

AI-Assisted Causal Pathway Diagrams (CPD) for Human-Centered Design (HCD)

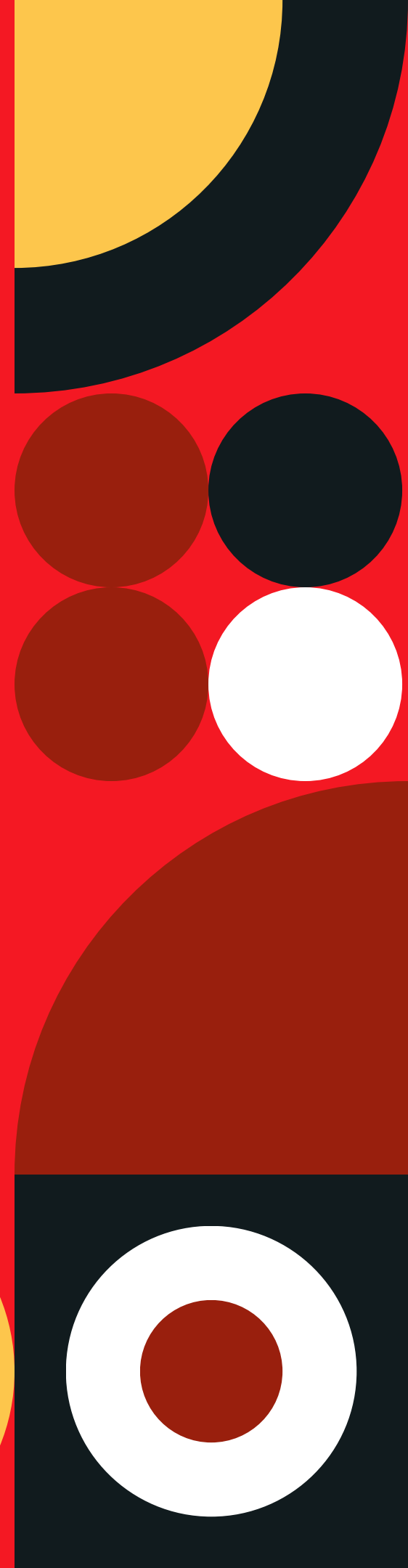
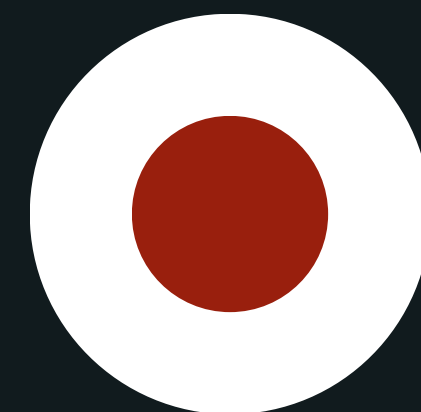
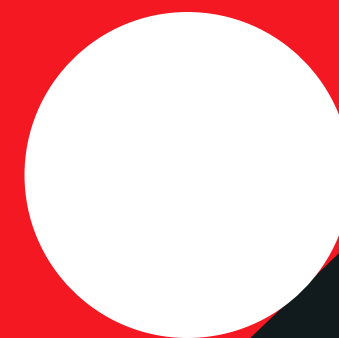
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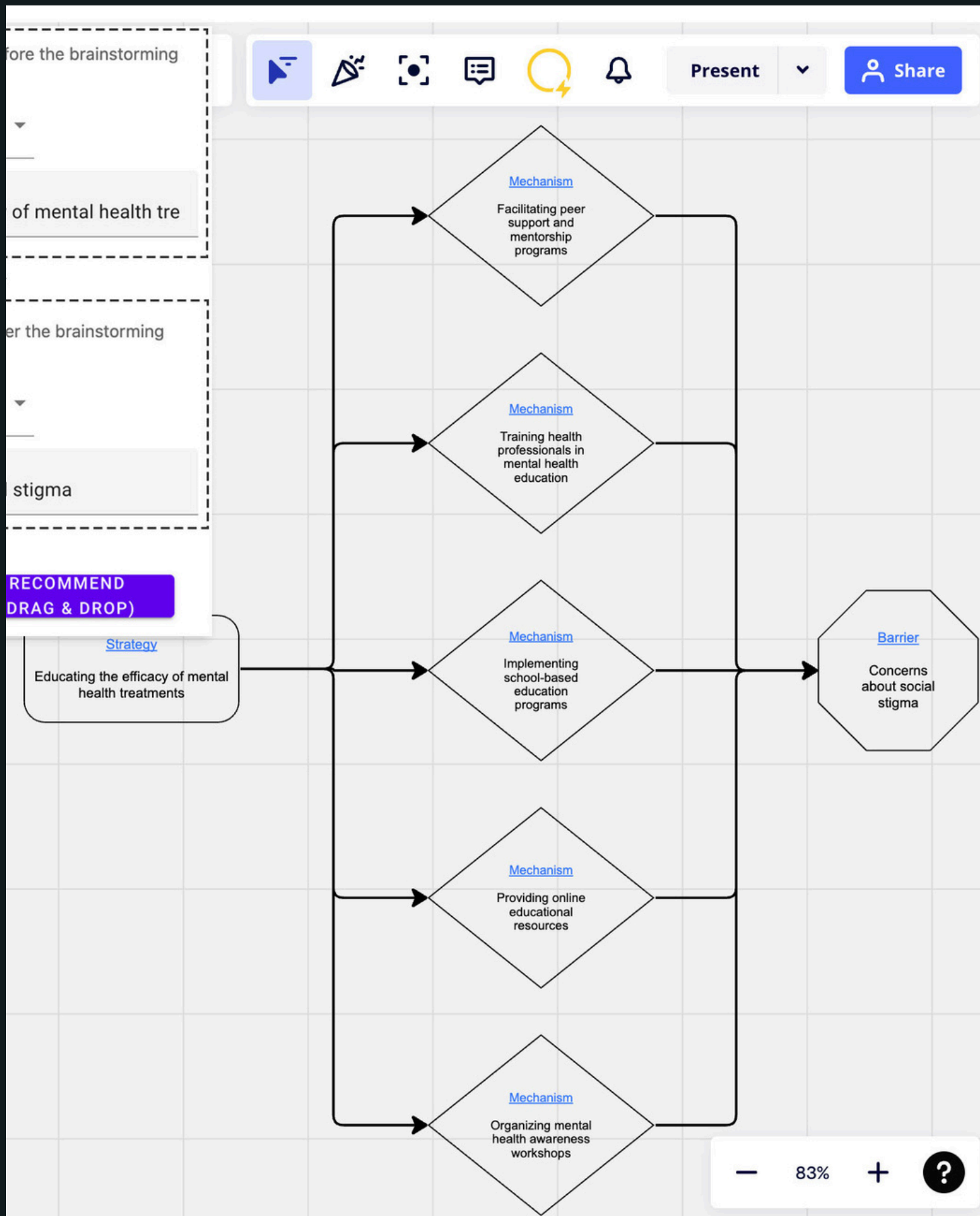
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Presented by

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What is a Causal Pathway Diagram (CPD) ?

A CPD is a visual map of how design strategies can overcome barriers and lead to outcomes — using mechanisms, moderators, and preconditions.

Application: Helpful in theory-driven design and behavioral strategy implementation.

Key Components:

Strategy: Implementation method.

Barrier: Obstacle preventing outcomes.

Mechanism: Process by which strategy affects outcomes.

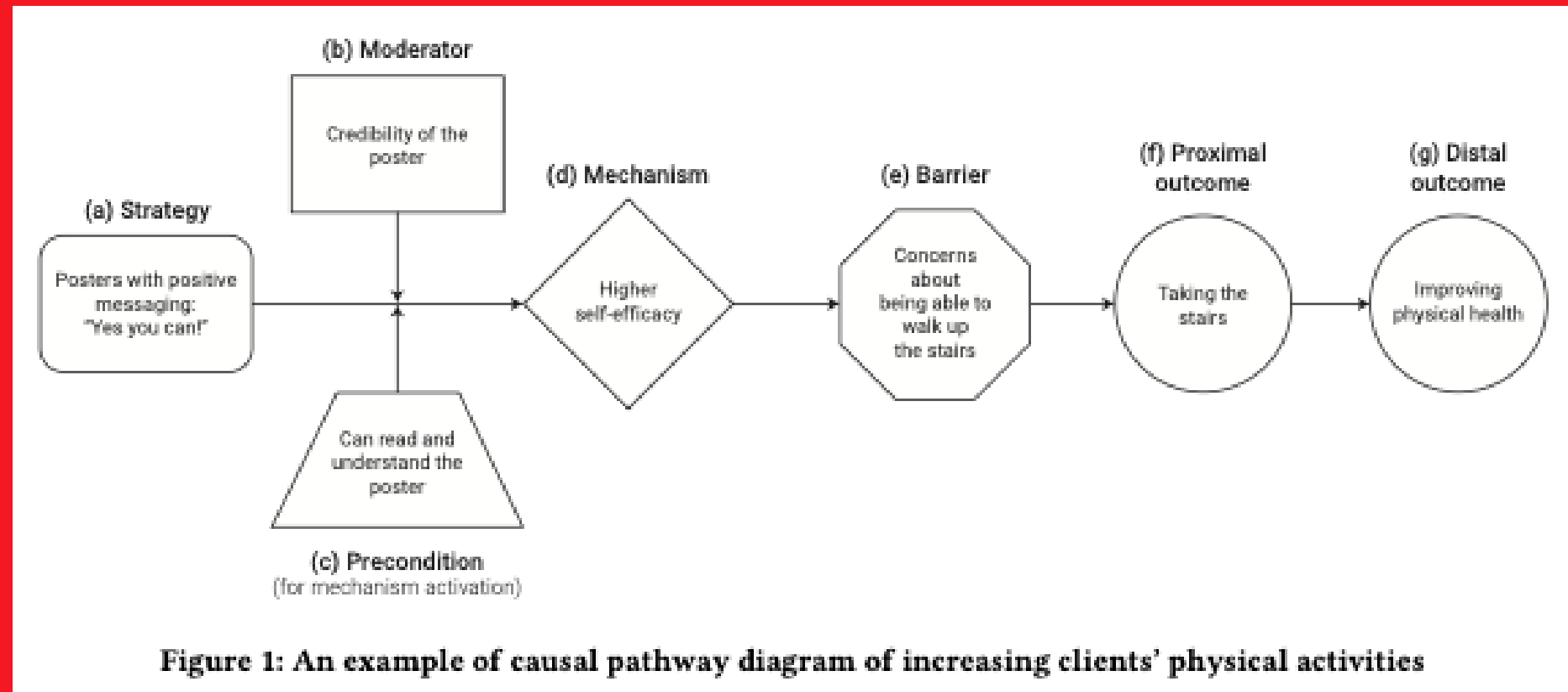
Moderator: Influences strength/direction of effects.

Precondition: Required condition for success.

Strategy → Mechanism → Barrier → Outcome

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Example of CPD in Action



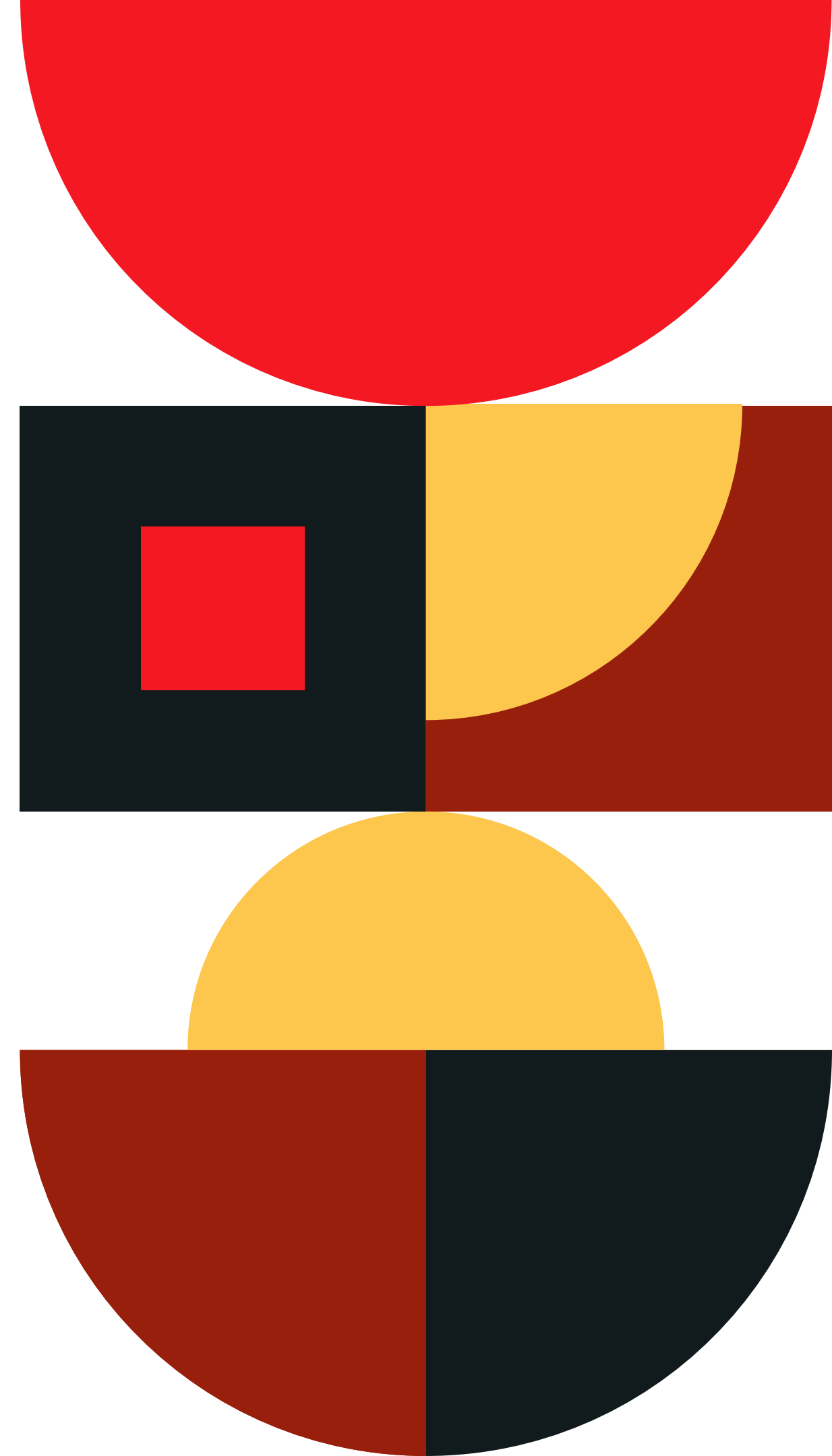
The strategy is a poster with positive messaging, which boosts self-efficacy to overcome concerns about using stairs, ultimately leading to improved physical health.

- **Scenario:** Increase client physical activity.
- **Visual:** CPD shows barriers, mechanisms, moderators, preconditions, and outcomes clearly.
- **Highlight:** Emphasizes goal-oriented design process.

Why Use CPD in Human-Centered Design?

- **Enhances:** Divergent and convergent thinking.
- **Improves:** Strategic prioritization by clearly visualizing constraints and outcomes.
- **Facilitates:** Communication among stakeholders by providing a common visual language.
- **Potential Issue:** Risk of oversimplification without thorough research.

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AI-Assisted CPD Plugin for Miro

Tool: Plugin developed for online collaborative platform Miro.

Features:

- Drag-and-drop CPD components.
- Wizard for step-by-step CPD creation.
- AI-driven brainstorming support via GPT-4.
- Real-time CPD validation.

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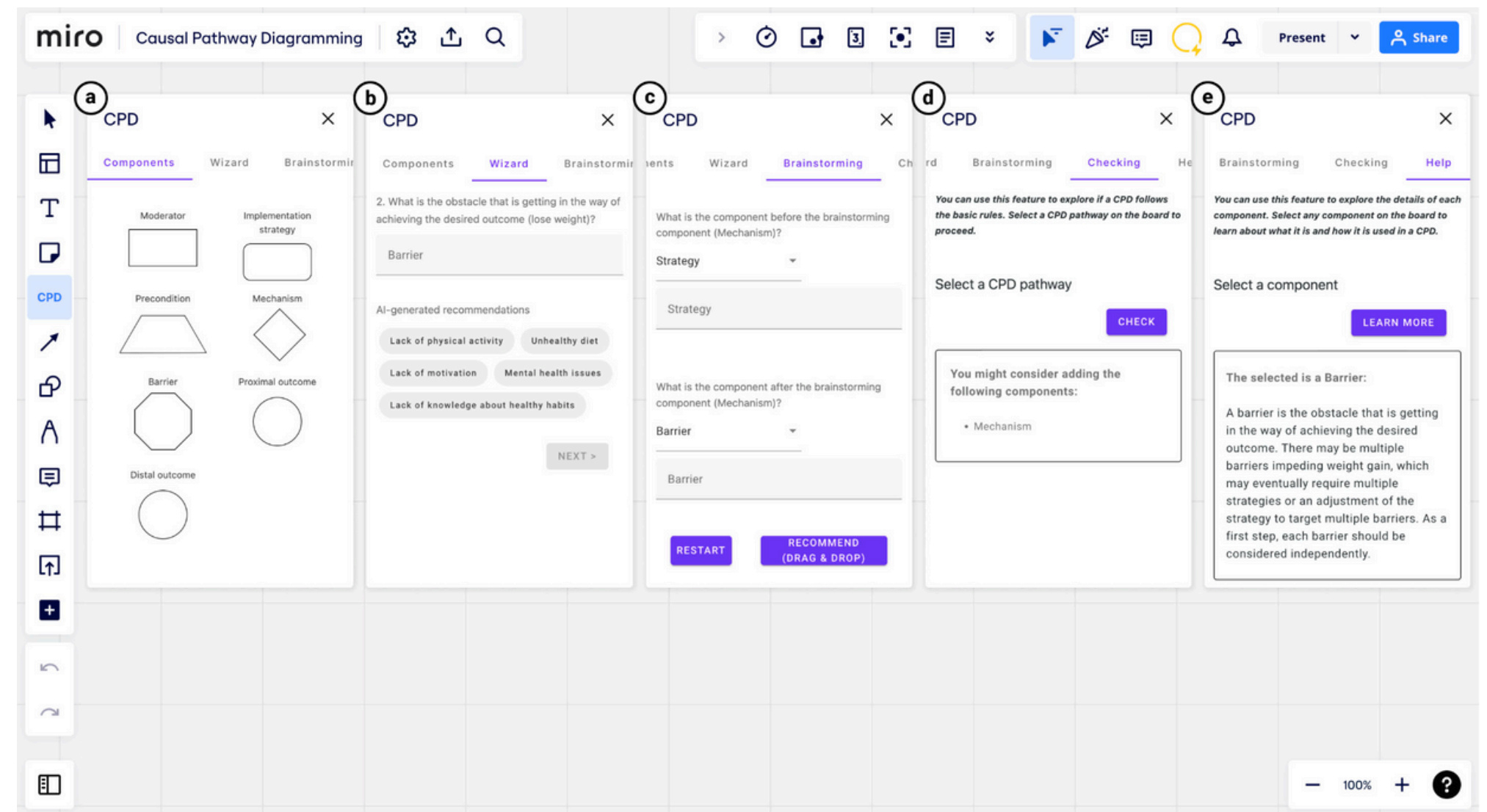


Figure 2: Key screens of our plugin. Consisting of five features, the plugin streamlines the creation and validation of CPD

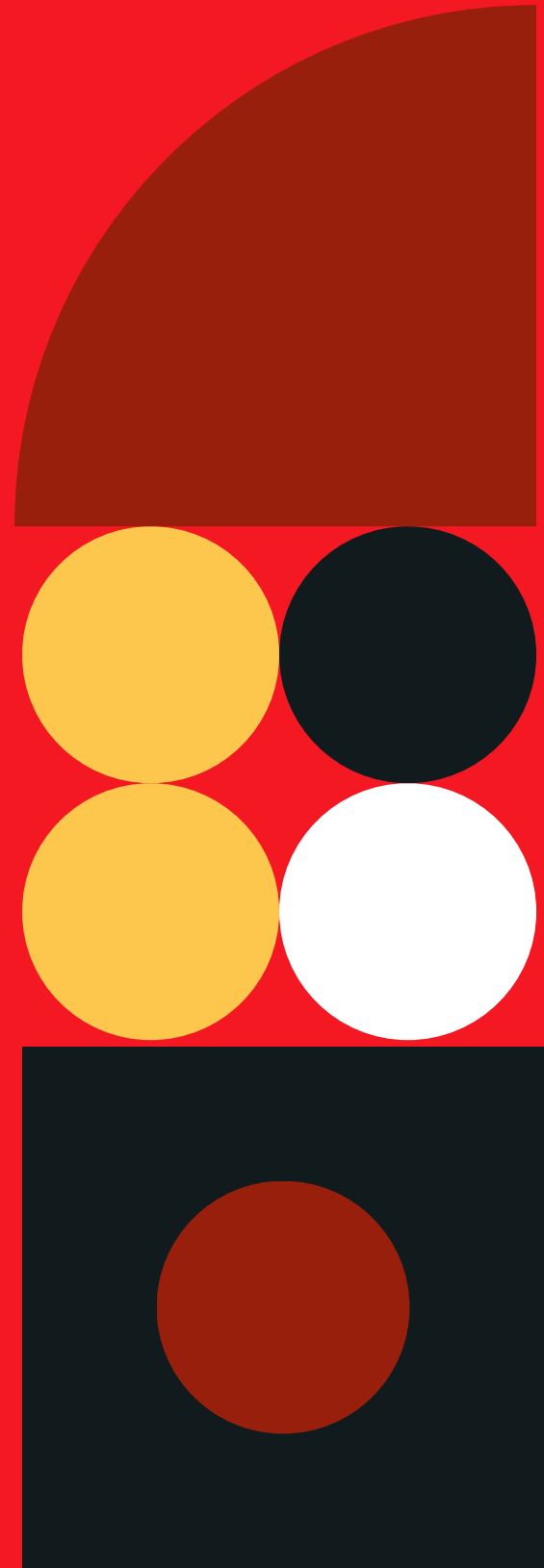
User Study and Results

Key Contributions:

- Demonstrated CPD's value in early-stage HCD.
- Developed practical AI-assisted CPD tool.
- Highlighted benefits and challenges of integrating AI in design.

Implications:

- Promising for improving design practice.
- Necessitates careful integration of user research and responsible AI use.



How CPD Changes Design Thinking

- 🎯 **GOAL-FIRST THINKING** INSTEAD OF SOLUTION-FIRST
- 🧩 **FOCUS ON UNDERLYING CAUSES AND BARRIERS**
- 🧠 **ENCOURAGES EVIDENCE-BASED CREATIVITY** INSTEAD OF INTUITION-BASED IDEAS
- 📊 **SUPPORTS BOTH DIVERGENT (IDEA GENERATION) AND CONVERGENT (STRATEGY SELECTION) THINKING**


Old Approach



CPD Approach



CPD: Powerful, But Not Plug-and-Play

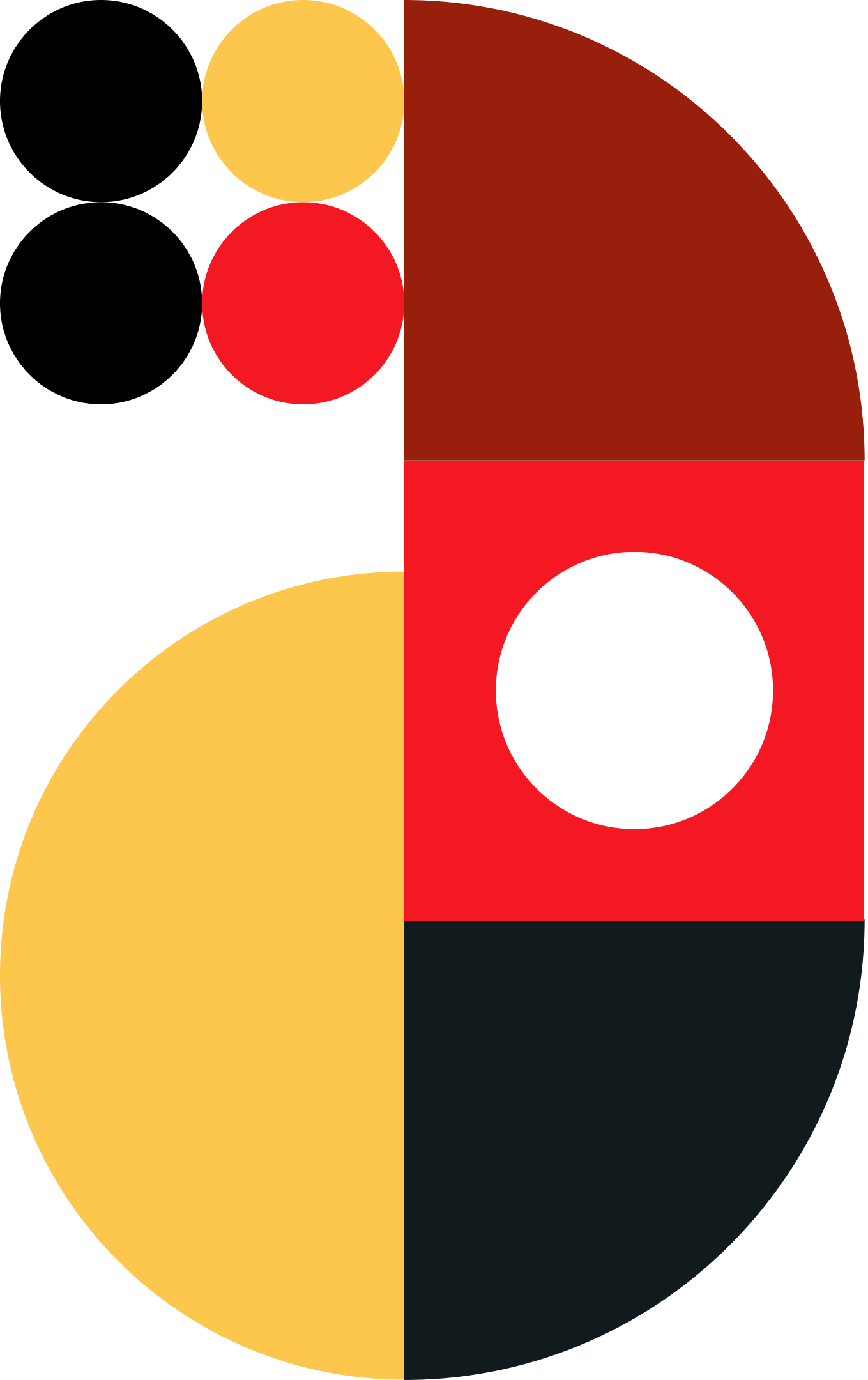


RISK OF
OVERSIMPLIFYING
COMPLEX
PROBLEMS

REQUIRES
STRONG USER
RESEARCH TO
BACK UP EACH
COMPONENT

CPD IS A TOOL,
NOT A
REPLACEMENT
FOR CRITICAL
DESIGN
THINKING

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FUTURE WORK

- **Enhance AI recommendations:** More context-specific and evidence-based.
- **Explore team settings:** Evaluate CPD's effectiveness in collaborative environments.
- **Expand plugin features:** Support integration of direct user research data.

Discussion Questions



- Do you think this change improves outcomes in real-world projects, or might it slow down ideation?
- How can we ensure the recommendations are both useful and evidence-based?
- Can CPDs improve communication between cross-functional teams (e.g., designers and product managers)?
- How do we balance clarity in diagrams with the messy, nuanced nature of real user needs?

Thank you!

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