

# Building Interactive Systems

# **HACK:** Modeling Systems

**Professor Bilge Mutlu | Spring 2023**

# What we will **do** today

1. Review theory on "modeling"
  - Dubberly (2009). ON MODELING: Models of models. *Interactions*.
  - Dubberly et al. (2008). ON MODELING: The analysis-synthesis bridge model. *interactions*.
2. Make HACK groups
3. Start assignment

# What is modeling?

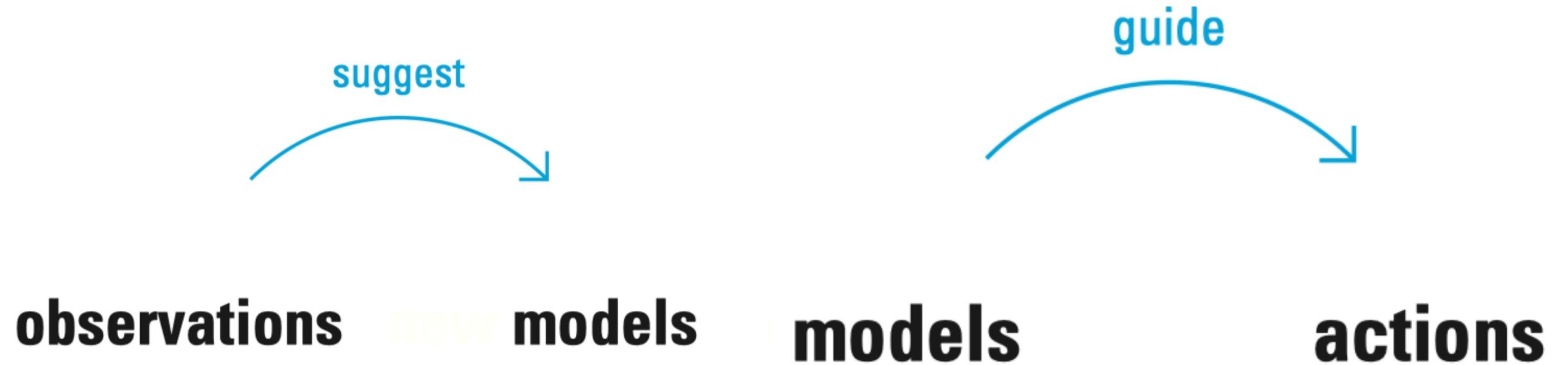
# What is a **model**?

From Dubberly (2009):<sup>1</sup>

- Models are ideas about the world—how it might be organized, how it might work.
- Models describe relationships: parts that make up wholes; structures that bind them; and how parts behave in relation to one another.
- Models support communication and learning.
- Models help bridge the gap between observing and making, between research communities and design communities.

<sup>1</sup>Dubberly (2009). ON MODELING: Models of models. *Interactions*.

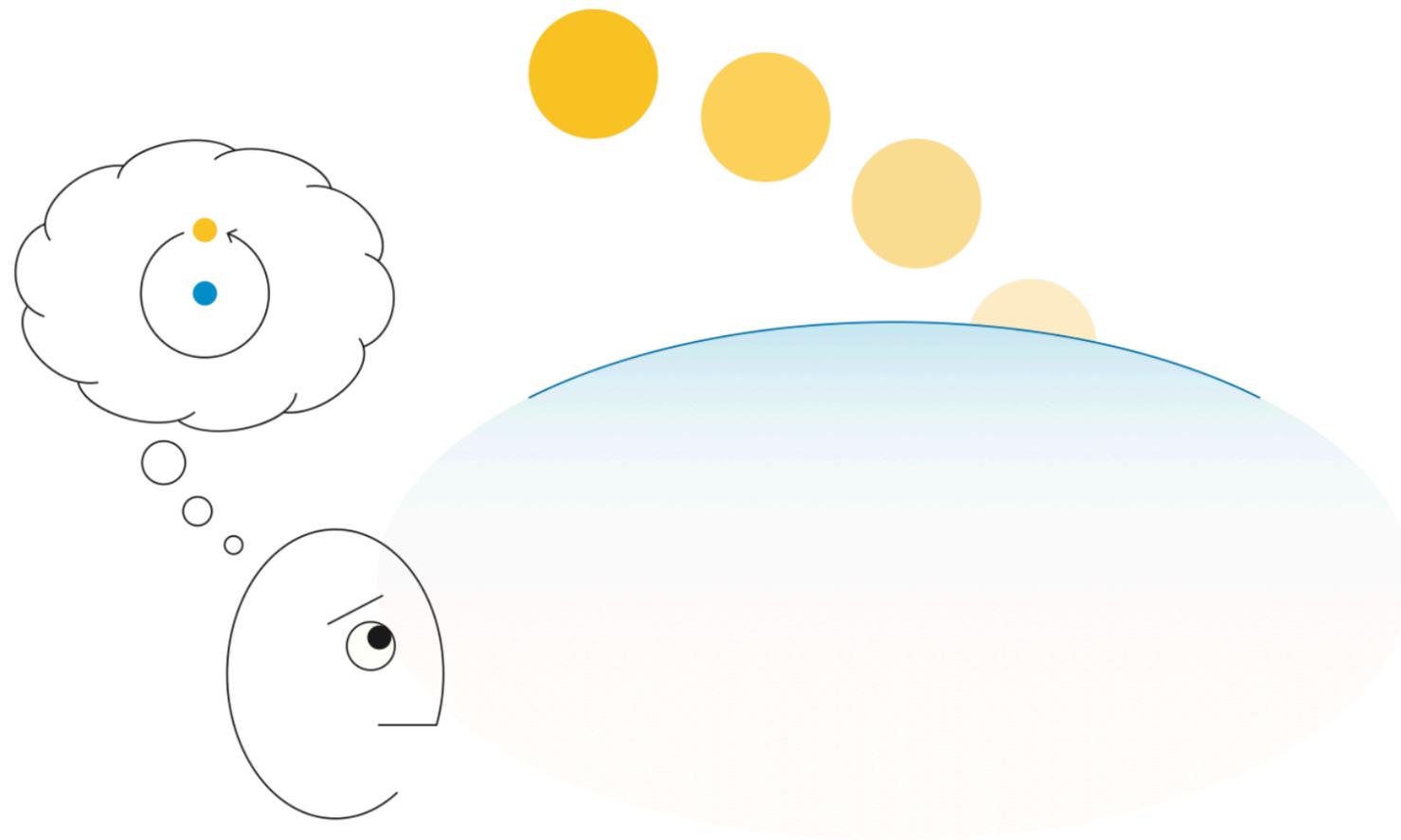
How do we form models?<sup>1</sup>



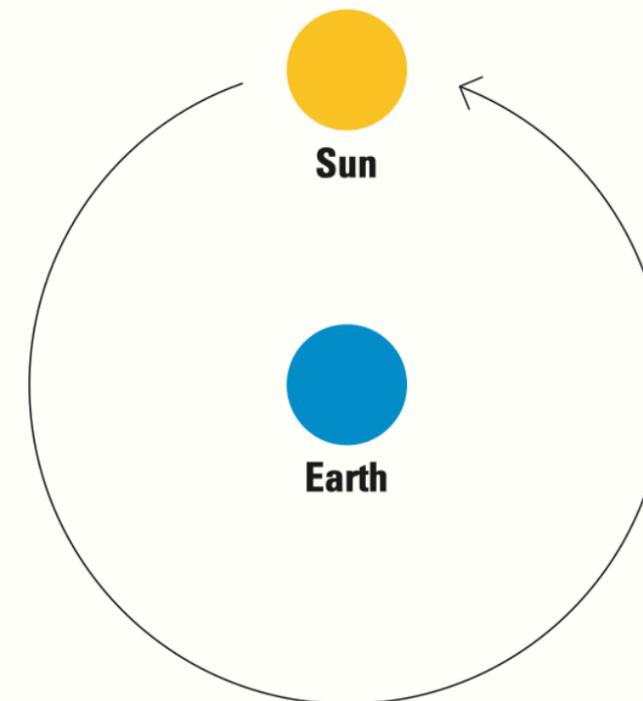
<sup>1</sup> Dubberly (2009). ON MODELING: Models of models. *Interactions*.

# How do we know that our models are accurate?<sup>1</sup>

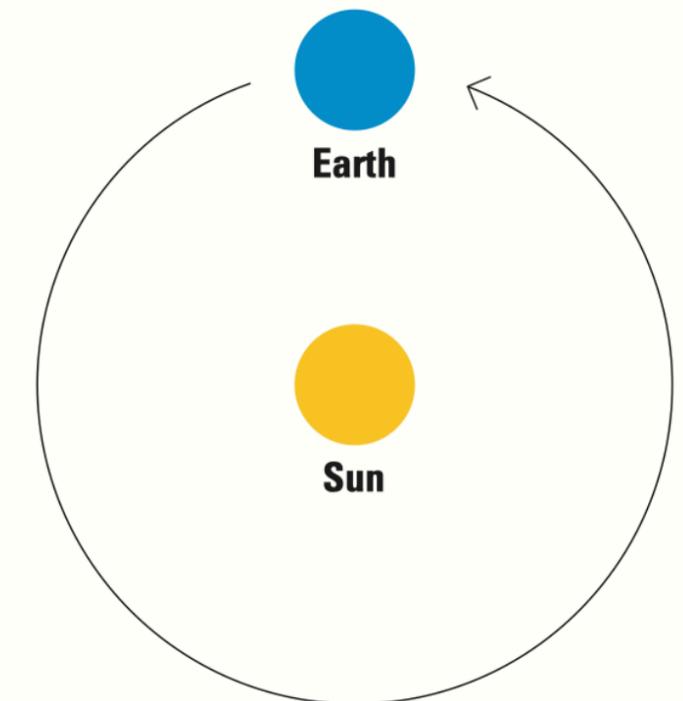
Models are ideas about the world—  
how it might be organized and how it might work.



A representation  
of the Ptolemaic model  
of the “world system”—  
a geo-centric view.

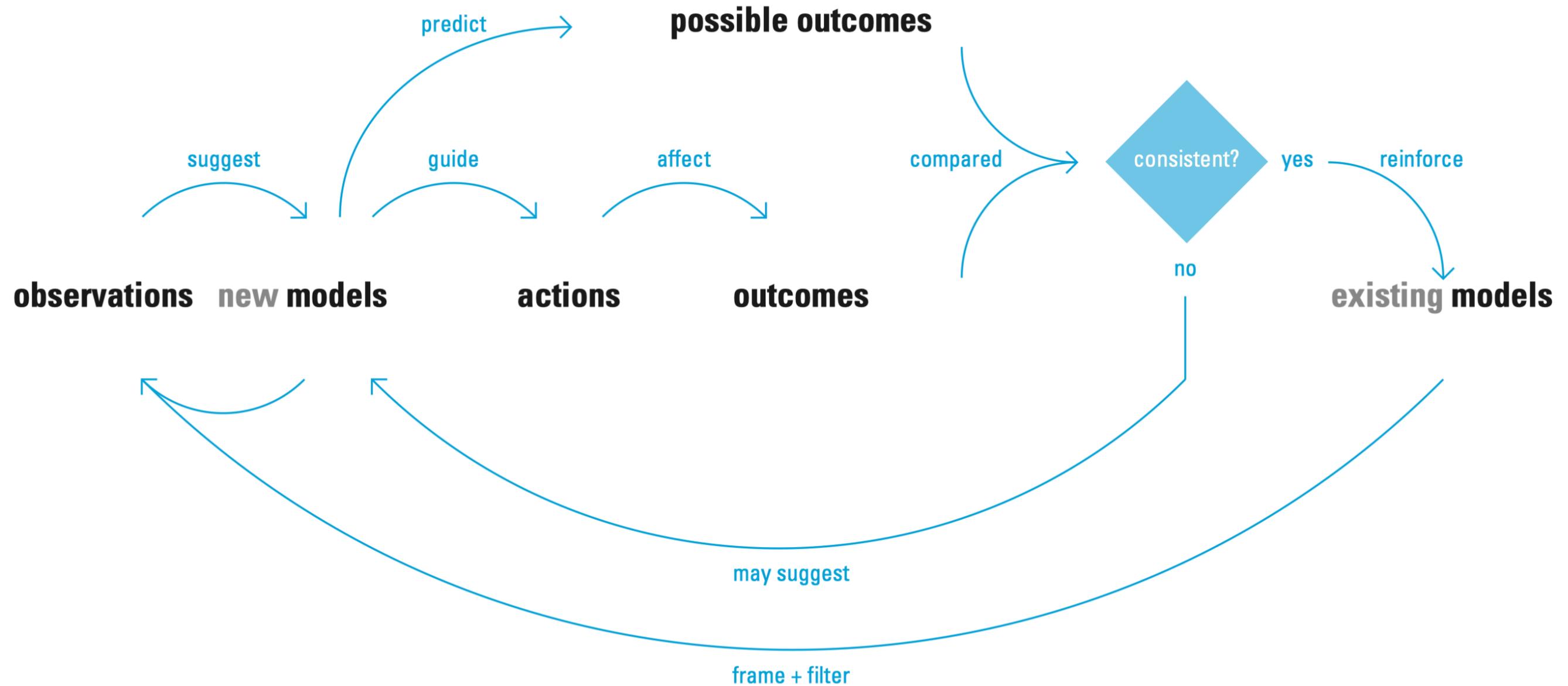


A representation  
of the Copernican model  
of the “solar system”—  
a helio-centric view.



<sup>1</sup> Dubberly (2009). ON MODELING: Models of models. *Interactions*.

Our models evolve as we test their predictions.<sup>1</sup>



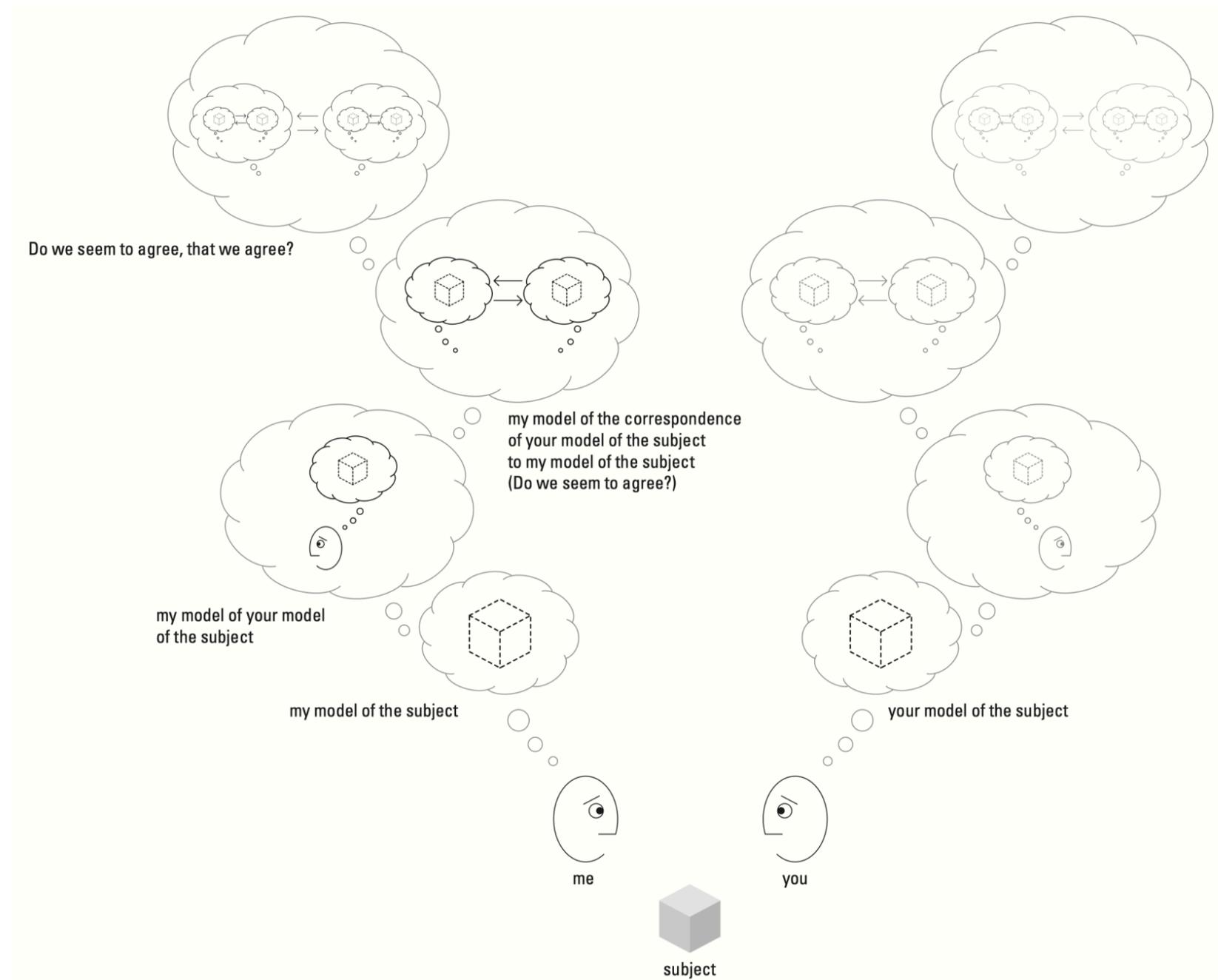
<sup>1</sup> Dubberly (2009). ON MODELING: Models of models. *Interactions*.

# Three levels of modeling<sup>1</sup>

1. **First-order models:** engaging existing models of the world
2. **Second-order models:** improving first-order models through learning and designing
3. **Third-order modes:** improving second-order models, i.e., learning to learn

<sup>1</sup>Dubberly (2009). ON MODELING: Models of models. *Interactions*.

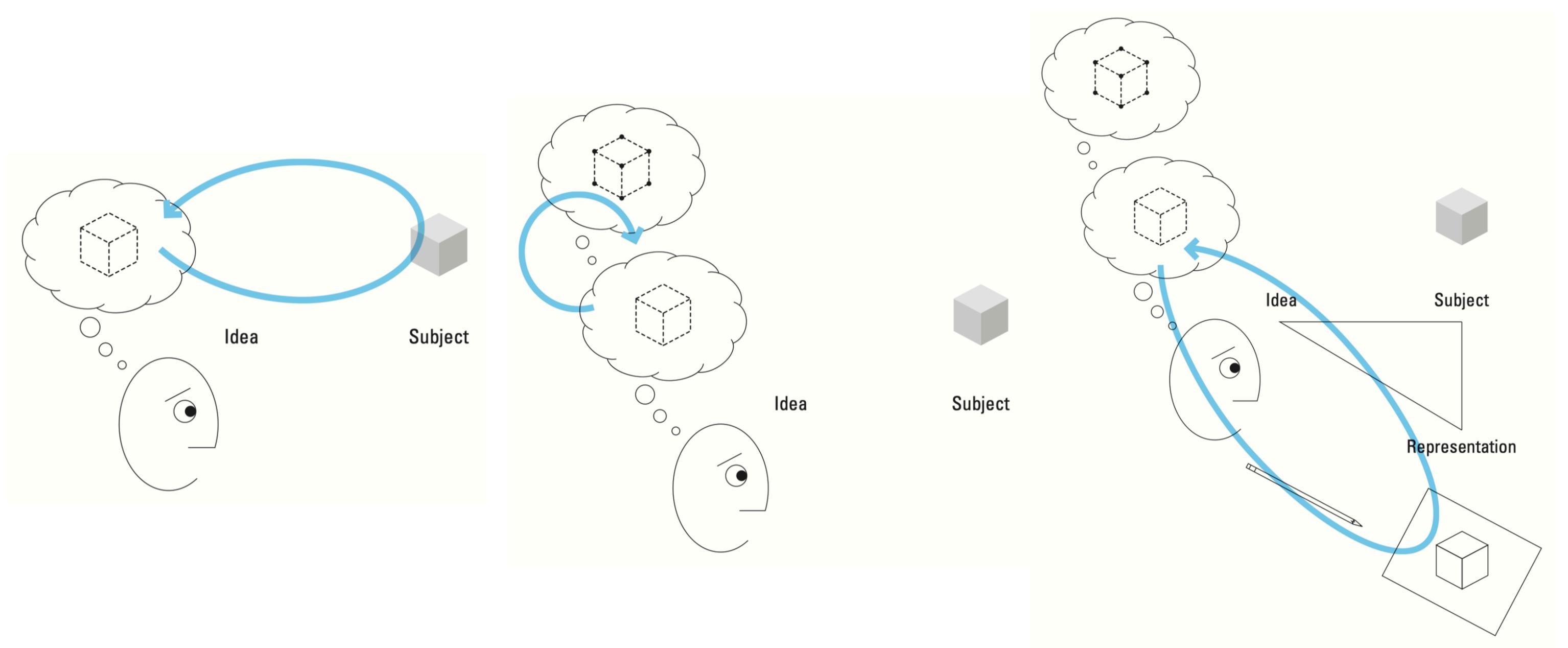
Model sharing facilitates communication, agreement, joint action<sup>1 2</sup>



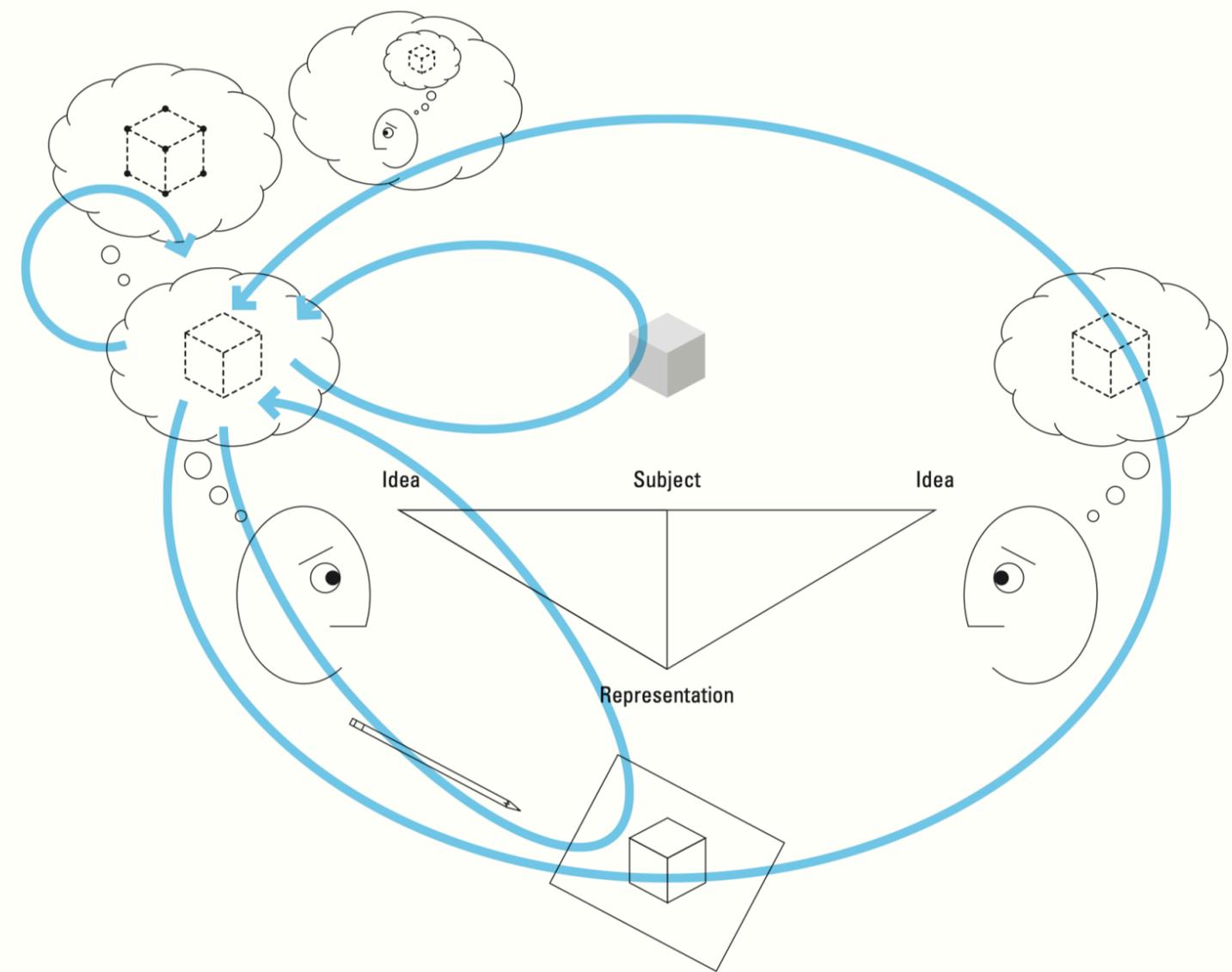
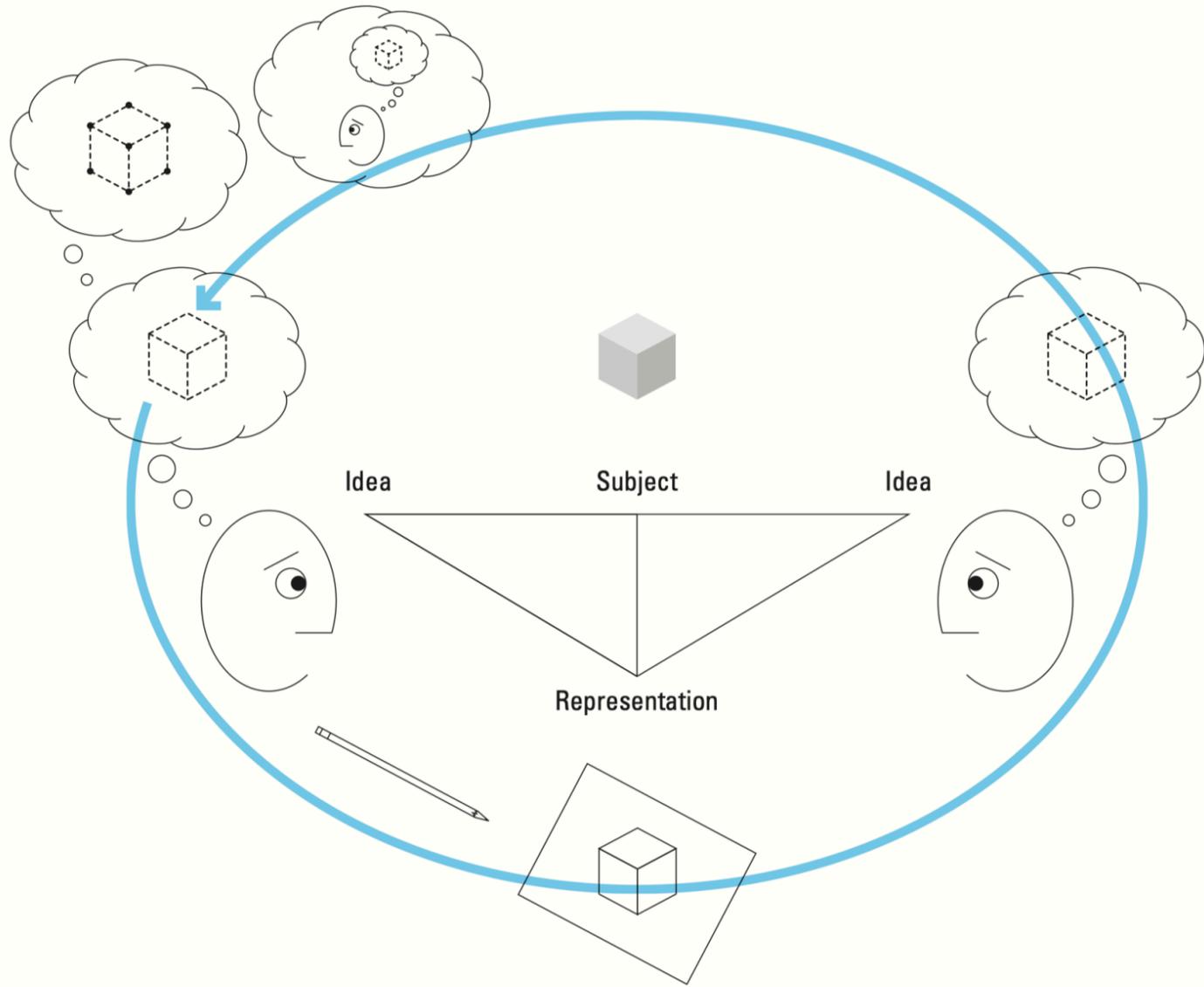
<sup>1</sup> Dubberly (2009). ON MODELING: Models of models. *Interactions*.

<sup>2</sup> Sebanz et al. (2006). Joint action: bodies and minds moving together. *Trends in cognitive sciences*.

# How do we model systems?<sup>1</sup>



<sup>1</sup> Dubberly (2009). ON MODELING: Models of models. *Interactions*.

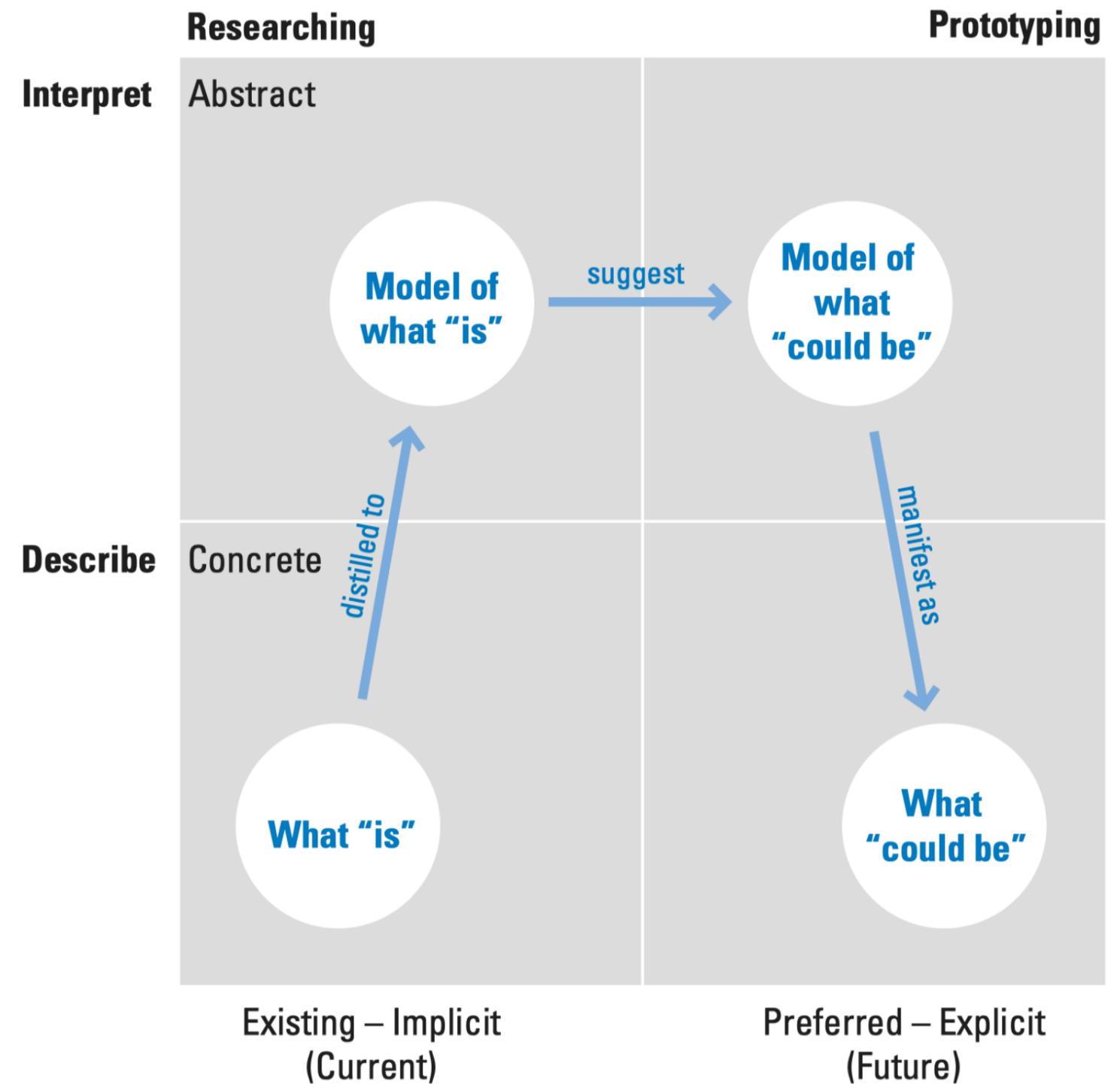


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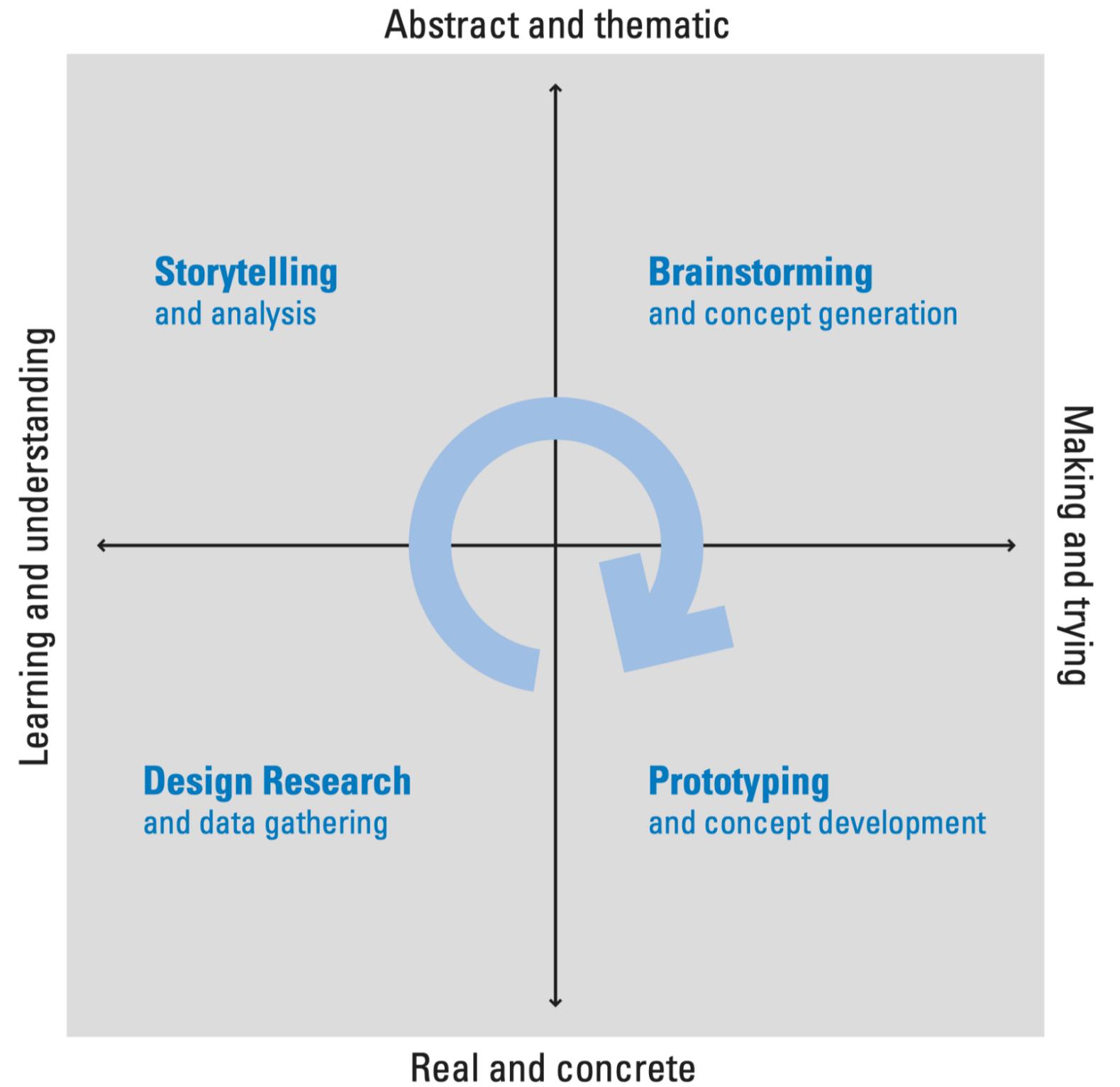
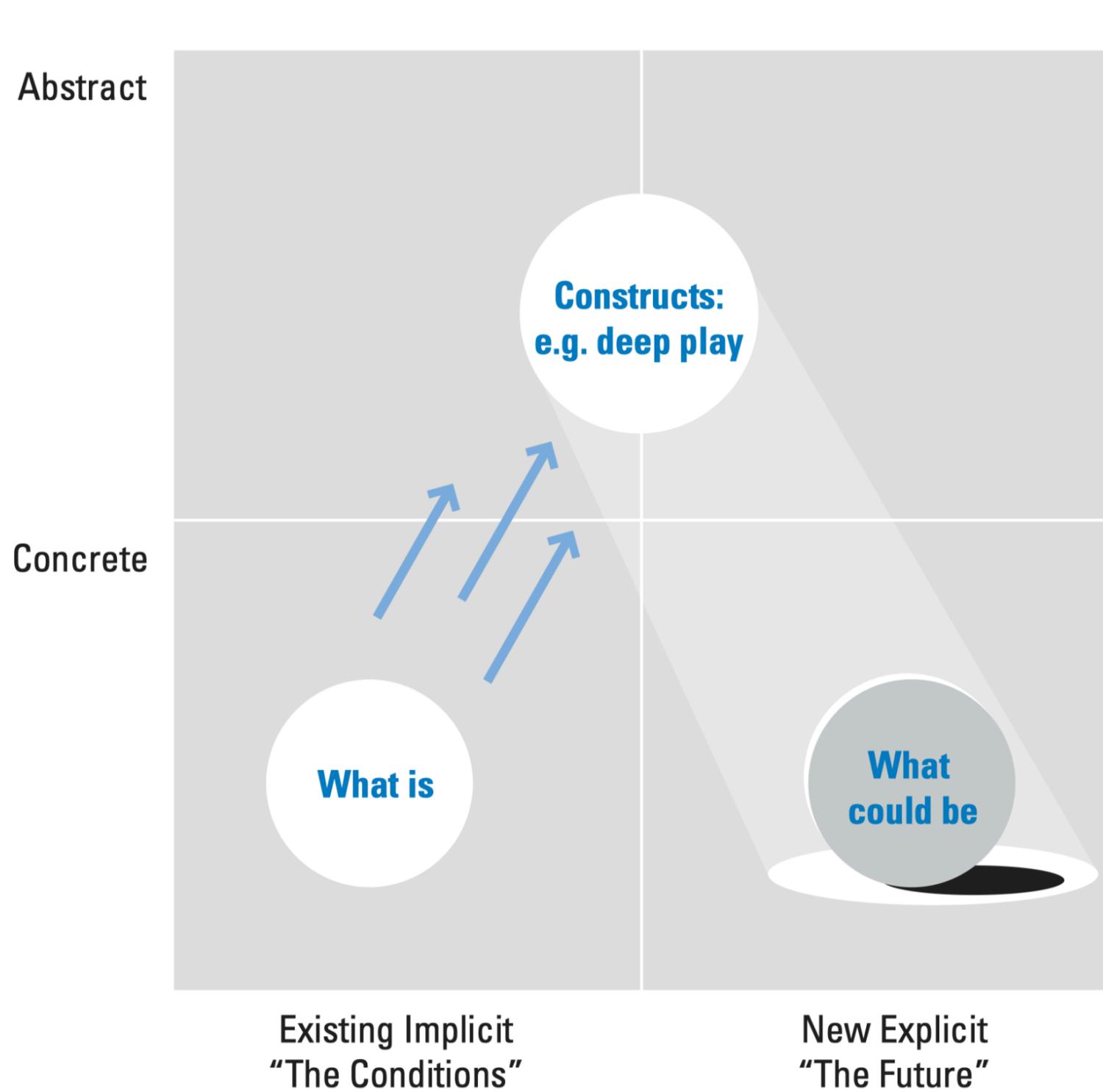
# How can models help us **design**?

# The Analysis-Synthesis Bridge<sup>3</sup>

- The design process has *two* main stages: **analysis**, **synthesis**
- Modeling, abstraction serves as a "bridge" between the two
- Modeling facilitates storytelling, ideation, exploration



<sup>3</sup> Dubberly et al. (2008). ON MODELING: The analysis-synthesis bridge model. *interactions*.



# Today's **HACK**: Modeling Systems

- Form groups of 5
- Model an existing system, explore possibilities
- Due next week