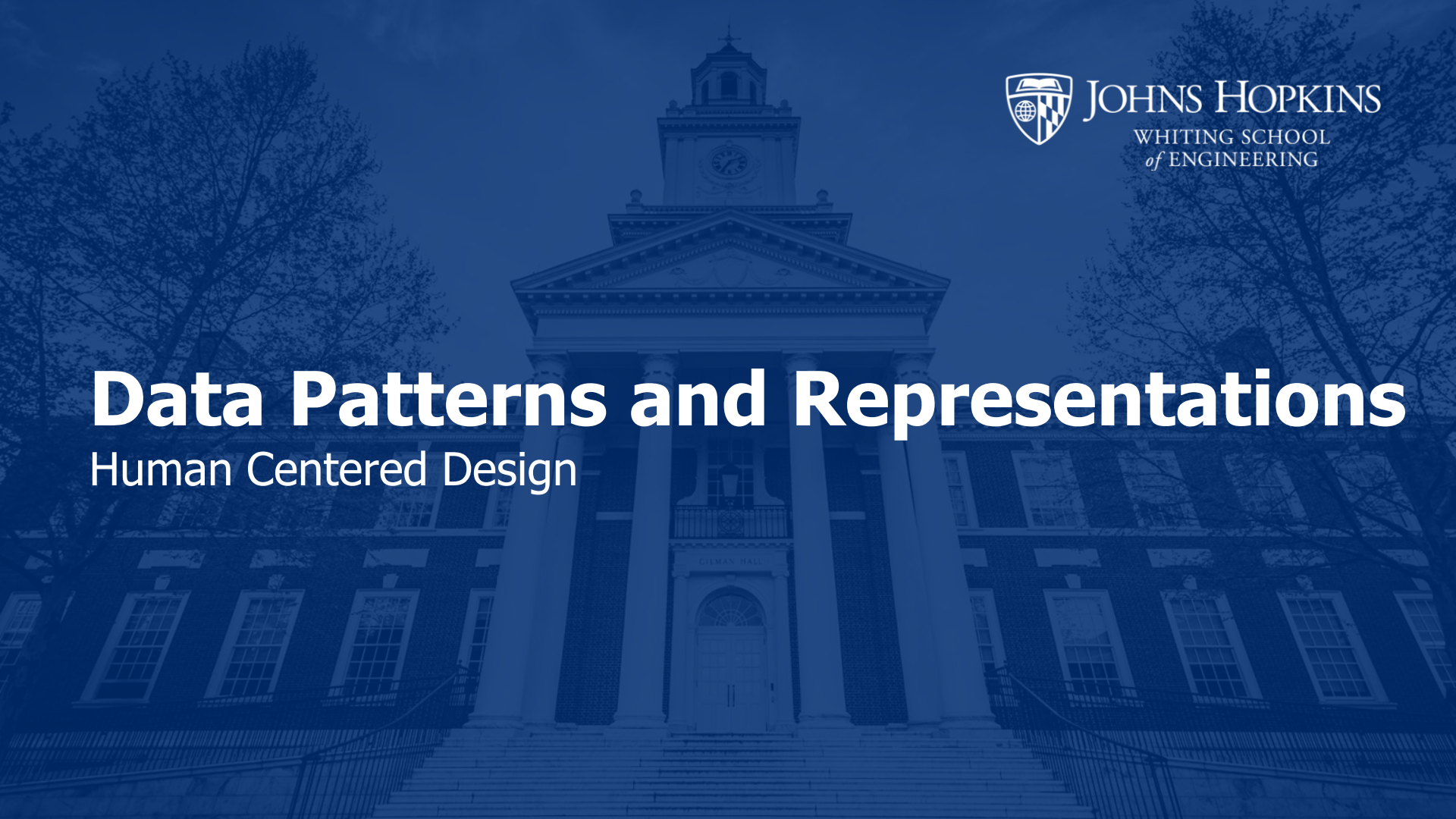
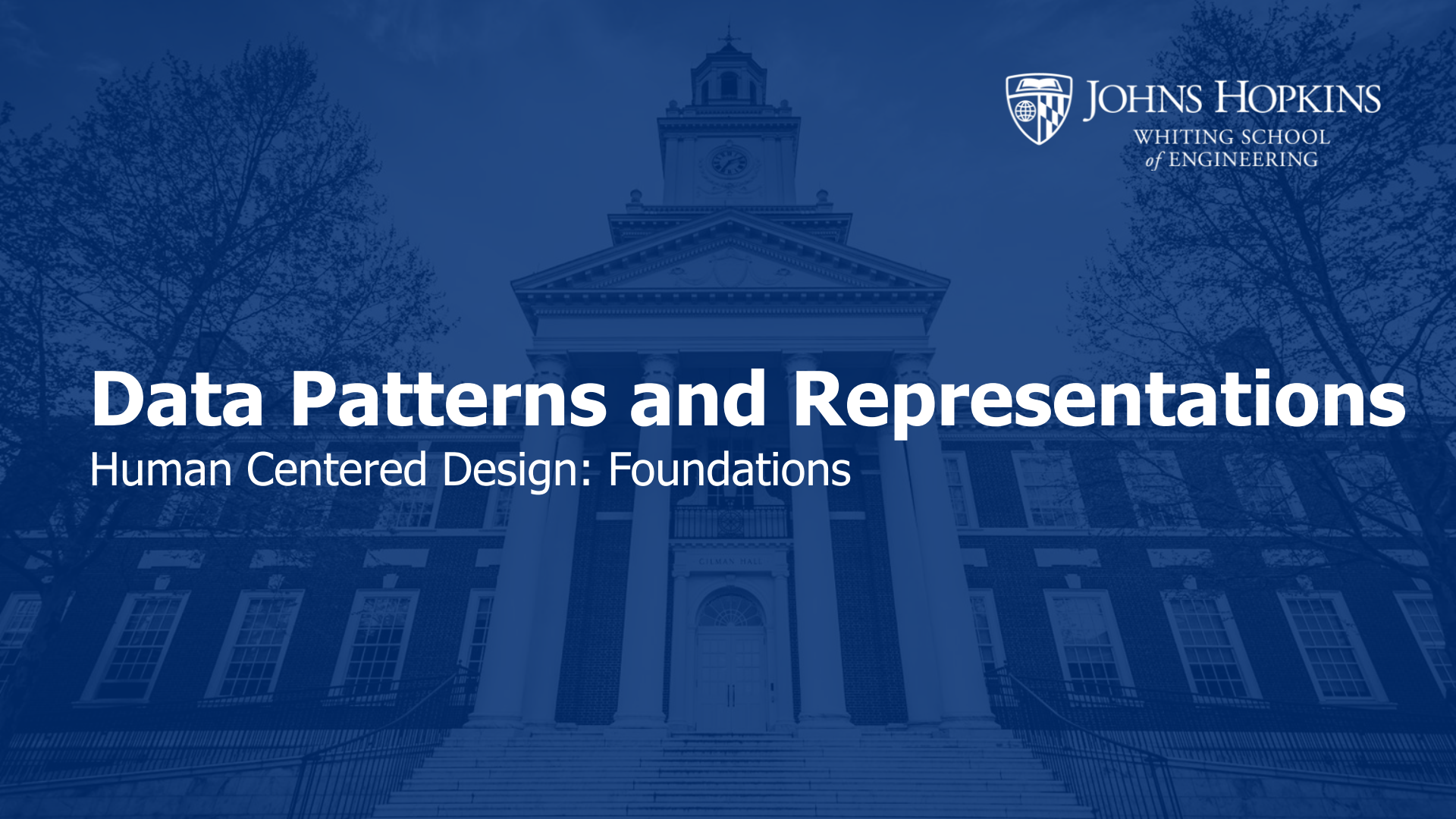



# Data Patterns and Representations

## Human Centered Design




# Data Patterns and Representations

## Human Centered Design: Foundations

# Module Learning Objectives

## MLO 1

Identify key principles of Human-Centered Design, including User Experience, User Interfaces, and Design Foundations.

## MLO 2

Explain the influence of psychology foundations and cognitive biases on user decision-making and behavior.

## MLO 3

Analyze the role of usability frameworks, such as the Honeycomb of Usability and Usability Heuristics, in creating intuitive interfaces.

# Module Learning Objectives

## MLO 4

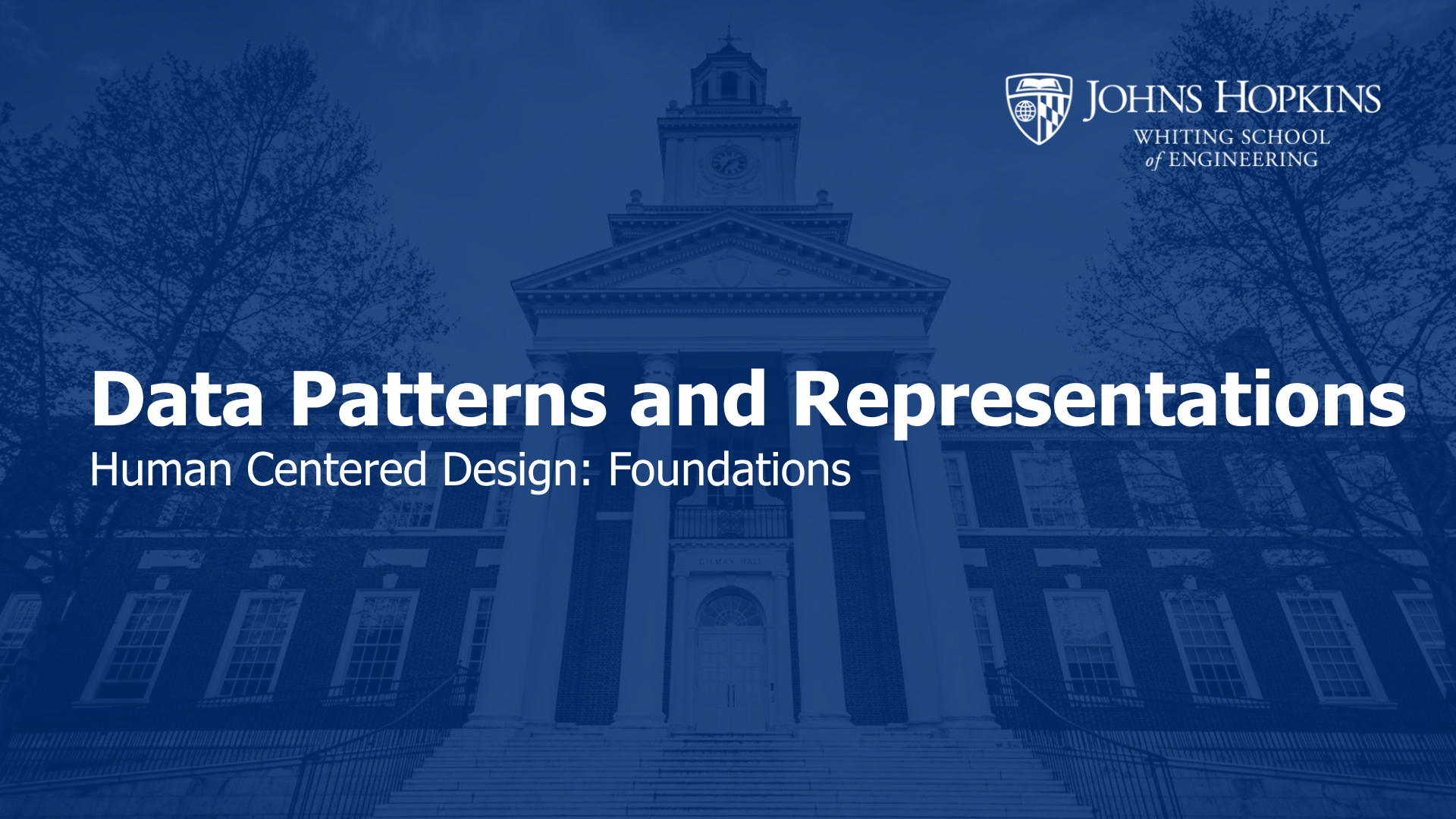
Evaluate the effectiveness of Human-Centered Design methodologies and tools, such as Territory Mapping, Directed Storytelling, and Co-Creation.

## MLO 5

Create a design solution that integrates UX principles, psychological insights, and user-centered methodologies

# Assigned Readings

- Storytelling with Data
  - Chapter 2: choosing an effective visual
  - Chapter 5: think like a designer




# Data Patterns and Representations

## Human Centered Design: Foundations

# Definitions

A **problem-solving approach and mindset** that focuses on the needs, goals, and pain points of people.

**Human Centered Design**

An **iterative process and framework** in which solutions evolve through divergent and convergent phases.

**Design Thinking**

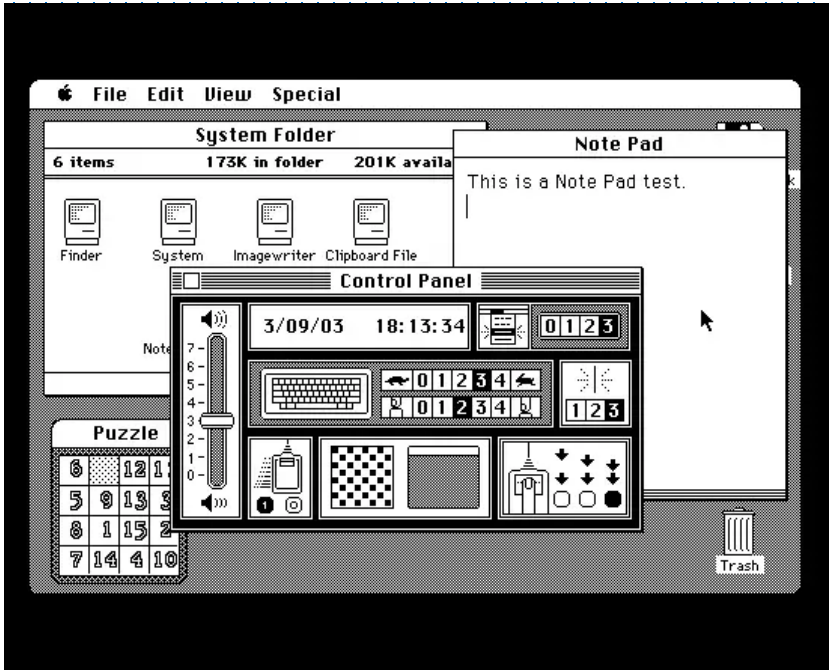
A **product design practice** that focuses on the full experience from a user's first contact to the last.

**User Experience Design**

A **product design practice** that focuses on the visual touchpoints that allow users to interact with a product.

**User Interface Design**

# User Interface History



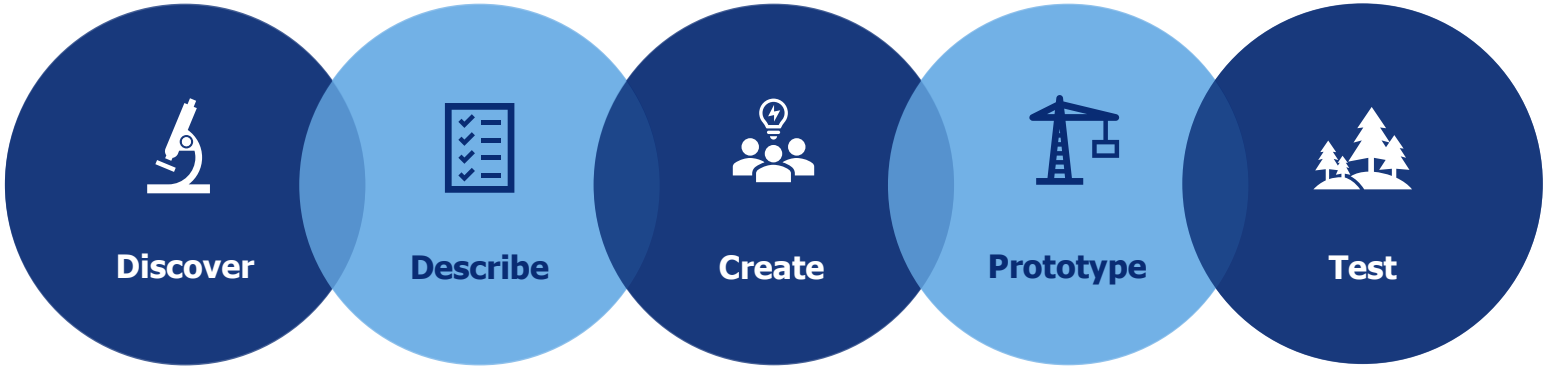

Tech Journeyman, 2024

Apple.com, 2024

# Human Centered Design

**Radical collaboration, Co-creation**

**Bias towards action, Always be testing**




**Learn from people, It starts with empathy**

**Show, don't tell, Learn from making**

**Relentless revisions, Design never stops**

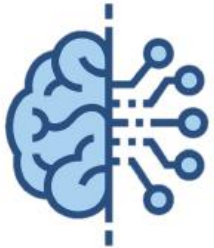

# Data Patterns and Representations

## Human Centered Design: Psychology Foundations

# Psychology Foundations

Human psychology, behavior, and decision-making drive how our target users and audience will experience our products/designs.

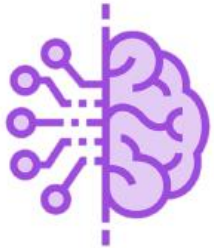
Sensation & Perception



Cognitive Biases

*A designer who doesn't understand human psychologies is going to be no more successful than an architect who doesn't understand physics.*

- **Joe Leech**
*Psychology of Designers*



Cognitive Heuristics

Gestalt Principles

# YOU WILL READ THIS FIRST

*At some point you may come back and read this line but maybe not*

## And then you will read this line next.

You will go back to read the body copy if you want to know more. It takes the most effort to read because it has a lot of text in a small font in a light weight with tight line spacing. Many people will skip paragraphs like this unless they aren't engaged right away. This is why it's important to draw attention to your message using visual hierarchy.

**You'll probably read this before the paragraph**

# Psychology Foundation

| Sensation | Perception | Salience |
| --- | --- | --- |
| ▪ **Sensation** is the process by which we receive information from the environment (light, sound, taste, smell, pressure, temperature, orientation, balance, etc). | ▪ **Perception** first involves finding and attending to a stimulus, then distinguishing the stimulus from everything else (the background) and identifying the stimulus. | ▪ **Salience** the visual design principle where we use visual variables to guide users/ audiences to consume information in a pre-defined, structured manner. |

# Cognitive Biases - Definitions

| Anchoring Bias | Confirmation Bias | Framing Effect | Mere Exposure Effect |
| --- | --- | --- | --- |
| ▪ The anchoring bias, or focalism, is the tendency to rely too heavily – to "anchor" – on one trait or piece of information when making decision. | ▪ The tendency to search for, interpret, focus on and remember information in a way that confirms one's preconceptions. | ▪ The tendency to draw different conclusions from the same information, depending on how that information is presented. | ▪ The tendency to express undue liking for things merely because of familiarity with them. |

# Cognitive Biases - Impact

## Anchoring Bias

- People tend to anchor new ideas based on the first piece of information presented resulting in only small, incremental ideas for improvement
- Stifles radical, out of the box thinking

## Confirmation Bias

- Assuming "That's the way we've always done it" confirms why new ideas or change tends to fail while overlooking many other extraneous factors as to why change has never been accomplished before.

## Framing Effect

- Without thoughtful design of information, audiences are left to draw their own conclusions
- Unconscious negative framing of information could lead your audience to draw a different conclusion than intended

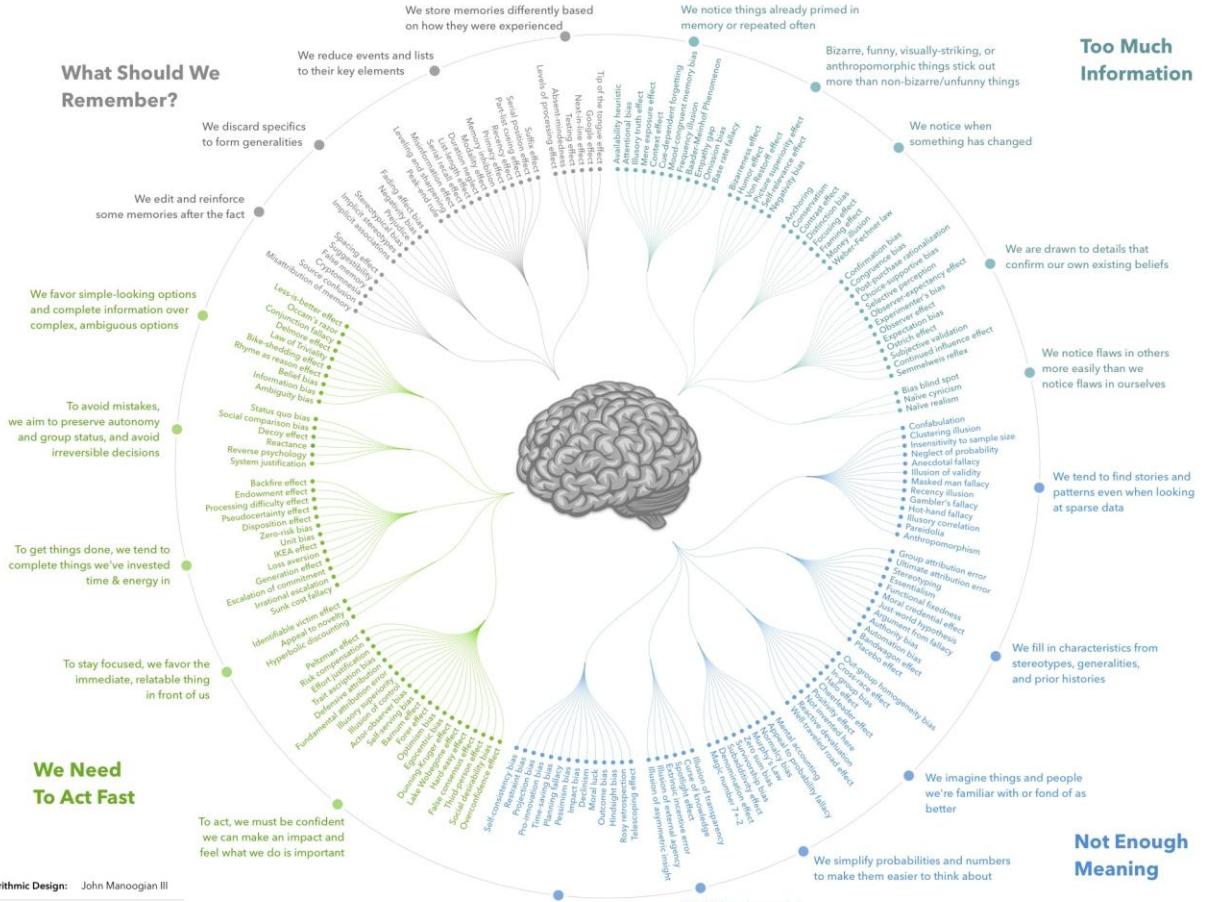
## Mere Exposure Effect

- Users or stakeholders reluctancy to accept new, or change because it is foreign and unfamiliar
- May also bias users to express preference towards visualizations, features, etc. because they have been exposed to them before, not because of substance

# Cognitive Biases - Solution

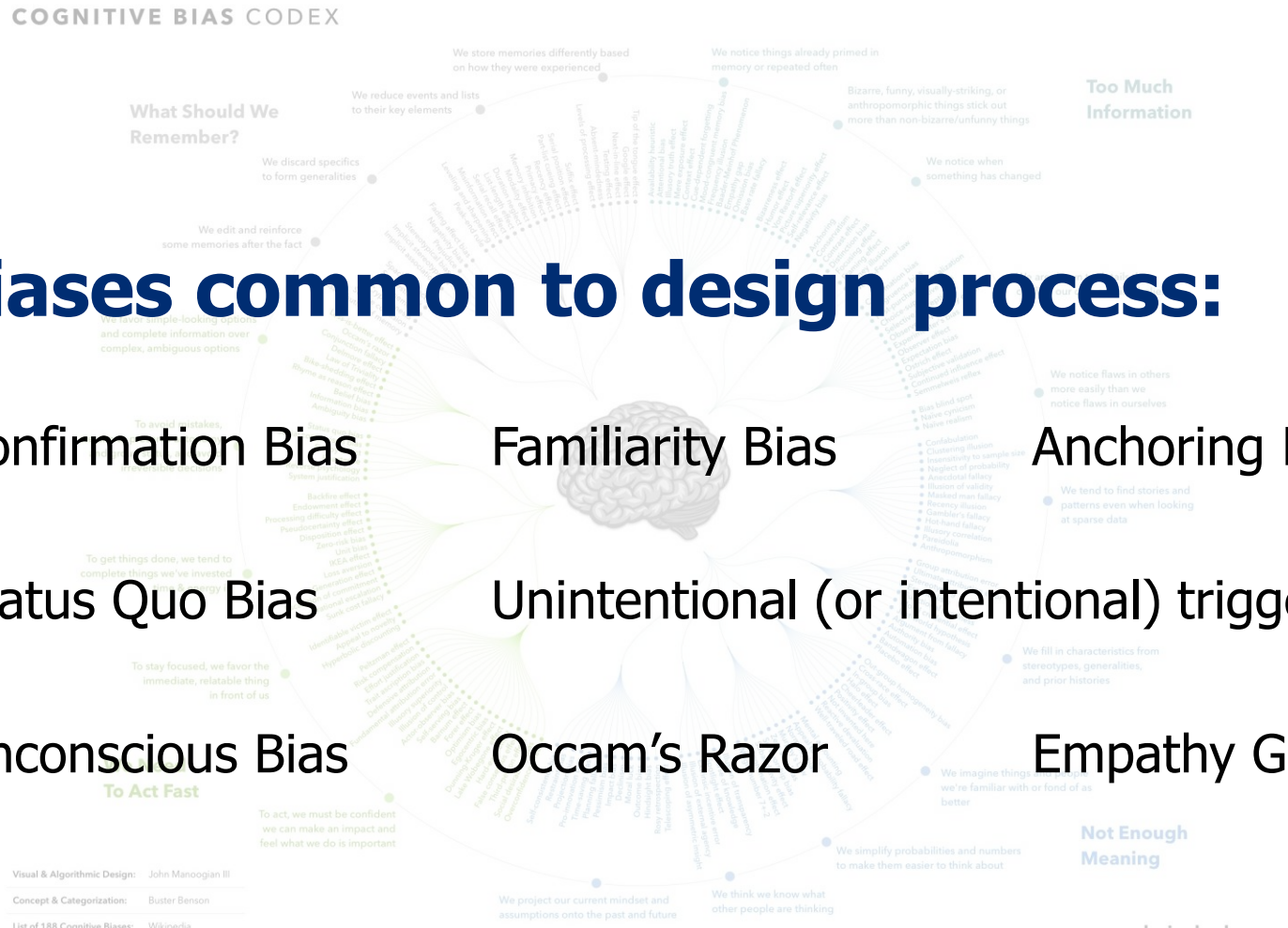
| Anchoring Bias | Confirmation Bias | Framing Effect | Mere Exposure Effect |
| --- | --- | --- | --- |
| ▪ Avoid exposing audiences to a current state UI/visual/process before asking them to broaden ideas to think of something new | ▪ Rather than focusing on the elements your audience is ”confirming”, look to investigate causes, relationships, and dependencies that also influence outcomes, and establish why a new approach would render different results. | ▪ Pay careful attention to the conclusions you want your audience to draw and frame information in such a way that they draw that conclusion naturally on their own. | ▪ Appeal to logical, tested and proven fast as to benefits and drawbacks of a new idea compared to an existing one – Focus on concrete evidence rather than emotions preference of your audience. |

# COGNITIVE BIAS CODEX




| | |
|---|---|
| **Visual & Algorithmic Design:** | John Manoogian III |
| **Concept & Categorization:** | Buster Benson |
| **List of 188 Cognitive Biases:** | Wikipedia |

**designhacks.co**




# Biases common to design process:

Confirmation Bias

Familiarity Bias

Anchoring Bias

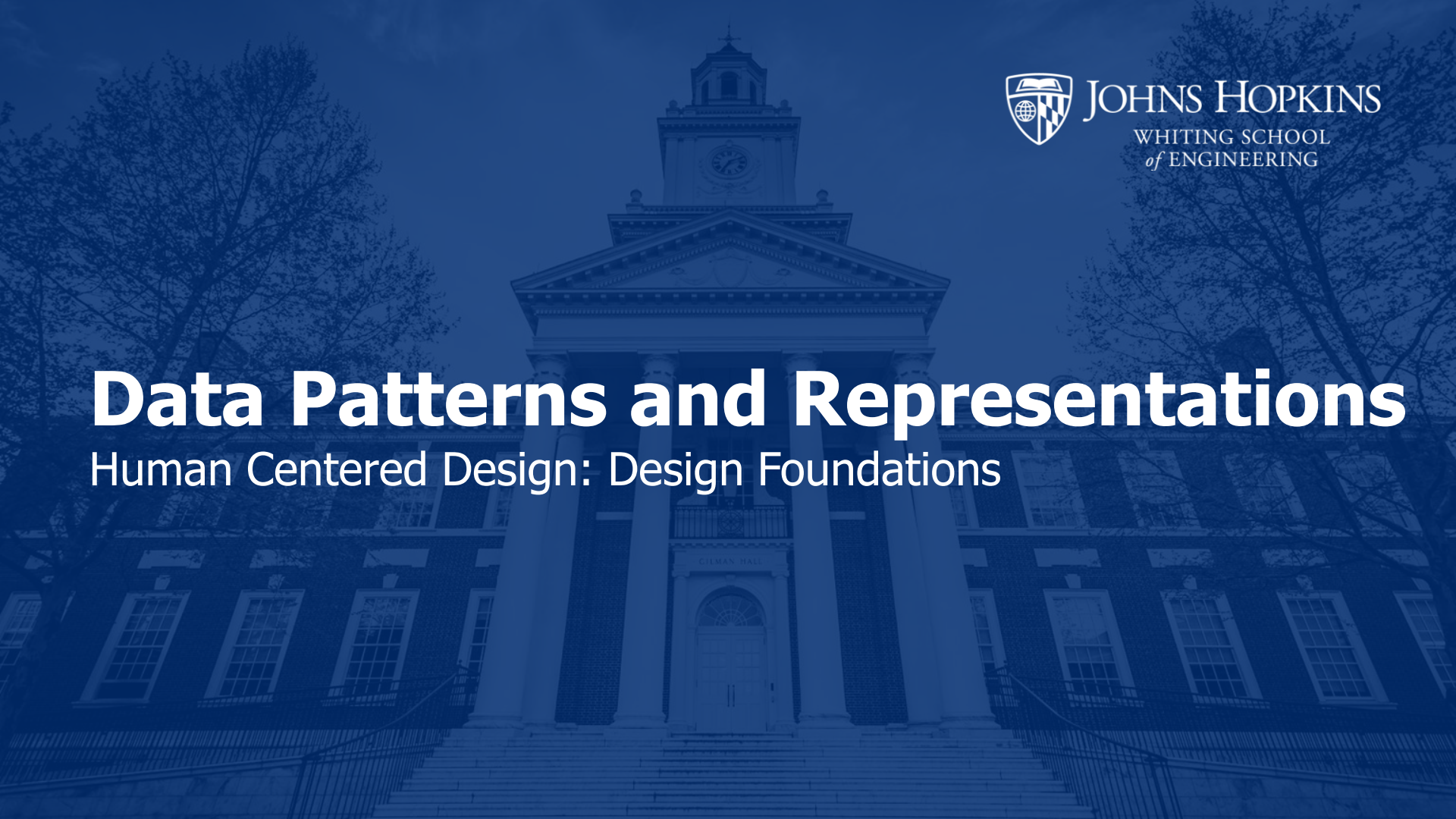
Status Quo Bias

Unintentional (or intentional) triggering

Unconscious Bias

Occam's Razor

Empathy Gap




# Data Patterns and Representations

## Human Centered Design: Design Foundations

# UX Guiding Principles


**Simple**

- Minimization of work
- Effective use of text and space
- Colors and background usage
- Page weight distribution
- Page layout
- Annoyances

# UX Guiding Principles


**Efficient**

- Productivity Enablement
- Fields and forms
- Reduction of cognitive load
- Alternatives and pop-ups
- Readability

# UX Guiding Principles


**Intuitive**

- Branding and familiarity
- Recognizable layout
- Page titles

# UX Guiding Principles


**Engaging**

- Comfort
- Utility
- Flexible Design

# UX Guiding Principles


**Supportive**

- Help and instructions
- Explanations
- Error handling

# UX Guiding Principles


**Accessible**

- Accessibility standards
- Labeling, language and grammar
- Designed for the audience

# UX Guiding Principles


**Clear Structure**

- Navigation controls
- Navigation model
- Information Architecture
- Memory


# Usability Honeycomb

The Usability Honeycomb is a framework developed by Peter Morville to illustrate the facets of user experience (UX) that contribute to the usability and value of a product or service. The honeycomb consists of seven interconnected components, each representing a different aspect of user experience

(Peter Morville, 2004)

# Usability Heuristics

### Make system status visible

Designs should keep users informed about what is going on, through appropriate, timely feedback.

### Align site with the real world

The design should speak the user's language. Use content that is relevant and aligns to the user's experiences outside of the digital world.

### Give users control

Users need control over how they navigate and interact with content. Pages should offer a variety of navigational and interactive options.

### Ensure consistency and standards

Use a consistent framework that is easy to understand to promote users' learnability of a site. Adhere to platform-wide standards.

### Target recognition over recall

Minimize the user's memory load by making elements, actions, and options visible. Avoid making users remember information.

# Usability Heuristics

### Prioritize flexibility and efficiency

Shortcuts – hidden from novice users – may speed up the interaction for the expert user.

### Pursue minimal design

Interfaces should not contain information which is irrelevant. Every extra unit of information in an interface competes with the relevant units of information.

### Prevent errors and ease recovery

Good error messages are important, but the best designs carefully prevent problems from occurring in the first place. Error messages should use plain language and suggest a solution

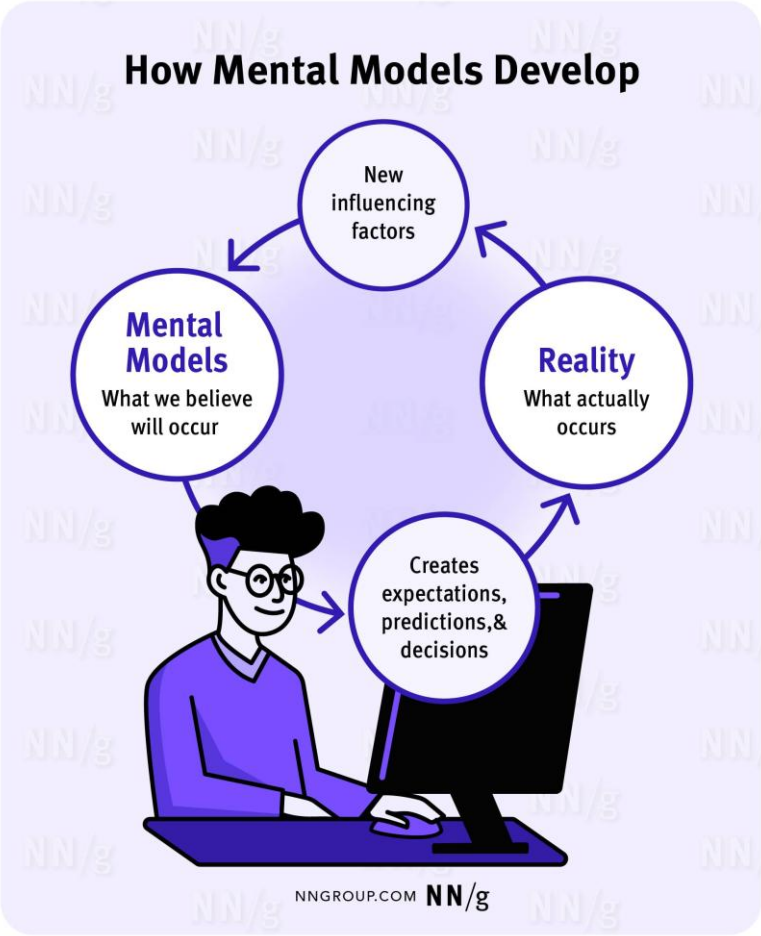
### Support with help and documentation

It's best if the design doesn't need any additional explanation. However, it may be necessary to provide documentation to help users complete their tasks.

# Mental Models

A mental model is what the user believes about the system (web, application, or other kind of product at hand. Mental models help the user predict how a system will work and therefore, influence how they interact with an interface.

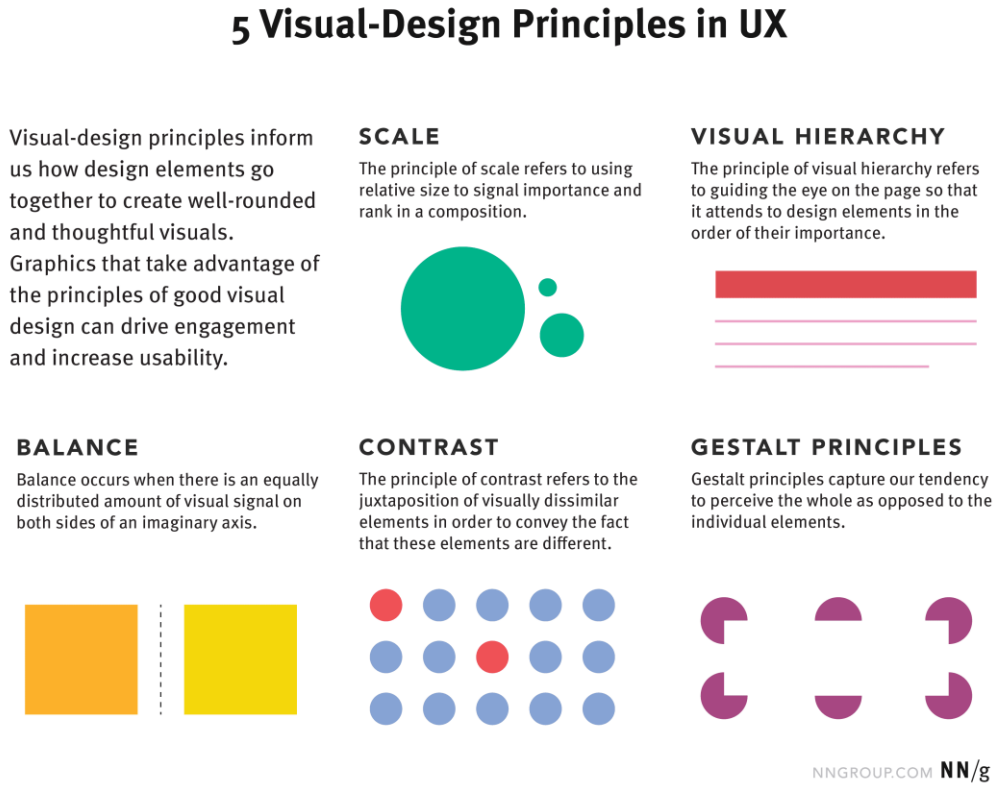
- They are based on beliefs not facts.
- They are unique to each user
- They can change over time based on additional experience
- There's great inertia in users' mental models – stuff that people know well tends to stick



# Visual Design Principles

**Scale:** The most important elements are the biggest, because they are more likely to be noticed. Aim to use no more than 3 different sizes to establish visual hierarchy.

**Visual Hierarchy:** Structure elements in order of importance to effectively guide the eye. Hierarchy can be established through variations in scale, value, color, spacing placement, etc.

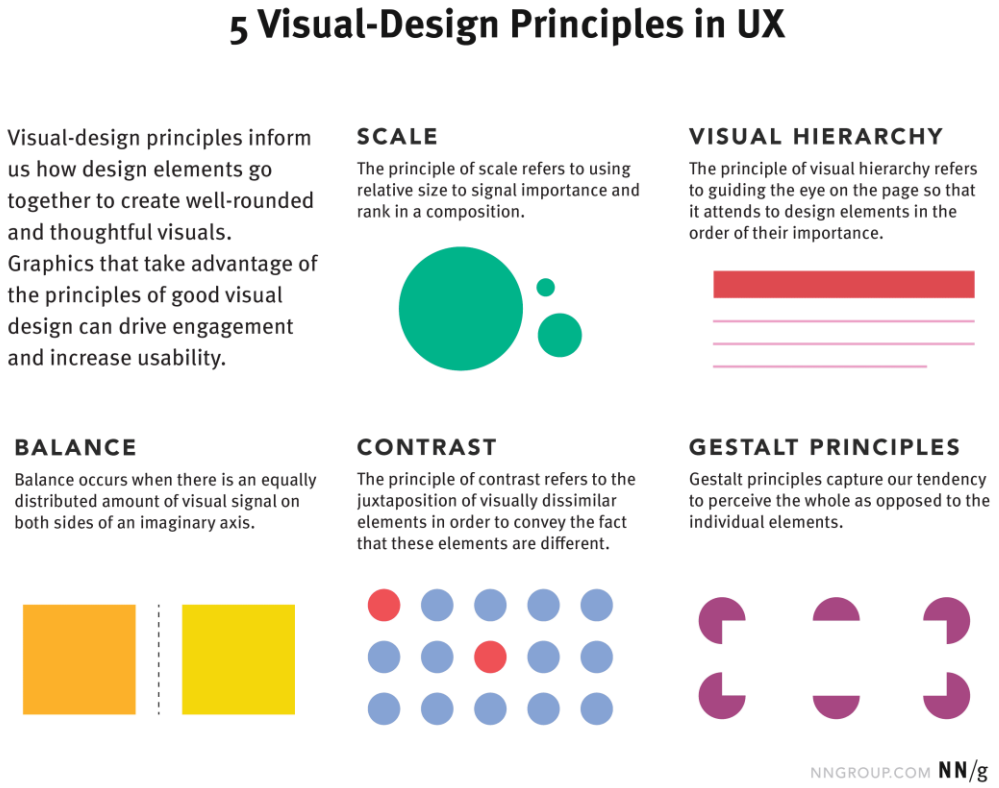


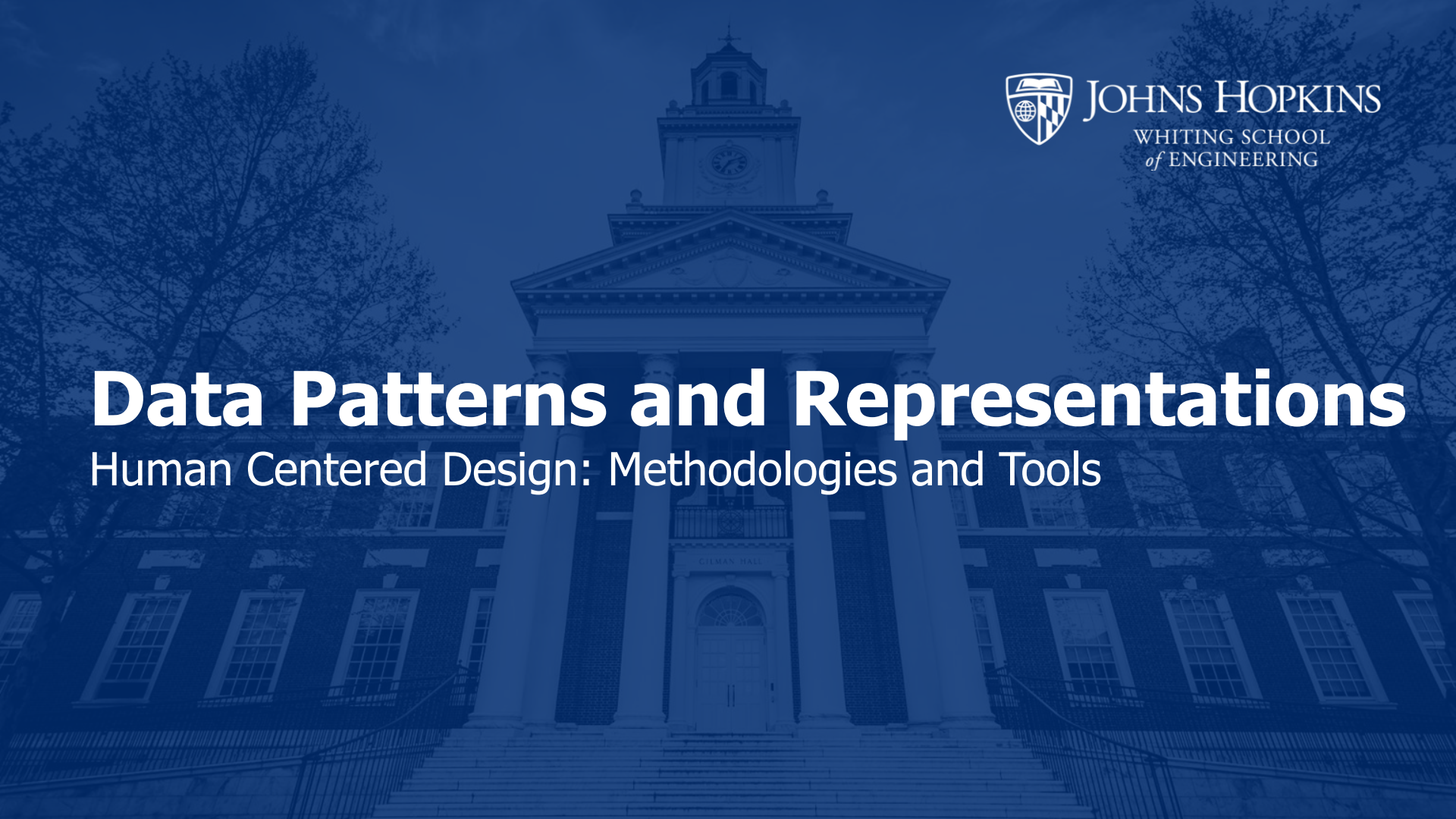
# Visual Design Principles

**Balance:** Equally distribute the amount of visual signal across a page. Balance can be symmetrical, asymmetrical, or radial.

**Contrast:** Provide the eye with a noticeable difference between two objects in order to emphasize they are distinct.

**Gestalt Principles:** A set of principles that explain how humans make sense of images.





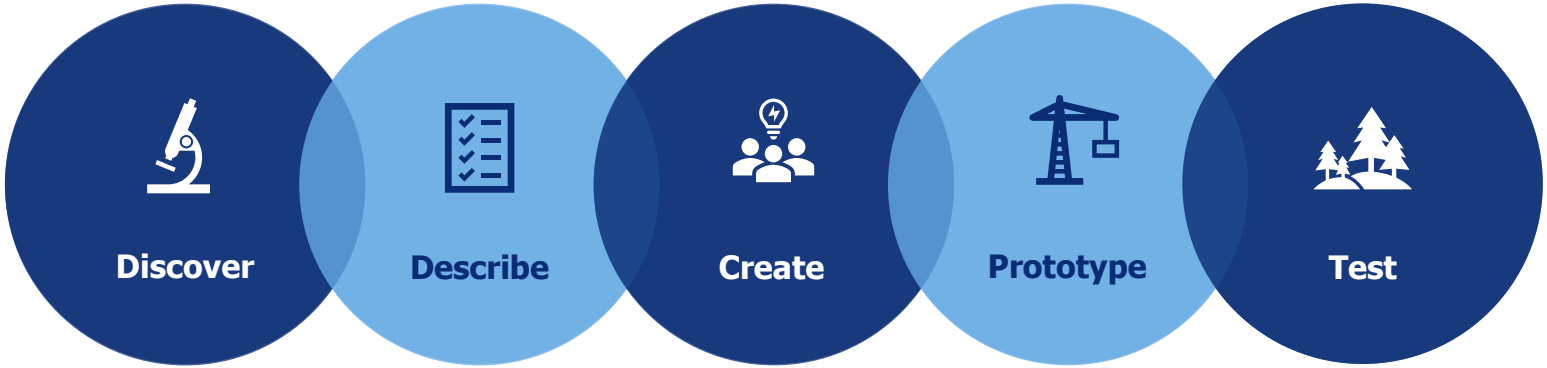

# Data Patterns and Representations

## Human Centered Design: Methodologies and Tools

# Human Centered Design

**Radical collaboration, Co-creation**

**Bias towards action, Always be testing**




**Learn from people, It starts with empathy**

**Show, don't tell, Learn from making**

**Relentless revisions, Design never stops**

# Discover Phase

A research technique where you follow a person and observe someone's workflows, actions, routines, patterns and decision making while they perform a task or job

**Shadowing**

A way for to capture and acknowledge everyone's individual perspective and understanding of what matters for the overall project

**Territory Mapping**

A research technique where a person is asked to tell a story of a particular experience.

**Directed Storytelling**

# Describe Phase

Summary of insights, recommendations, and/or concepts resulting from the synthesis of user and secondary research. Highlights opportunities for the future vision

**Research Readout**

'How Might We" (HMW) questions are a technique to frame your challenge for ideation. Start your questions with HMW to get to the core of the problem

**How Might We?**

An archetype developed to represent a specific user group. It is helpful in creating empathy and understand for users' motivations and behaviors

**Personas**

# Bring it to Life

Wireframe in lo-fidelity the visual that represents the main components. Ensure accurate statistics and models are developed and showcased

**Create**

Simulation of the final product to test and validate ideas.

**Prototype**

Continuously refine and test your prototype to then take the ideas and finalize them. Watch out for bad techniques and biases.

**Test**

# Tools of the Trade

(Maze, 2024)

- A user testing platform that allows designers to create and conduct usability tests on prototypes.


(AdobeXD, 2024)

- A versatile design software that helps designers create and prototype user experiences for websites, mobile apps, and digital user interfaces

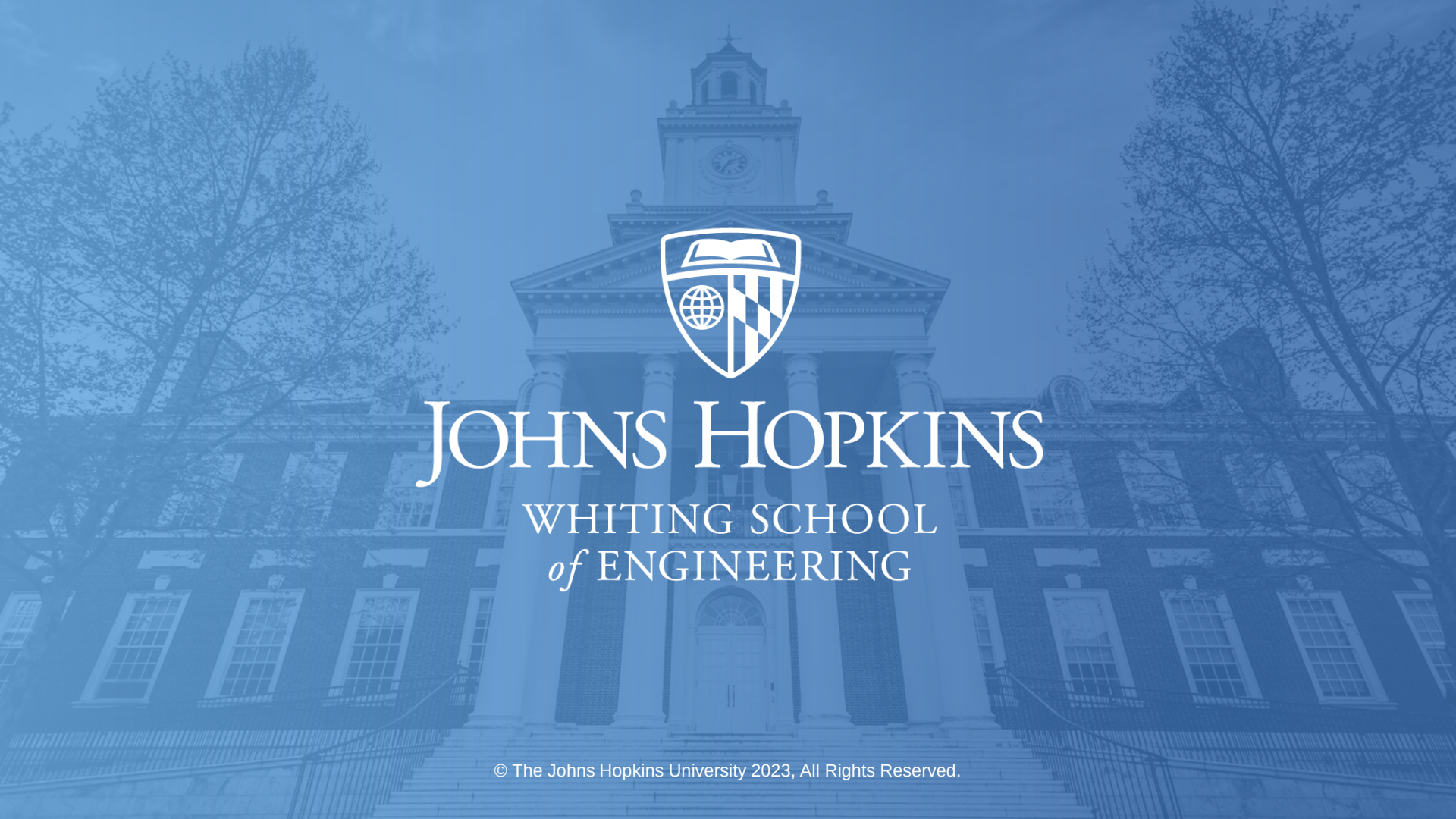

(Streamlit, 2024)

- An open-source Python framework that allows you to create custom web apps for machine learning and data science

(Tableau, 2024)

- A powerful and flexible data visualization tool used in the Business Intelligence (BI) industry


# Streamlit is going to be our Canvas




© The Johns Hopkins University 2023, All Rights Reserved.