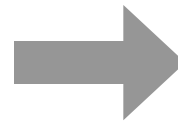


Northeastern University, Center for Design (CfD), Design & AI Conversation  
February 6, 2023, Boston, via Video Conference

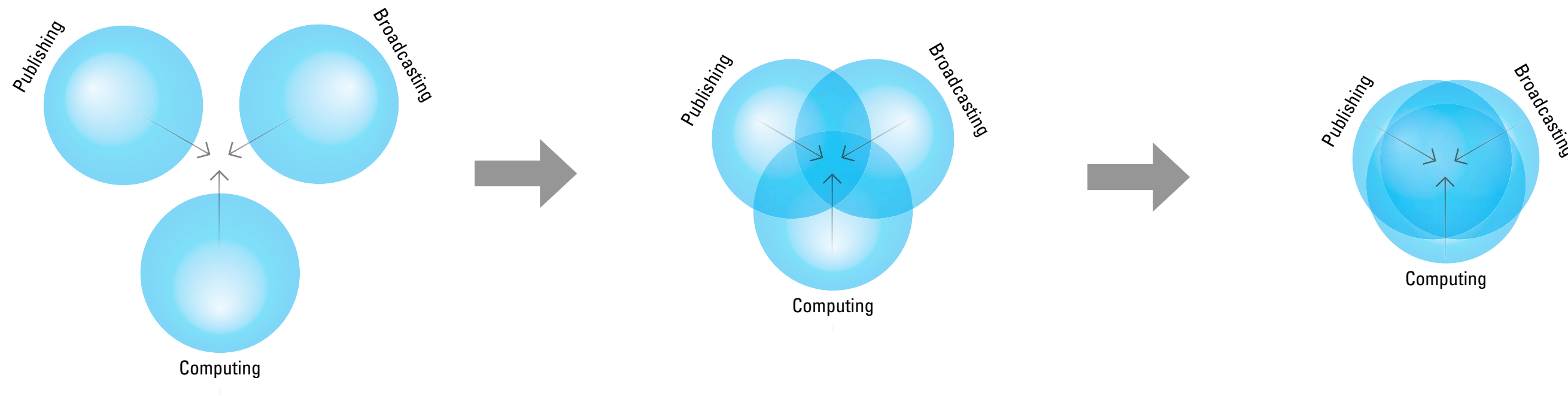
# **Data + Algorithms: New Materials for Design**

Hugh Dubberly

In the 1980s, computers emerged as a **tool** for designing —  
a way to produce variations, iterations, and specifications more quickly.



By 2000, the internet emerged as a **medium** for designing — print, radio, and TV were replaced by the web and then smartphones.



— after Nicolas Negroponte's convergence diagram



In the 2020s, data + algorithms are emerging as a **material** for designing — key building blocks of almost everything.



— after Xavier Barrade  
<https://xavier-barrade.squarespace.com/waymoexperience/>  
<https://www.youtube.com/watch?v=B8R148hFxPw>  
<https://www.youtube.com/watch?v=o8rCOKSDMcg>

Today, data + algorithms are the **main source of value** in the economy.

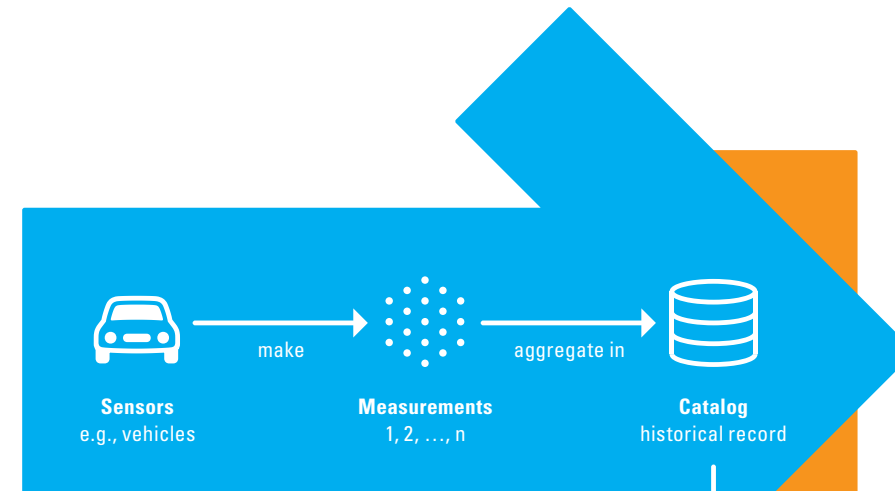


Source: <https://companiesmarketcap.com/>  
Data retrieved on June 27, 2022

# A core activity is building and applying **digital twins** to services and systems.

## 1. Data lake — Gather histories

Sensors make a series of point-in-time measurements. As measurements accumulate, an historical record emerges.



## 2. Data refinery — Derive models

Sufficient historical data enable analysts to discover patterns and relationships—these are codified in models.

enables

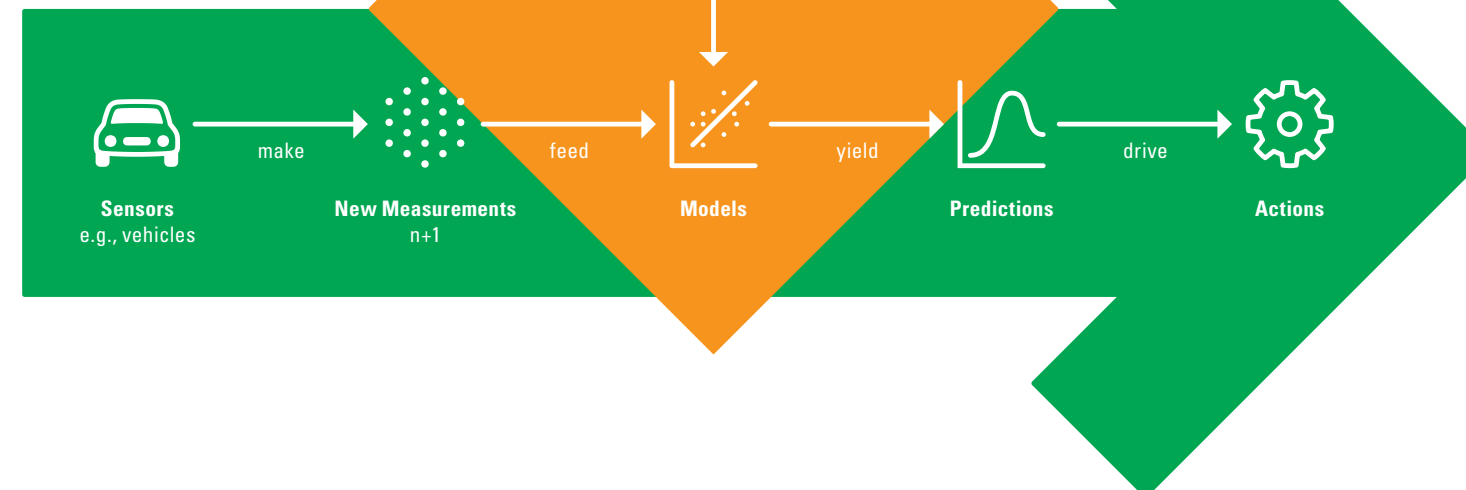


Machine Learning

yields

## 3. Digital twin — Predict futures

Once trained, new measurements are fed through the model to predict the future—enabling us to act today.



Advances in generative AI, particularly **large language models (LLMs)** are disrupting the search ecosystem and cascading across the economy.

- **auto-completion widgets**

become

- **explanation oracles** (the new 'search' interface)

become

- **personal assistants** within a domain (e.g., Co-Pilot for programmers)

become

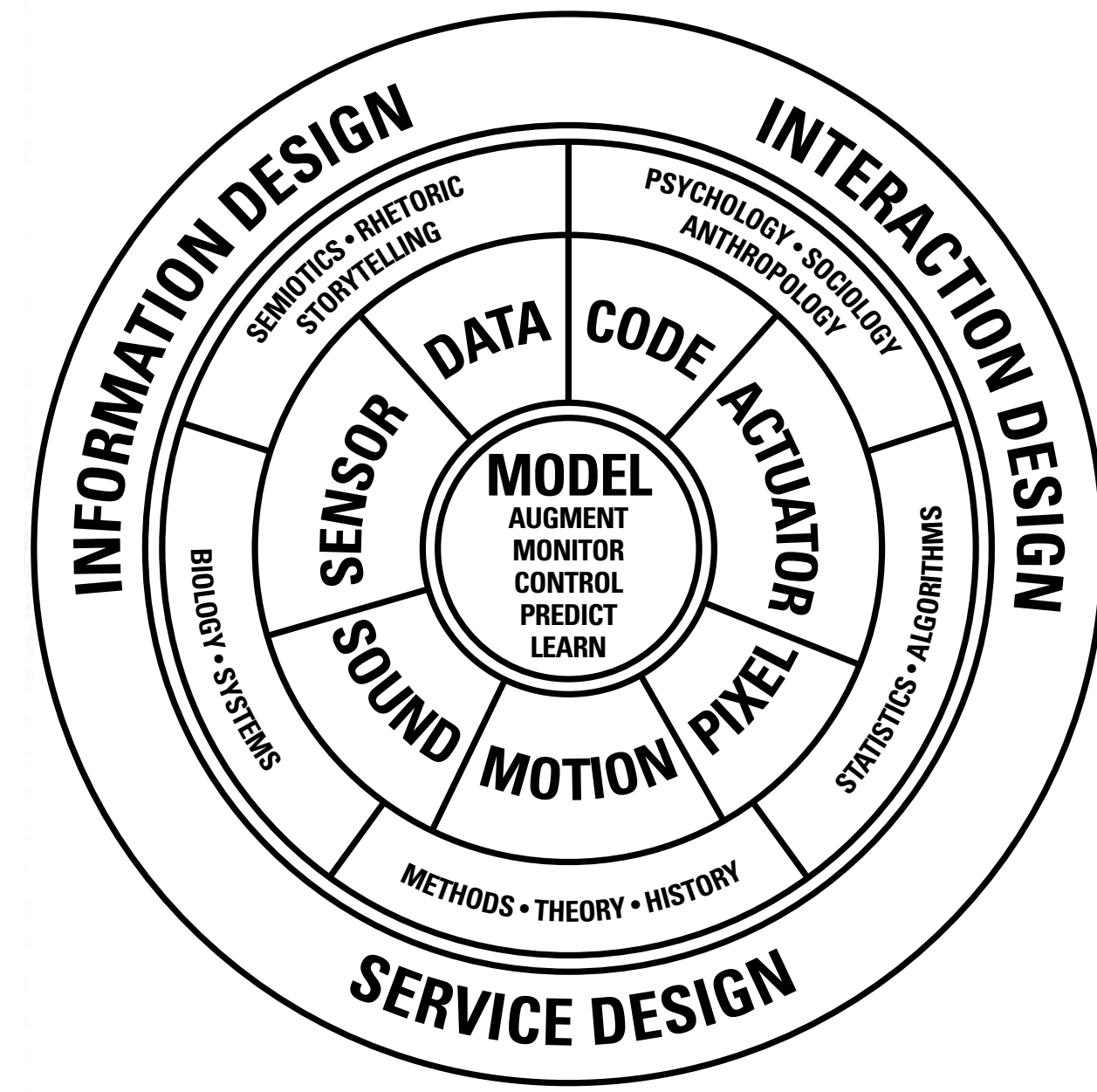
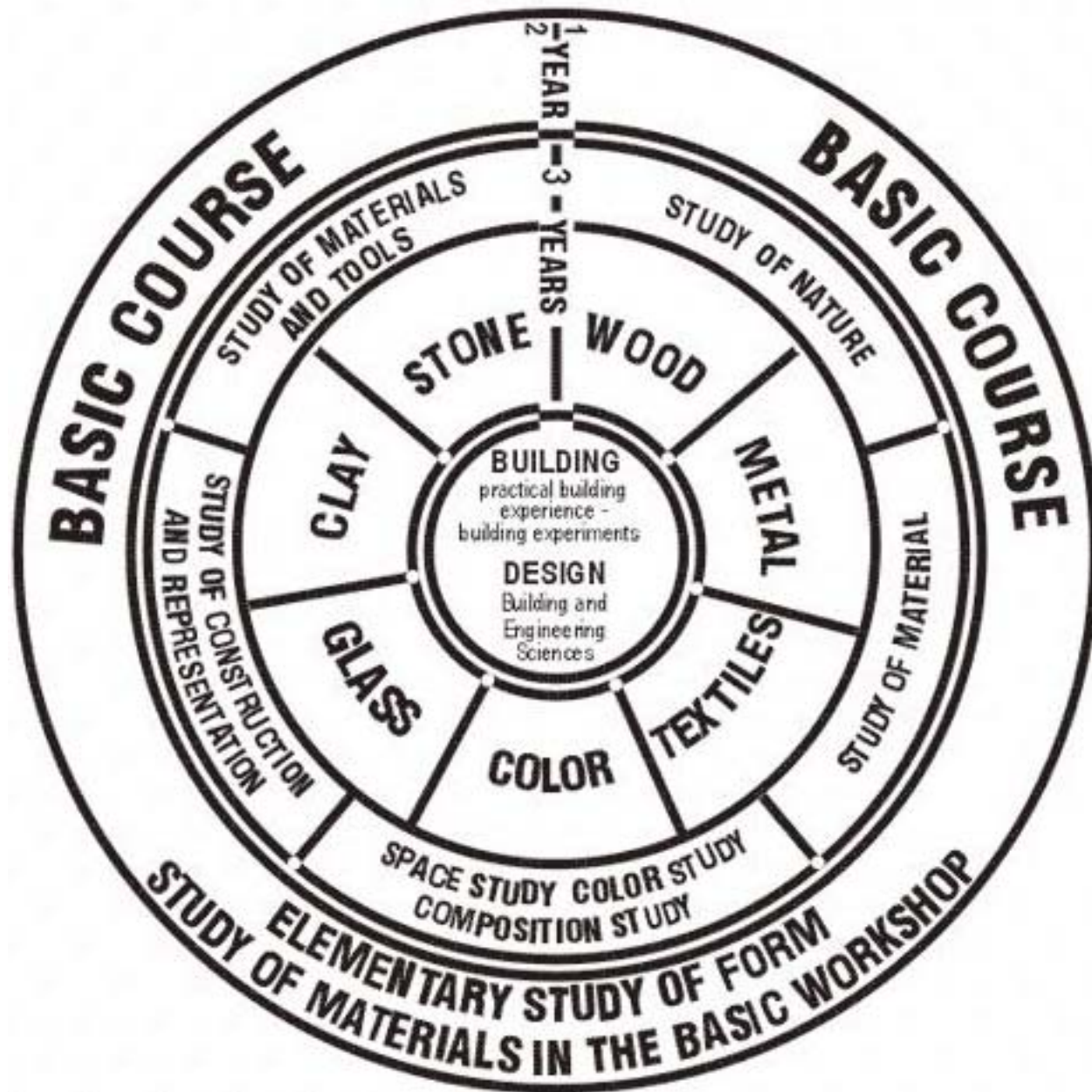
- **agents** acting with autonomy on our behalf



If Walter Gropius were to reform the Bauhaus School curriculum for today, he might replace

**the old 20th century materials...**

**with the new 21st century materials.**





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