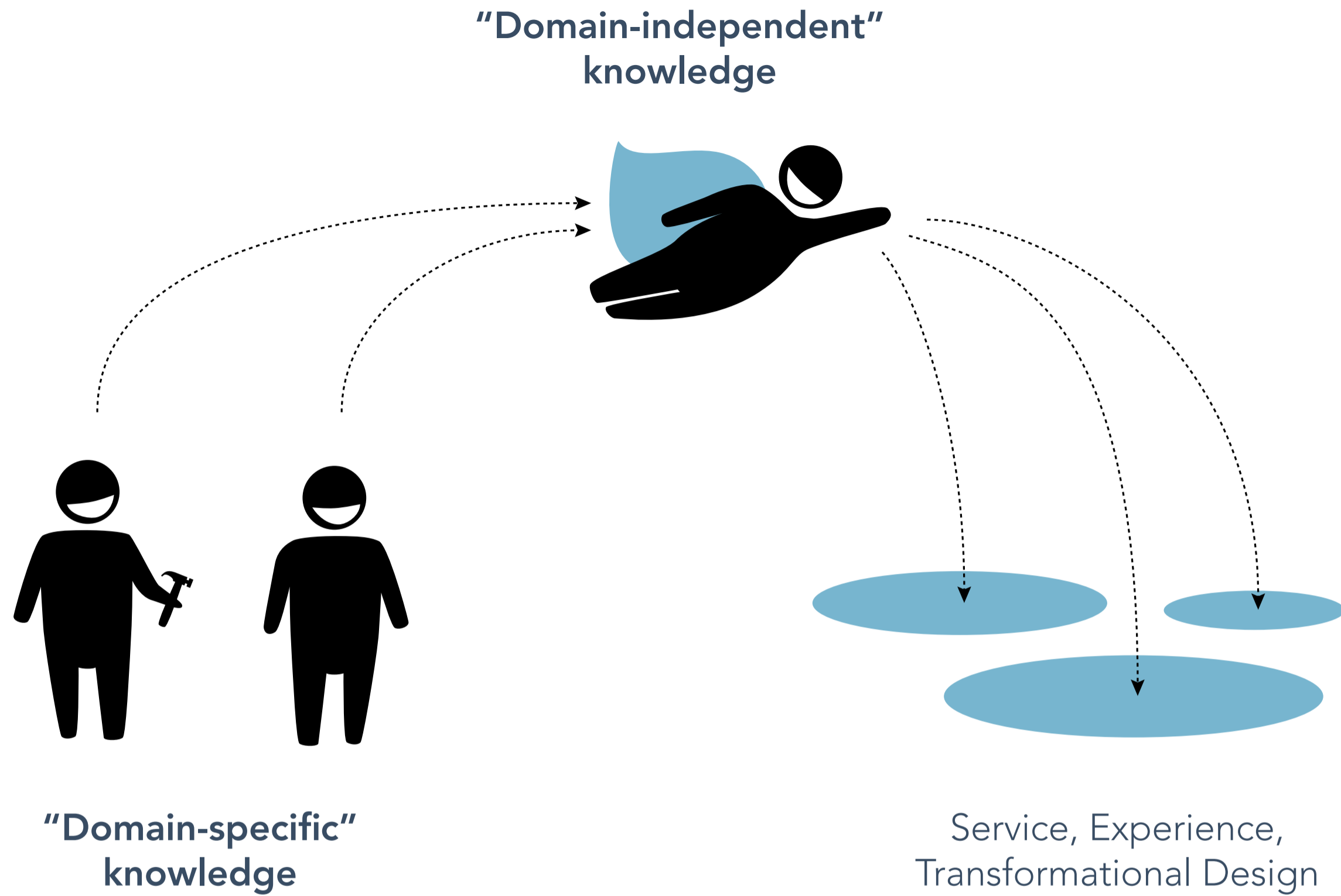
“Domain-specific”
knowledge



Service, Experience,
Transformational Design

But is Design Thinking really this powerful? What kind of domain-independent knowledge allows designers to move beyond their specific domains? Is Thinking enough?

The question I ask is not “what is design thinking...”



But is Design Thinking really this powerful? What kind of domain-independent knowledge allows designers to move beyond their specific domains? Is Thinking enough?

The question I ask is not "what is design thinking..."

What do designers know?

but, “what do designers know.”

and “what is domain-specific and domain-independent design knowledge?”

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and “what is domain-specific and domain-independent design knowledge?”

Research topics

1. Design methods movement
2. How on designers “design”
3. Models of design research
4. Types of knowledge

To find an answer, I did a lot of reading. I focused mainly on 4 topics;

the design methods movement, how designers design, models of design research, and finally, on knowledge itself.

Looking beyond intuition

1. Design methods movement
2. How on designers “design”
3. Models of design research
4. Types of knowledge

The Design methods movement, while not the earliest instance of designers creating knowledge, marked the beginning of theories about design itself.

Work from Herb Simon and Christopher Alexander are considered classic texts for all designers today.

While much from that time have been rejected or recanted, the movement, nonetheless, catalyzed the study of design and created much of what we now understand.

Cognition, perspective, process

1. Design methods movement
2. How on designers “design”
3. Models of design research
4. Types of knowledge

I looked at the study of designers and the act of designing.

From empirical studies to philosophy, this topic focused on how designers of all types perceive, behave, and understand.

Designers creates knowledge

1. Design methods movement
2. How on designers “design”
3. Models of design research
4. Types of knowledge

The movement towards an interdisciplinary discipline of design also covers topics on knowledge creation.

These models and theories of design research all sought to form a foundation for the discipline of design.

However, much of design research concerns itself with design process and design artifacts rather than designers themselves.

Definitions and taxonomies

1. Design methods movement
2. How on designers “design”
3. Models of design research
4. Types of knowledge

Finally I also looked for a better understanding of “knowledge” itself. What exactly is knowledge and what types of knowledge are there?

From Aristotle to Benjamin Bloom, I was concerned with ways to clarify and demystify the knowledge and abilities a designer can possess.

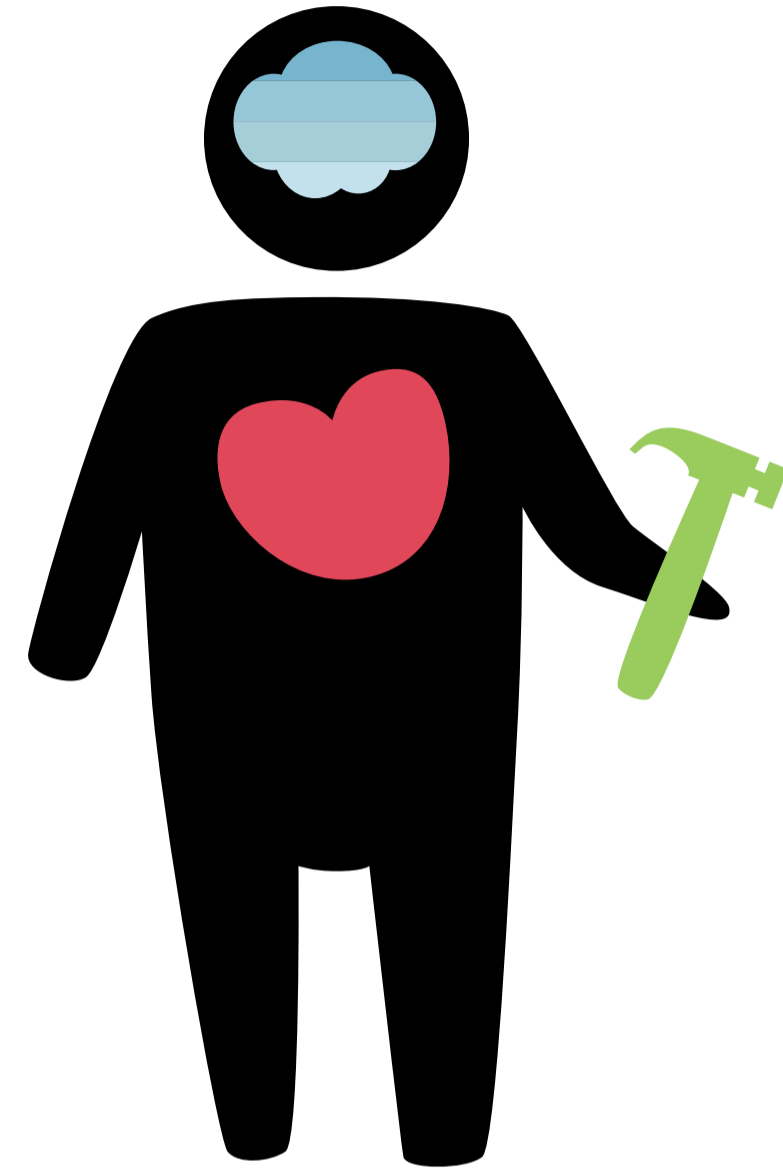
Classification of domain-specific and domain-independent design knowledge

So far, my research has suggested a classification of domain-specific and domain-independent design knowledge.

This classification utilizes the revised version of Bloom's Learning Models.

However, instead of focusing only on scales of achievement, I was more interested in the dimensions of skills, knowledge, and attitude.

Psychomotor
Cognitive
Affective



A designer's abilities can be categorized among 3 areas: Psychomotor—skills, Cognitive—knowledge, and Affective—attitude.

I will walk through this classification comparing both domain-specific and domain-independent abilities. For the sake of simplicity, I will use the domain of Visual Design to illustrate domain-specific abilities.

Skills

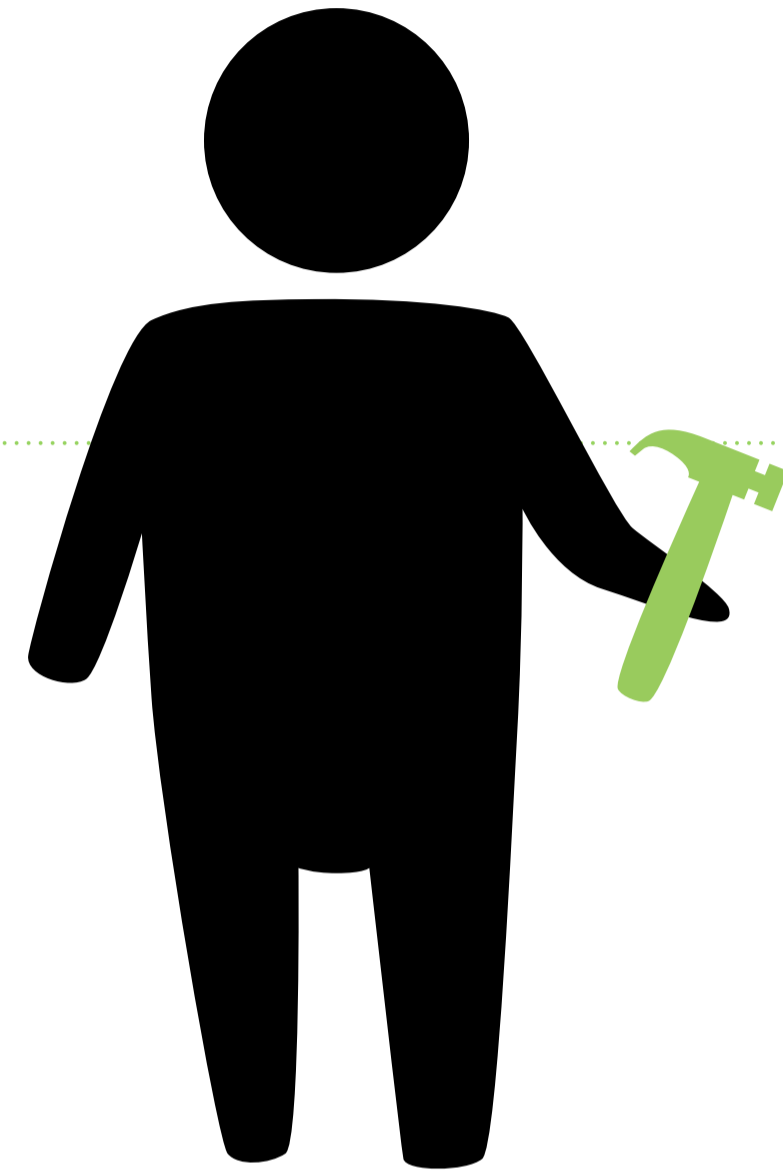
Psychomotor

**Domain
Specific** (*Visual*)

Sketching
Drawing

**Domain
Independent**

Visualizing
Diagramming



The skills of a visual designer involves the physical ability to sketch and draw.

Included in this category are also the tools and other “hand” skills of the designer.

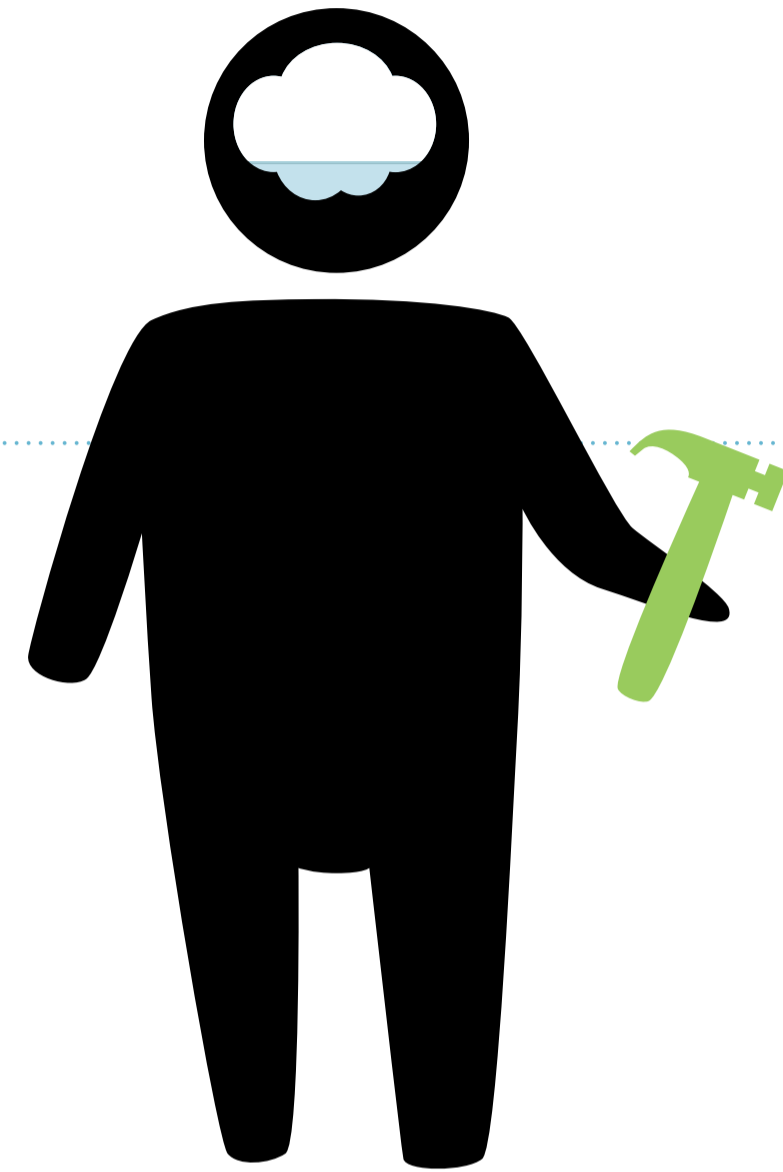
As for domain-independent skills, visualizing and diagramming are often considered to be fundamental.

Factual Knowledge
Cognitive

**Domain
Specific** (*Visual*)

Typeface identification
Conventions / layouts

**Domain
Independent**



The cognitive or knowledge classification consists of four parts.

The first of which is Factual Knowledge. For the visual designer, “facts” are elemental knowledge such as typefaces identification, layouts, and conventions.

On the other hand, Domain-independent facts are an inherent contradiction. All facts belong to a particular domain.

Conceptual Knowledge

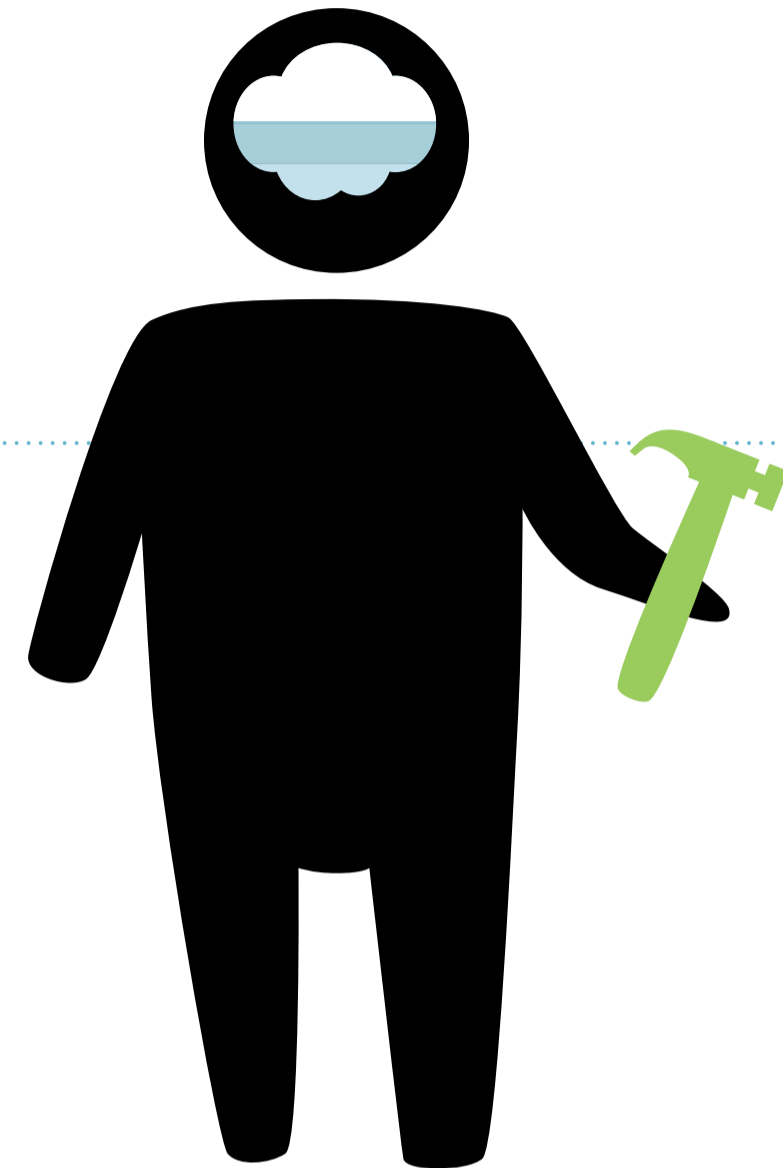
Cognitive

**Domain
Specific** (*Visual*)

Color Theory
Semiotics

**Domain
Independent**

Systems Theory
Cybernetics
Rhetoric



Conceptual Knowledge is made up of models and theories that give order to aforementioned factual knowledge.

Visual designers are trained in Color Theory or Semiotics. As for Domain-independent knowledge, recent work by Dr. Nelson and Hugh Dubberly have rekindled interest in Systems Theory and Cybernetics respectively.

These conceptual knowledge aim to provide designers with a foundation beyond traditional domains.

Dick Buchanan's framework of Rhetoric has long been such foundation for CMU Design.

Procedural Knowledge

Cognitive

**Domain
Specific** (*Visual*)

Judgements
Techniques

**Domain
Independent**

Reflective Practice



Procedural Knowledge makes up the knowledge expressed in the act of designing. Visual designers often rely on such tacit techniques and judgments.

Schon's concept of reflective practice falls under Domain-independent knowledge.

It is interesting to see the breadth of work that links domain specific procedural knowledge to the development of reflection in action.

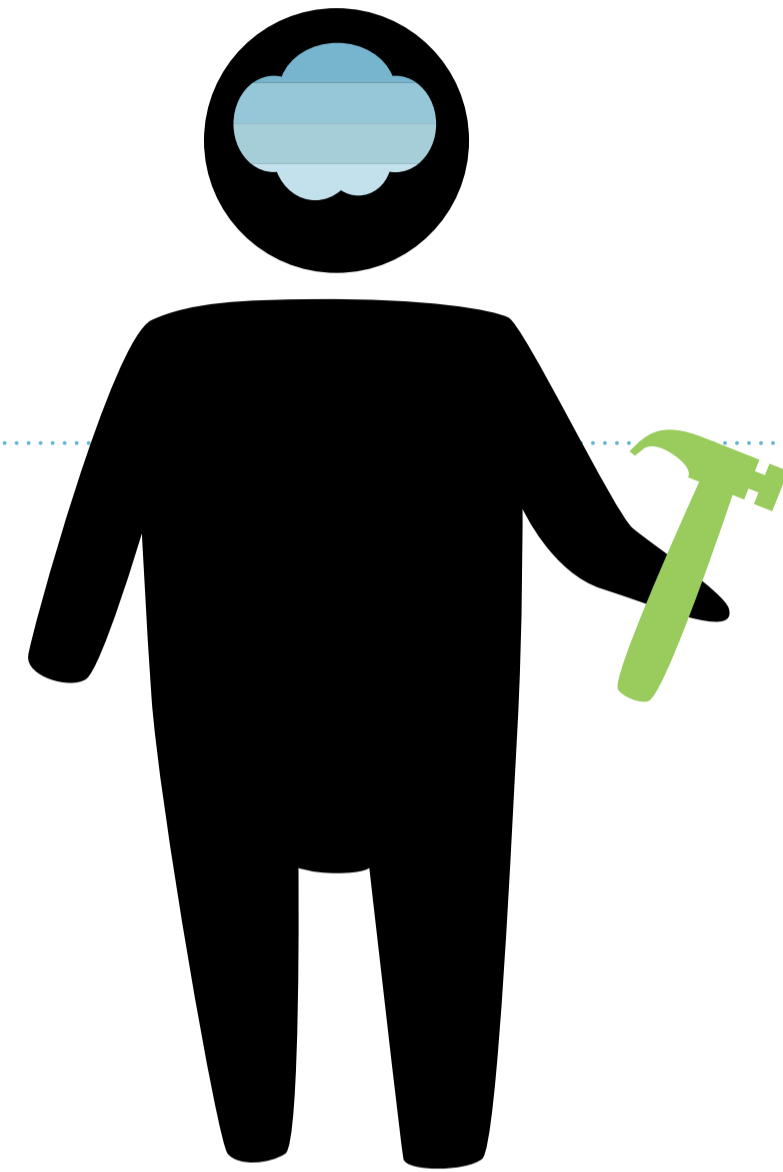
Metacognitive Knowledge

Cognitive

**Domain
Specific** (*Visual*)

**Domain
Independent**

Problem frame / reframe
Alternate Perspectives



Finally metacognitive knowledge is the awareness of one's cognition, cognitive contexts, and general cognitive strategies.

In short, knowing how to think and the way to think.

At this level of design knowledge, we begin to see the separation disappear. The ability to problem frame and reframe as well as to “juggle” alternative perspectives are fundamental problem-solving strategies exhibited by all designers.

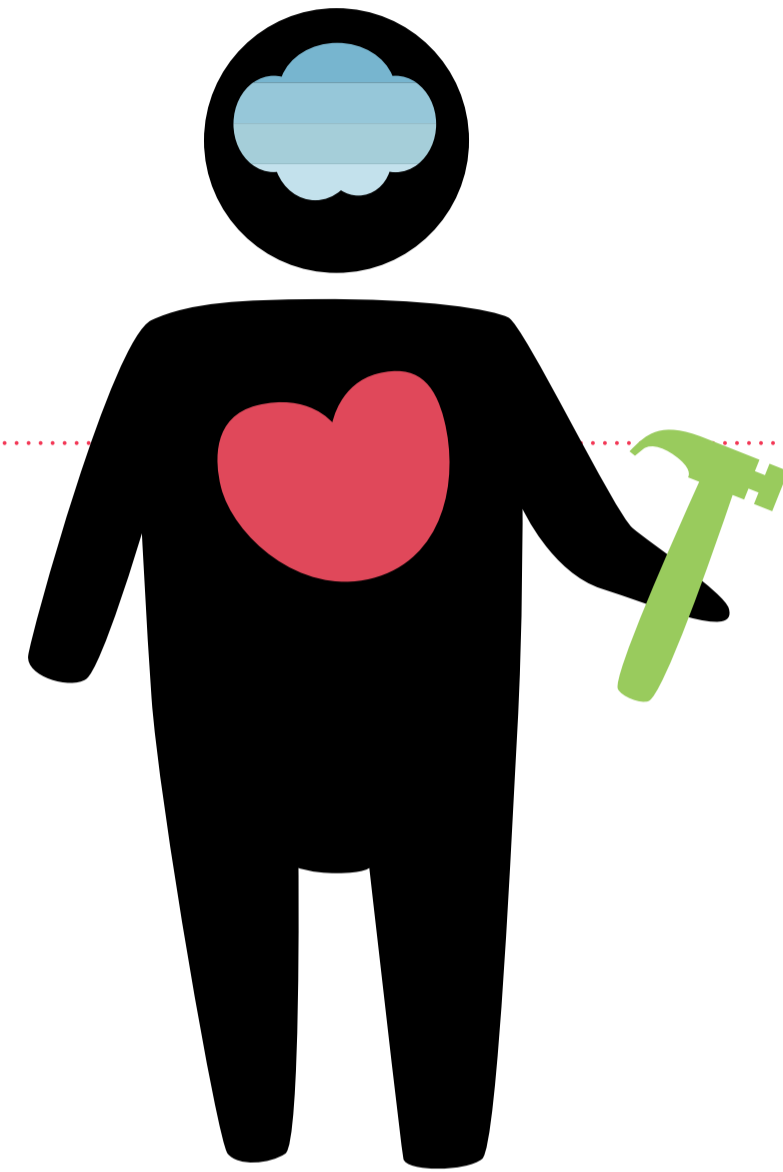
Attitudes

Affective

**Domain
Specific** (*Visual*)

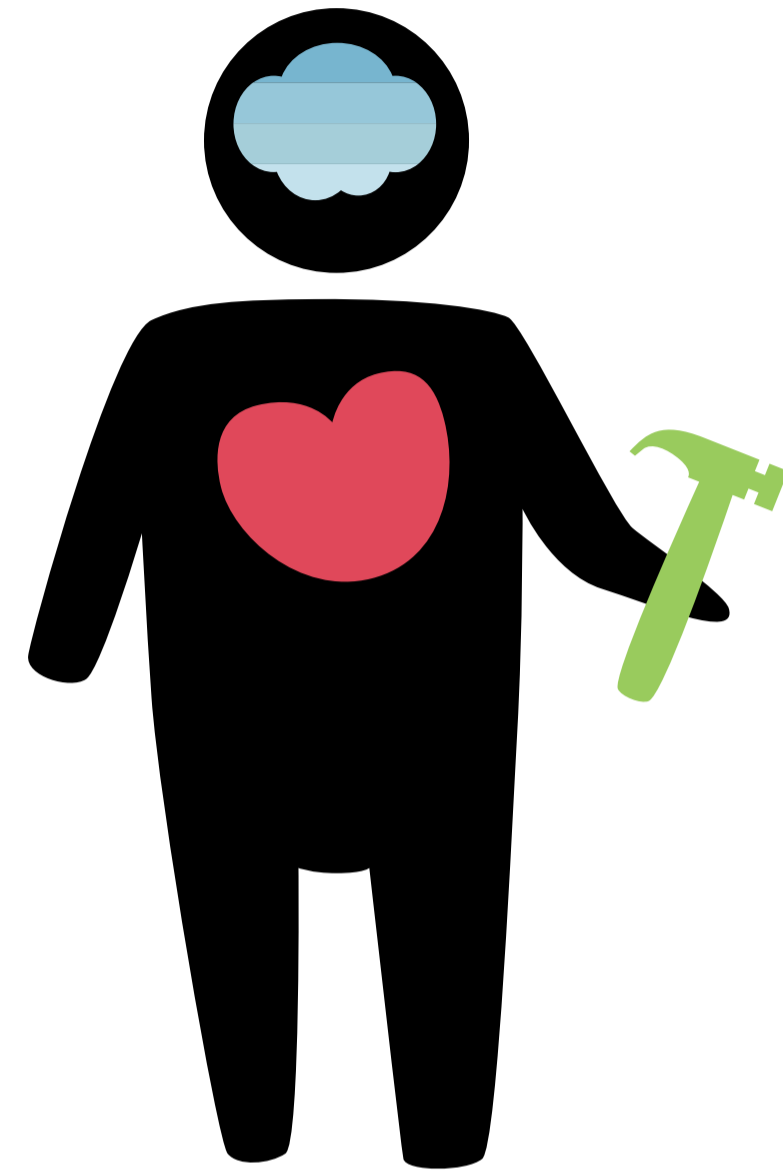
**Domain
Independent**

Human Centered Design
Design philosophies



Lastly, we arrive at the Affective category—where attitude make up the last classification of design abilities.

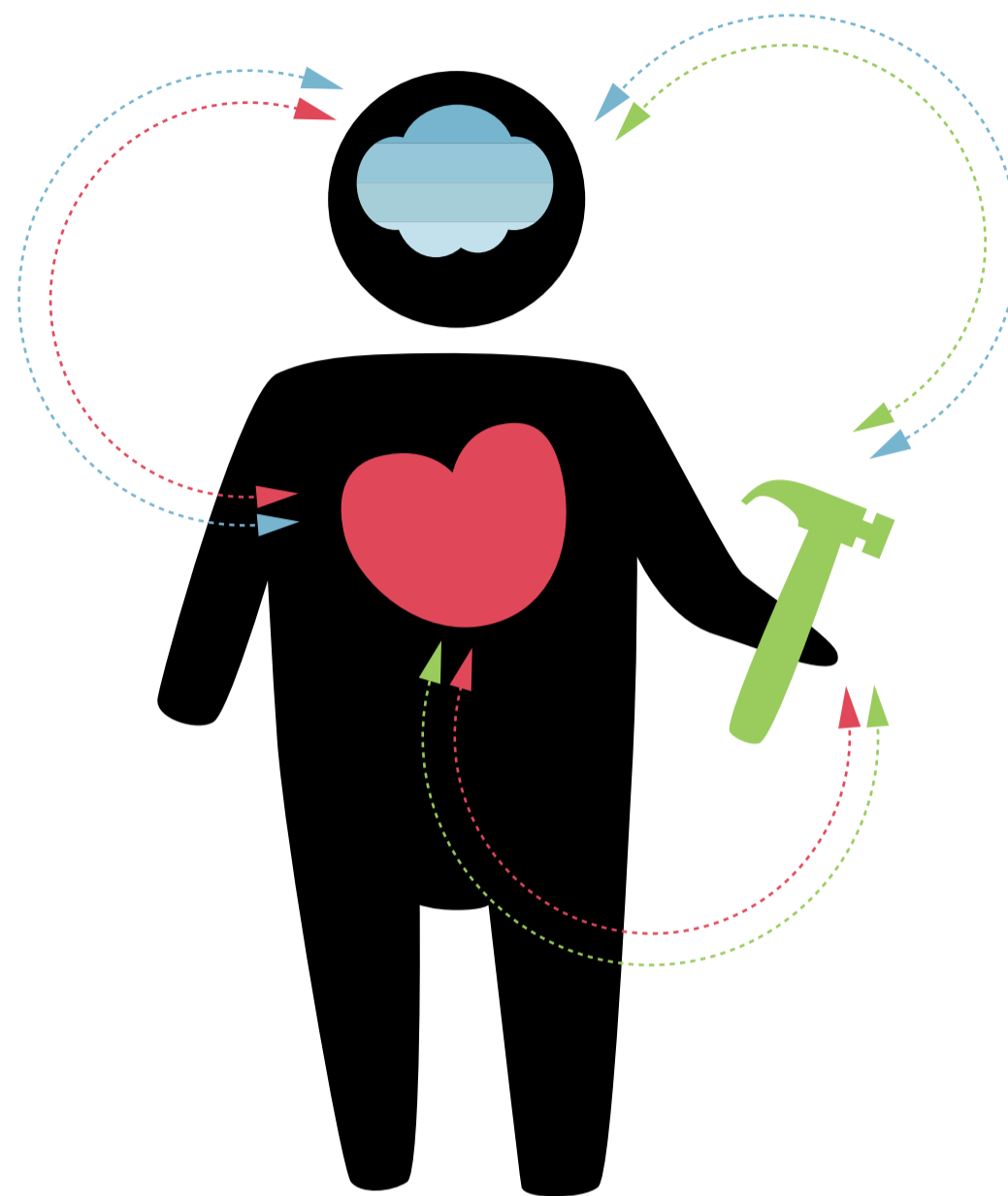
Human centered design and other Design philosophies are examples of what a designer values and embodies. Attitudes inevitably shape the abilities of the designer and therefore the outcomes of designing.



This classification of design abilities is certainly not definitive or absolute. But a classification allows for comparison and interaction

For example, in what Gabriela Goldschmidt calls “the dialectics of sketching”, the psychomotor skill of sketching, as seen through a cognitive procedural knowledge lens, is interpreted as “reflection-in-action”.

Cognitive / Affective

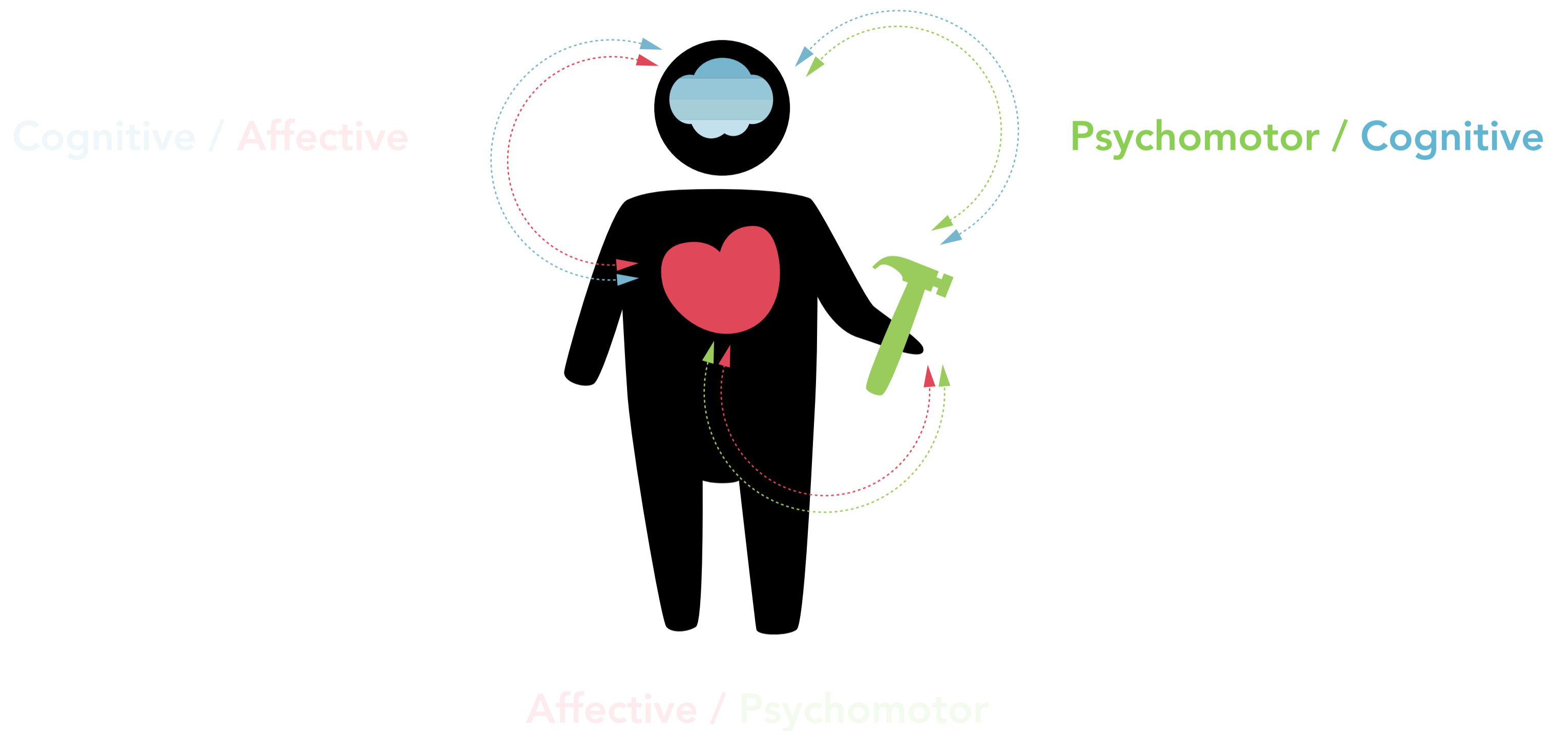


Psychomotor / Cognitive

Affective / Psychomotor

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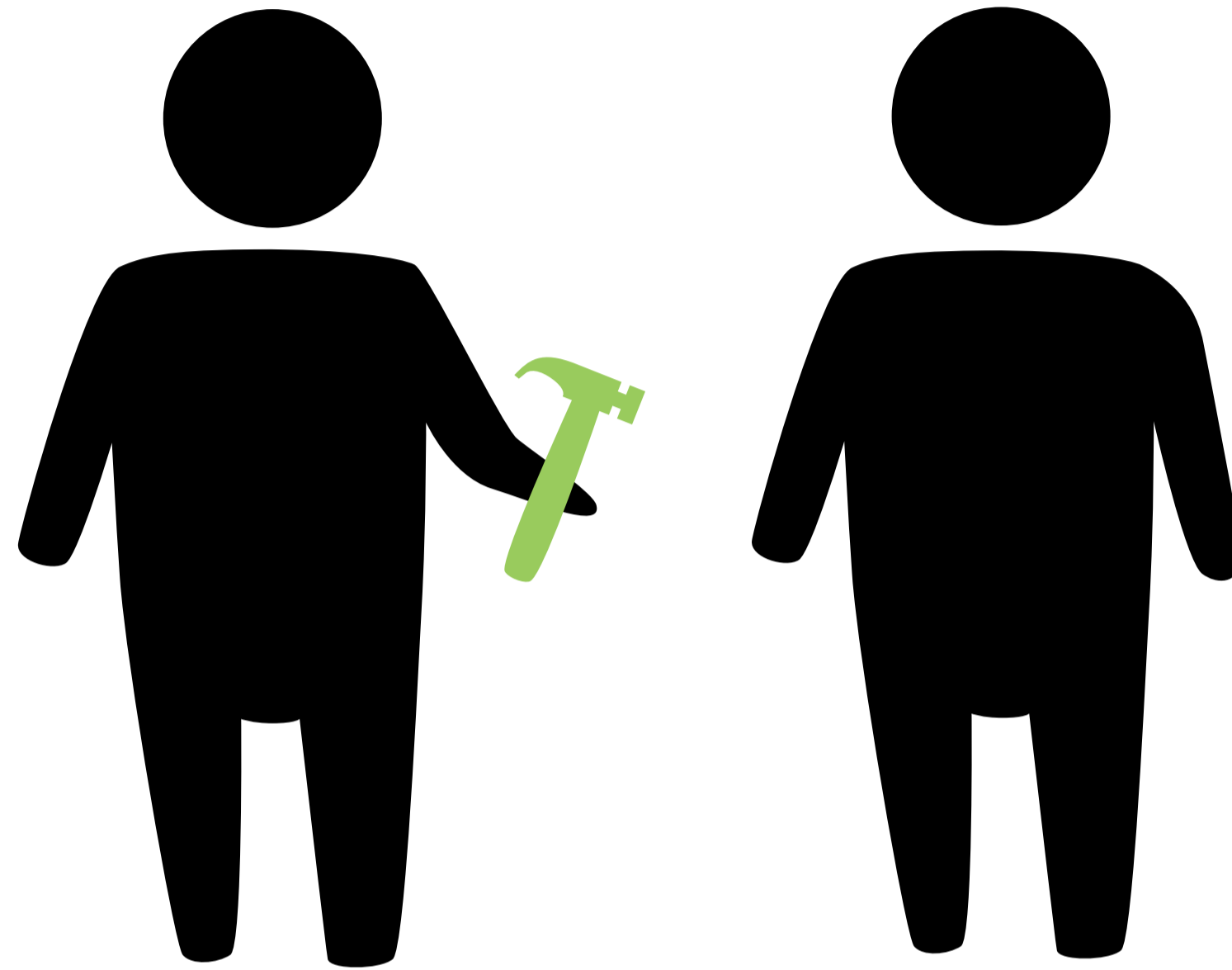
So let us return to the designers from different domains. Our classification—if valid—gives us a model of design development.

The domain-specific skills and tools does indeed take much more time to learn;

On the other hand, Factual knowledge and conceptual knowledge are relatively easy, and designers quickly pick things up from different domains such as Service Design, HCI.

Procedural knowledge are gained and exercised through the design projects themselves... and ideally, it eventually develops into reflective practice.

But how Metacognitive knowledge develops is much harder to determine or evaluate, yet these general designer cognitive strategies are the key abilities that make design a domain-independent activity.



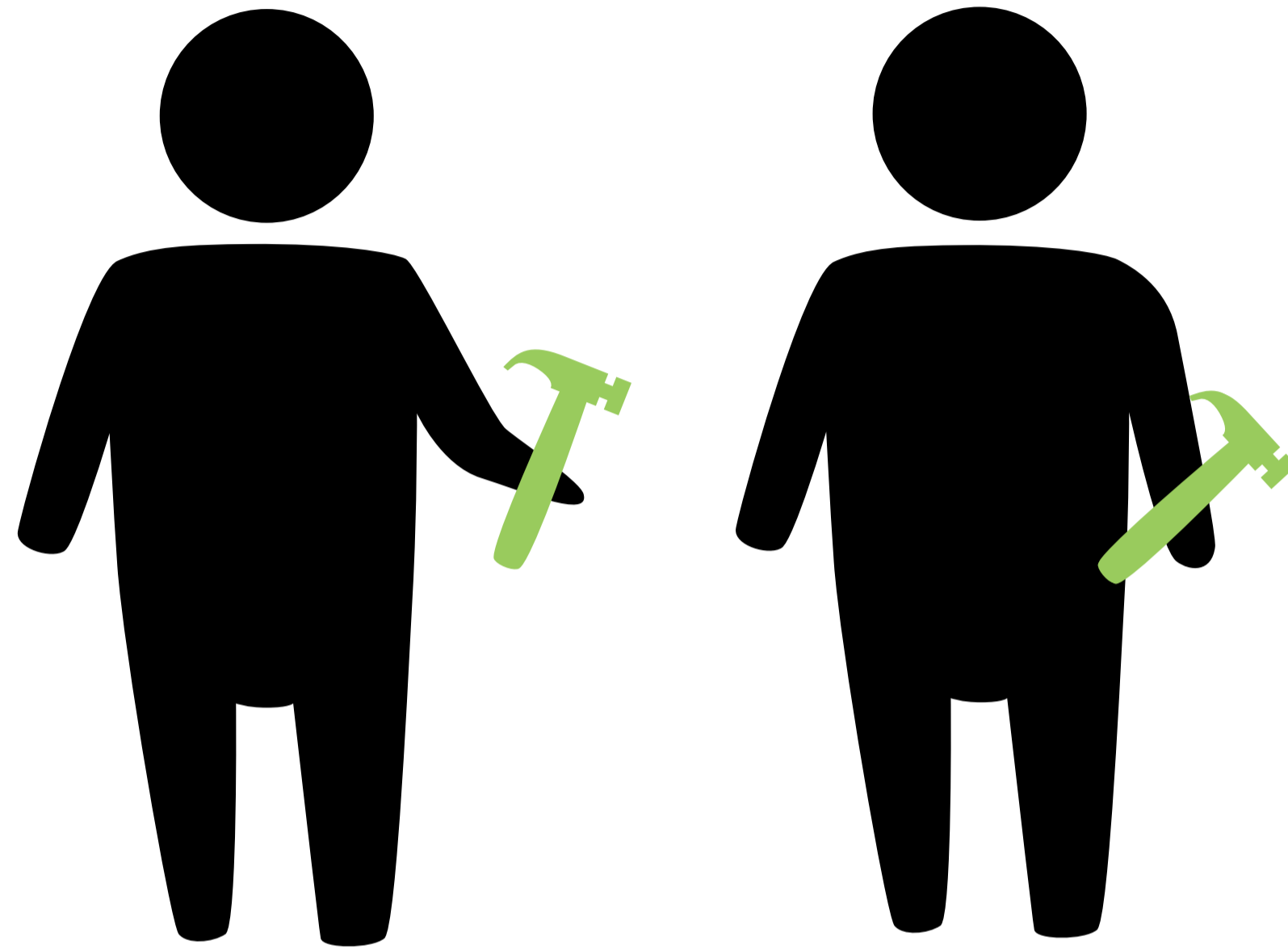
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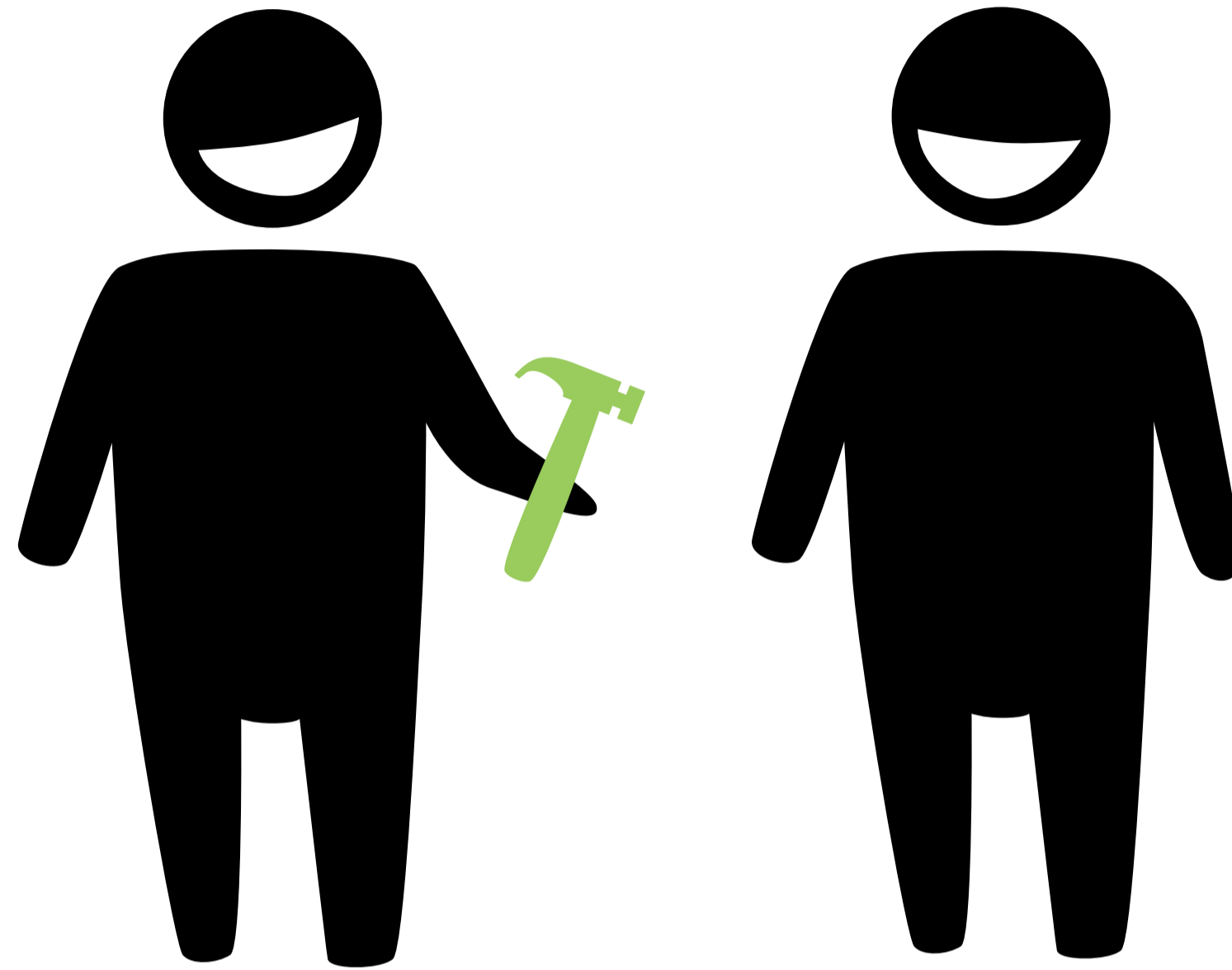
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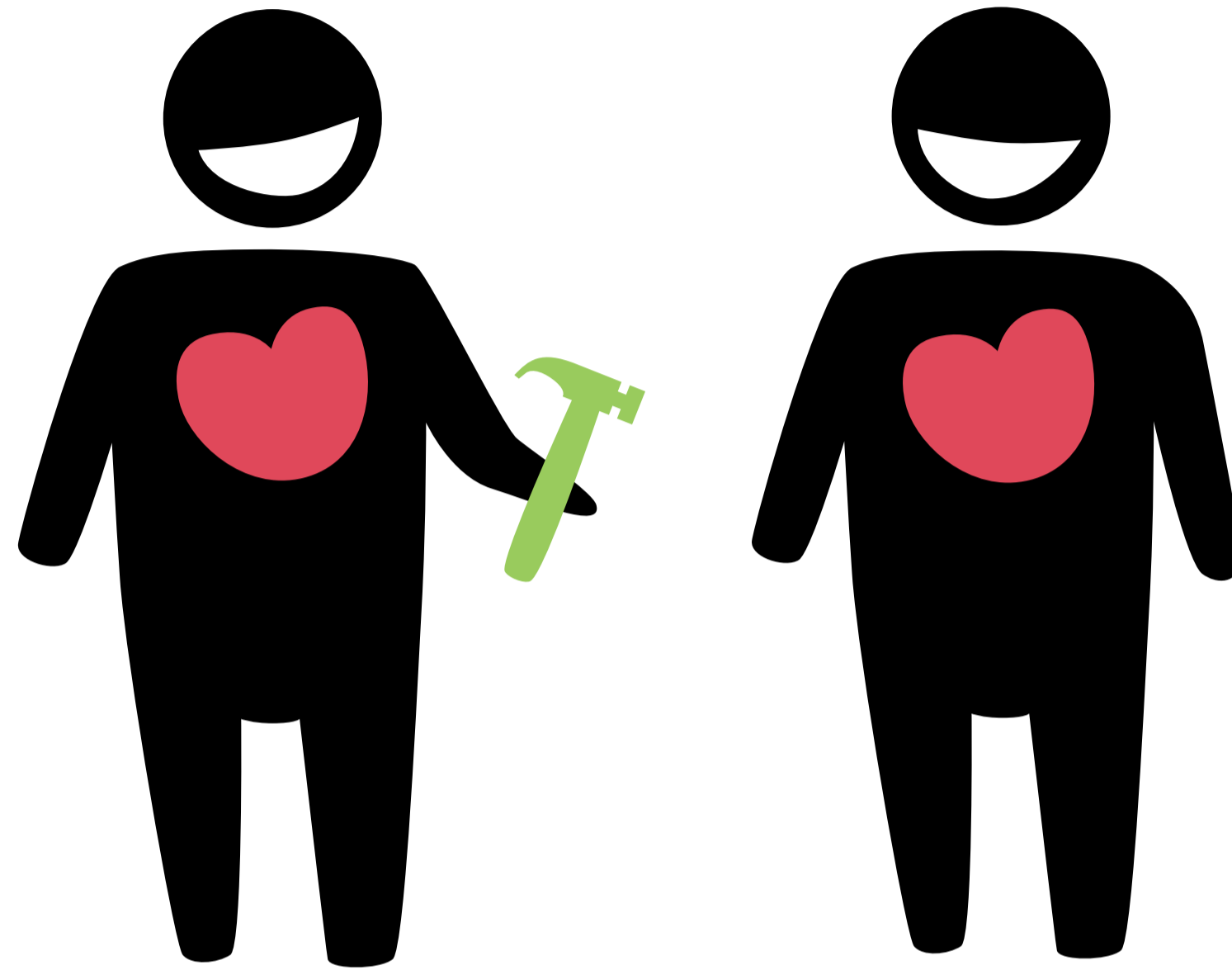
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What is critical and often overlooked, is a designer's attitude. With all of us focused on developing our skills, facts, and knowledge; we sometimes forget that we are all here because this attitude enables such learning.

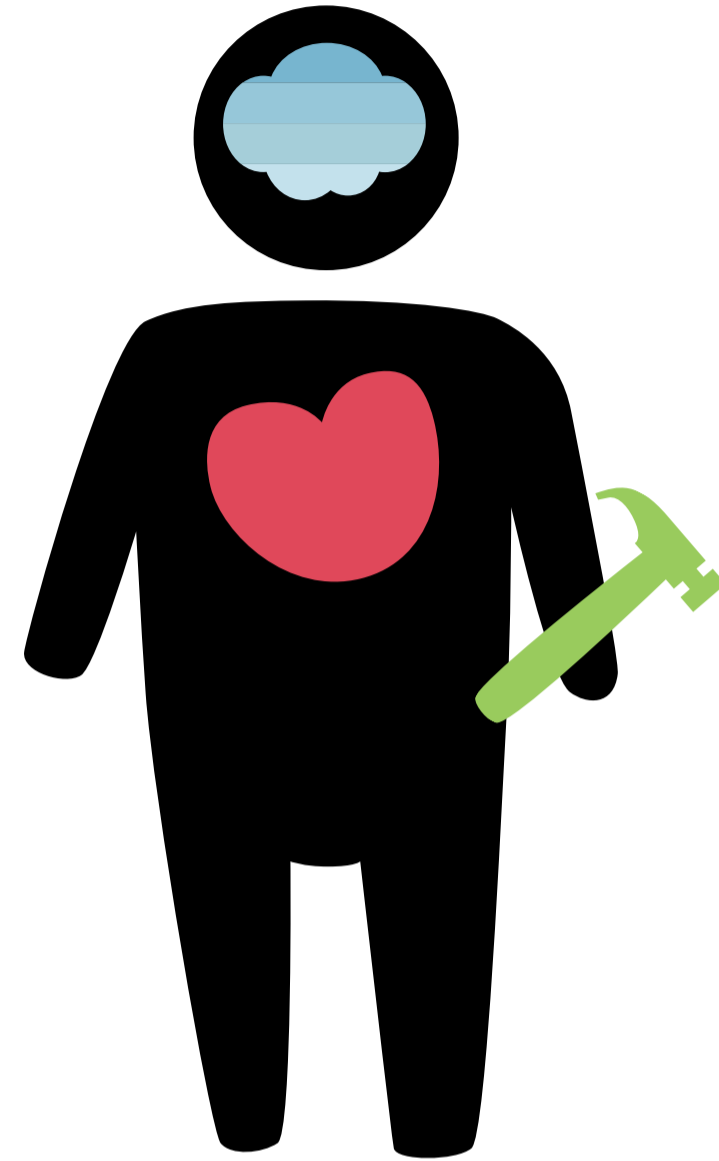
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Psychomotor
Cognitive
Affective



To summarize, I have presented a way to understand design knowledge.

A classification that takes into account physical skills, cognition that ranges from facts to strategies, and attitude.

But when we wonder if a designer can work beyond his or her specific domain...

Design is an attitude.

“There is design in organization of emotional experiences, in family life, in labor relations, in city planning, in working together as civilized human beings. Ultimately all problems of design merge into one great problem: design for life.”

Moholy-Nagy, *Vision in Motion*

I tend to agree with Moholy-Nagy, who said that above all, Design is an attitude.

Because regardless of domains, “Ultimately all problems of design merge into one great problem: design for life.”

Thank You.

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