VISUALIZATION–ENHANCED AGGREGATED SEARCH INTERFACES

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PROJECT 1 – ON HOLD

- Design, develop and evaluate innovative search result aggregation interfaces for content on the industrial partner's platform.

- Developed low and mid–fidelity prototypes; designed the user study.

- On hold due to backend challenges faced by our industrial partner.

PROJECT 2 – IN PROGRESS

- Design, develop, and study search interfaces

- Aggregate results from
  - Digital humanities archive (Europeana)
  - Digital academic library (University Library)
  - Crowdsourced digital encyclopedia (Wikipedia)

- Visually represent provenance
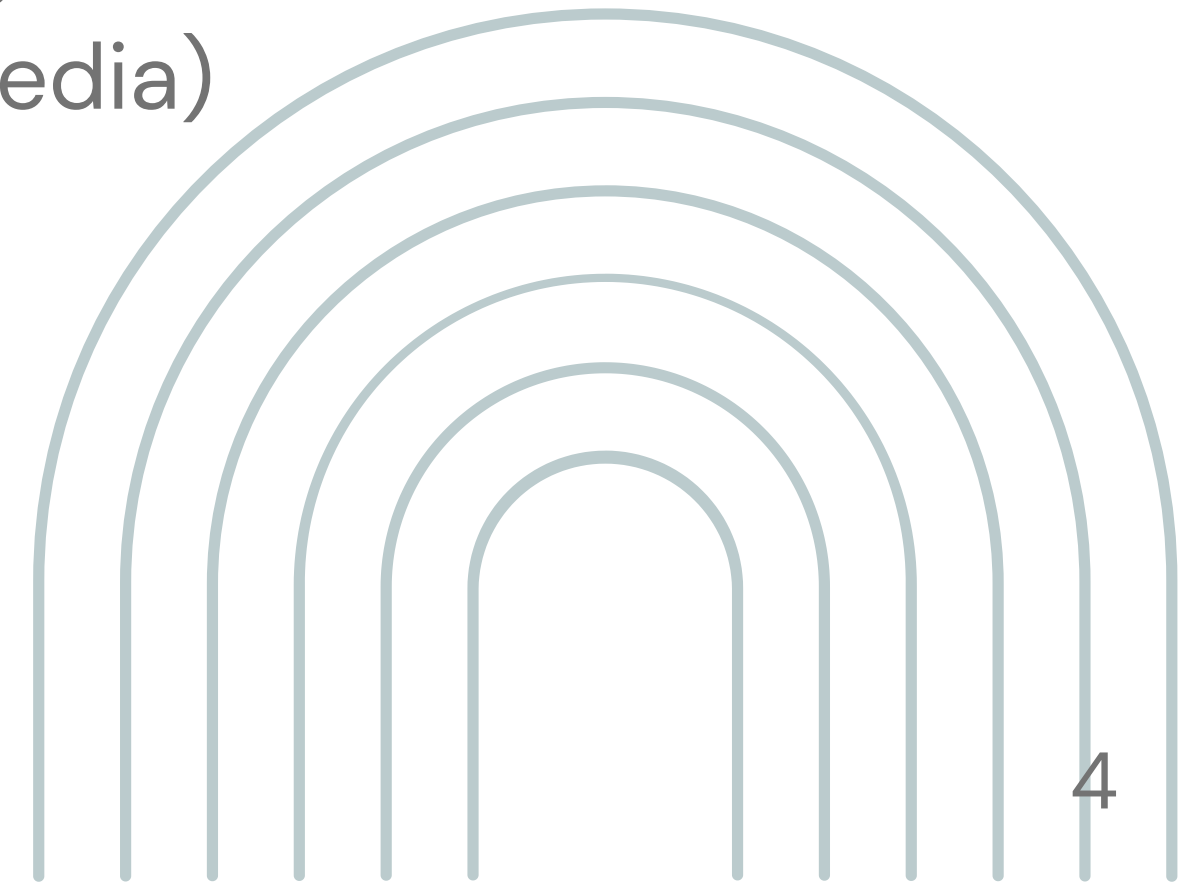
PROBLEM STATEMENT

Challenges in Search Result Presentation

- Search interfaces as primary gateways to IR platforms.

- Difficulty in delivering diverse content effectively

- Existing platforms often segregate search results in **tabs** per source (vertical)

- Tab-based interfaces may work well when a searcher has a clear vision of what they are looking
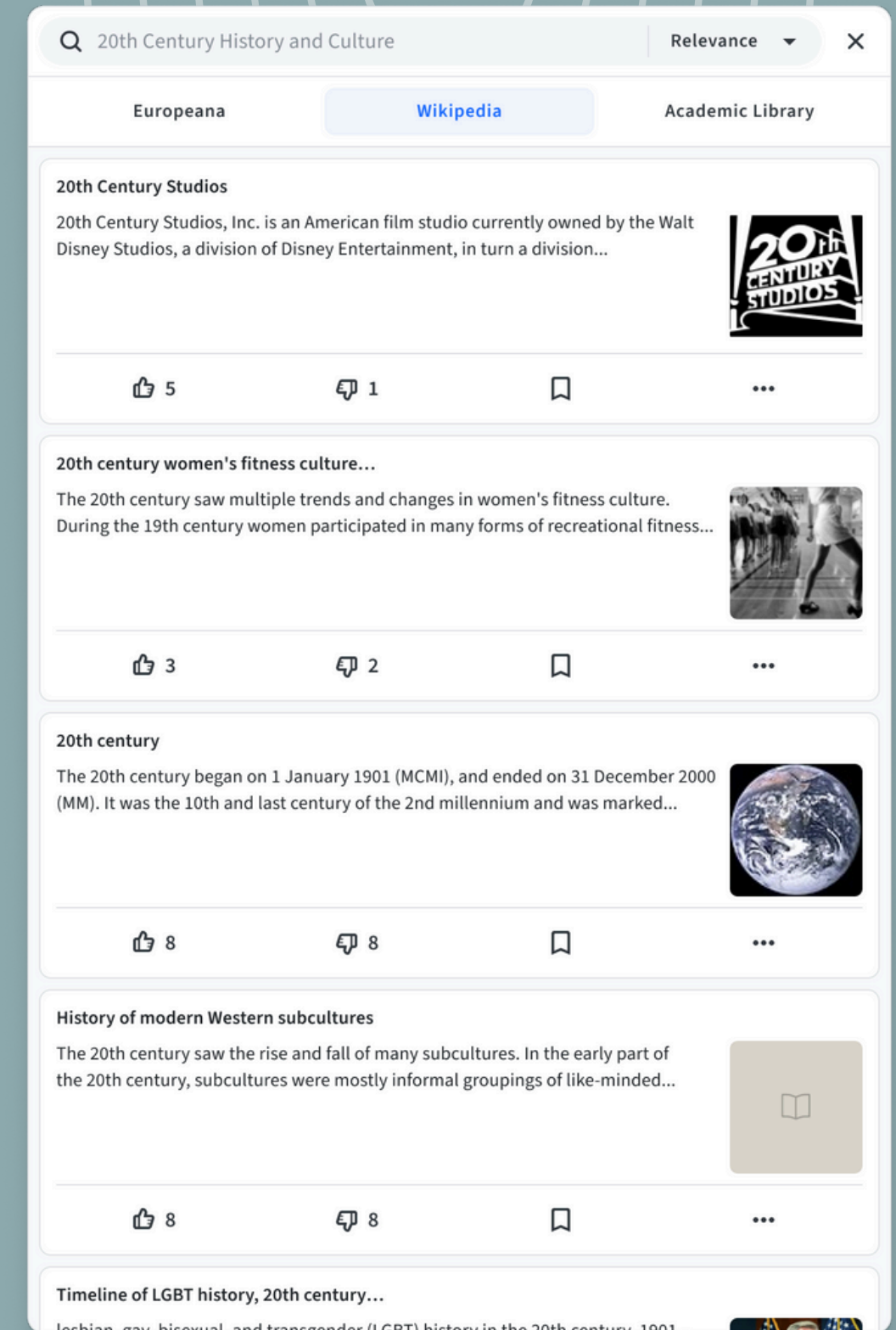
# RISKS OF TABBED INTERFACE

Challenges in Search Result Presentation

Usability Risks of Tab-Based Interfaces:

- **Risk of Default Reliance**
  - Users may stick to the default tab, missing out on better results in other tabs.

- **Wasting Time**
  - Choosing the wrong tab wastes time on less relevant results.

- **Search Abandonment**
  - Frustration from having poor results in one tab and not thinking to check the others.

SEARCH RESULT AGGREGATION

Importance of Aggregated Search Result

- **Aggregation** as a Solution

- Two key challenges in search result aggregation:
  - **Blending:**
    - How can we blend the search results from multiple sources into a single list?
  - **Representing:**
    - How can we represent the results so that the sources are conveyed to the searcher?
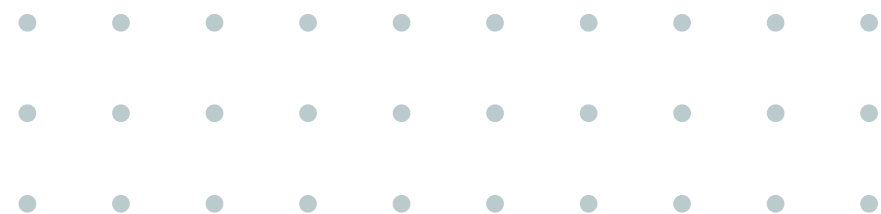
RELATED WORK

## Prior Approaches to Search Result Aggregation

- **Aggregated Search Algorithms:** Focus on selecting and blending diverse information sources for web searches (Arguello, 2017).
- **User Impact & Preferences:** Studies reveal mixed preferences for tabbed vs. blended search results, influenced by task complexity and perceptual speed (Arguello et al., 2012; Turpin et al., 2016).
- **Entity Cards and Visual Distinction:** Research on making search result sources visually distinct to enhance user interaction (Bota et al., 2016).
- **Leveraging Visualization:** (Hoeber, 2018) suggests using information visualization to clarify the source of search results, potentially increasing engagement and perception of value.
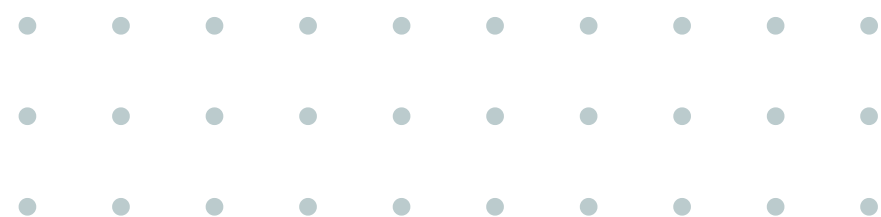
RESEARCH QUESTIONS

- **RQ1:** How can an interface be designed to blend aggregated results from different sources while visually representing provenance in the search interfaces?
- **RQ2:** What are the advantages and potential disadvantages of designing interfaces that blend aggregated results from different sources while visually representing provenance?
- **RQ3:** How does manipulating the diversity of search results in an aggregated search interface impact users' perception of the trustworthiness of the results?
- **RQ4:** How can this approach be applied to different structured data domains, such as digital humanities archives and digital academic libraries?
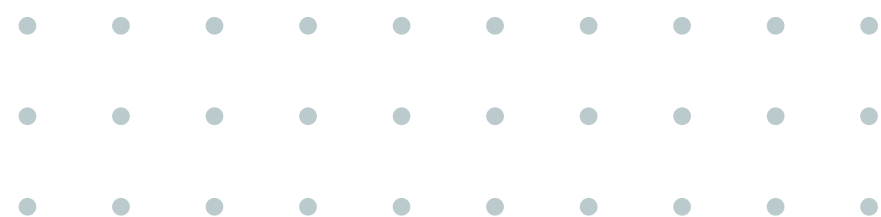
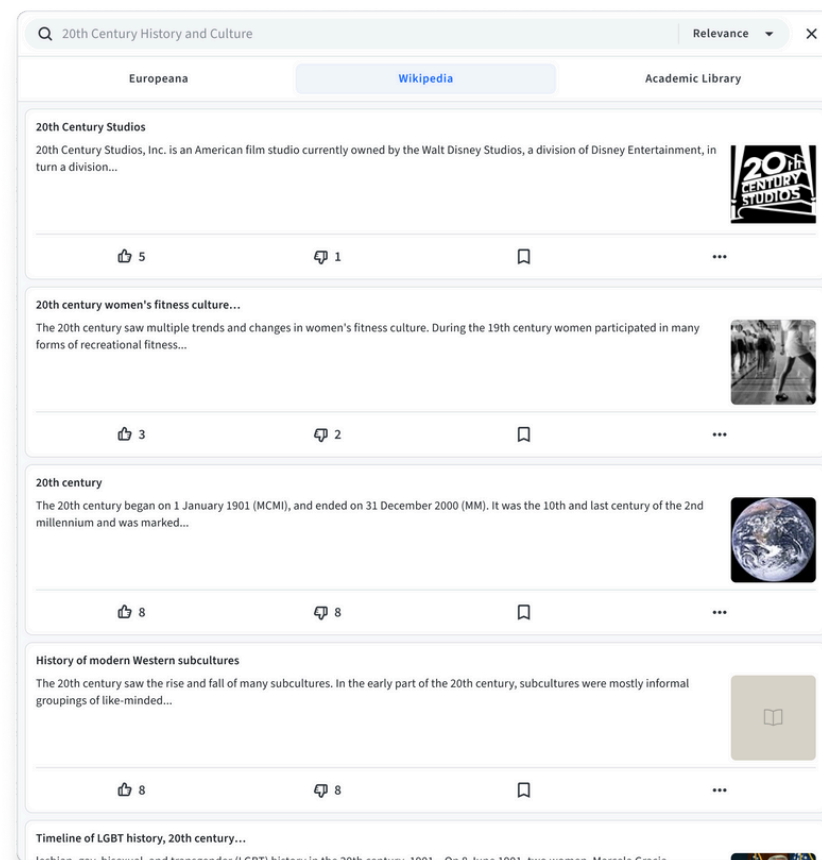# APPROACH
Structured, Iterative Research Approach

- **Phase 1: Ideation & Low–Fidelity Prototyping**
  - Explored multi–source search complexities.
  - Integrated visual perception and cognitive psychology
  - Sketched and refined/iterated via heuristic evaluations.
  - **Strategies:**
    - **Tab–based:** Traditional segmented search result presentation.
    - **Streamlined:** Unified list of search results.
    - **Bento Box:** Topic–specific tiles for result segmentation.
    - **Dynamic Topic Clustering:** Groups results by topic/keywords.
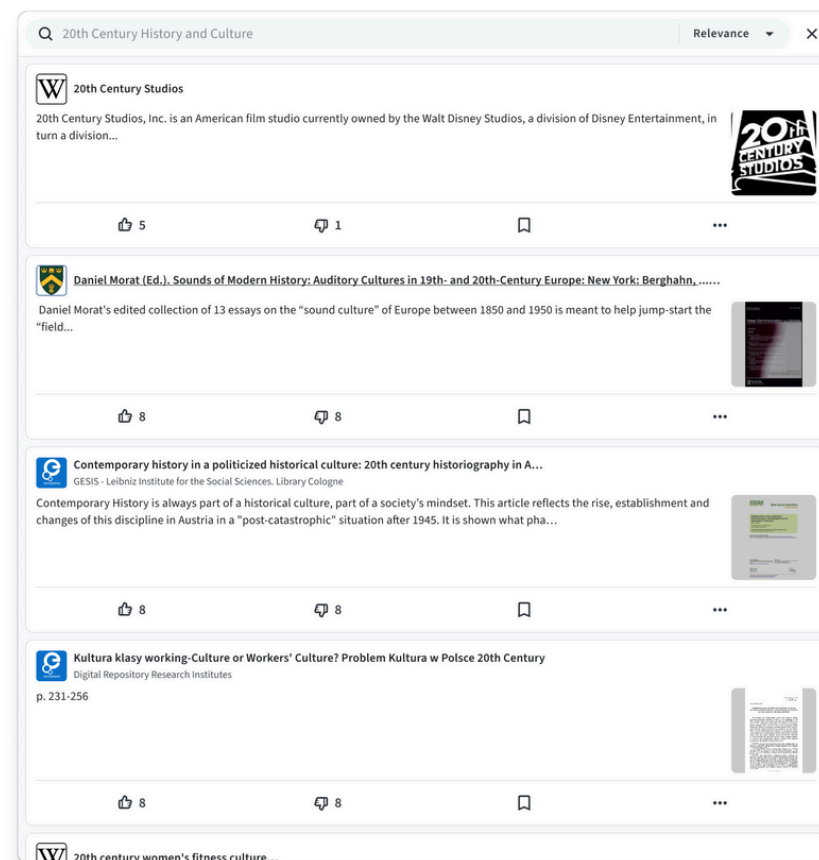
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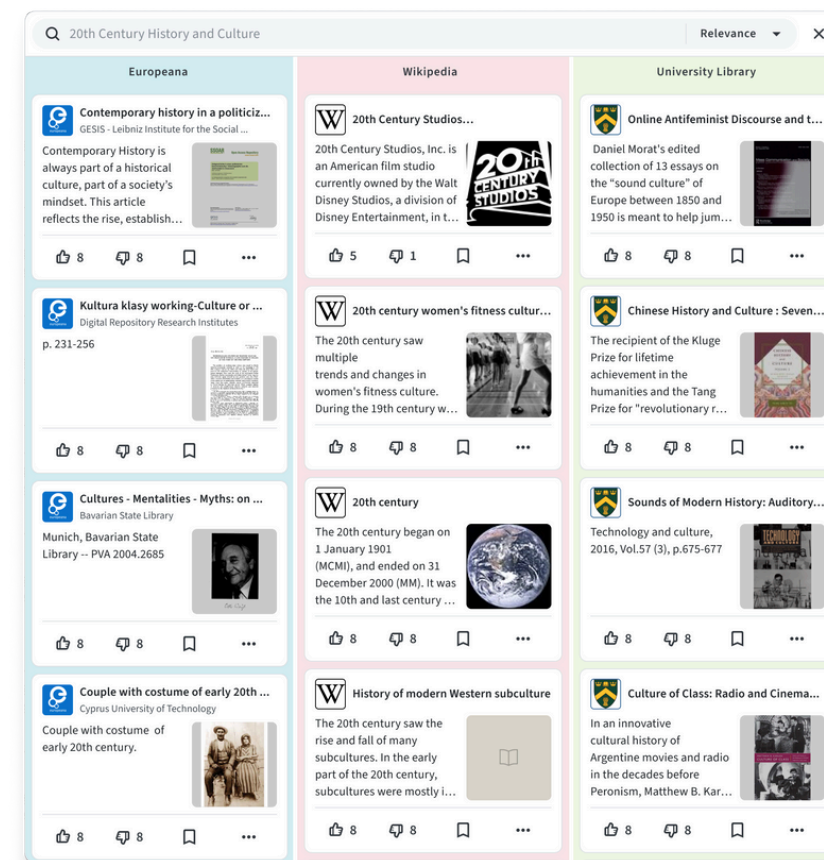# APPROACH

Structured, Iterative Research Approach

- **Phase 2: Medium-Fidelity Prototyping & Design Iteration**
    - Advanced to medium-fidelity prototypes using Figma, improved through cognitive walkthroughs and feedback for iterative design enhancements.
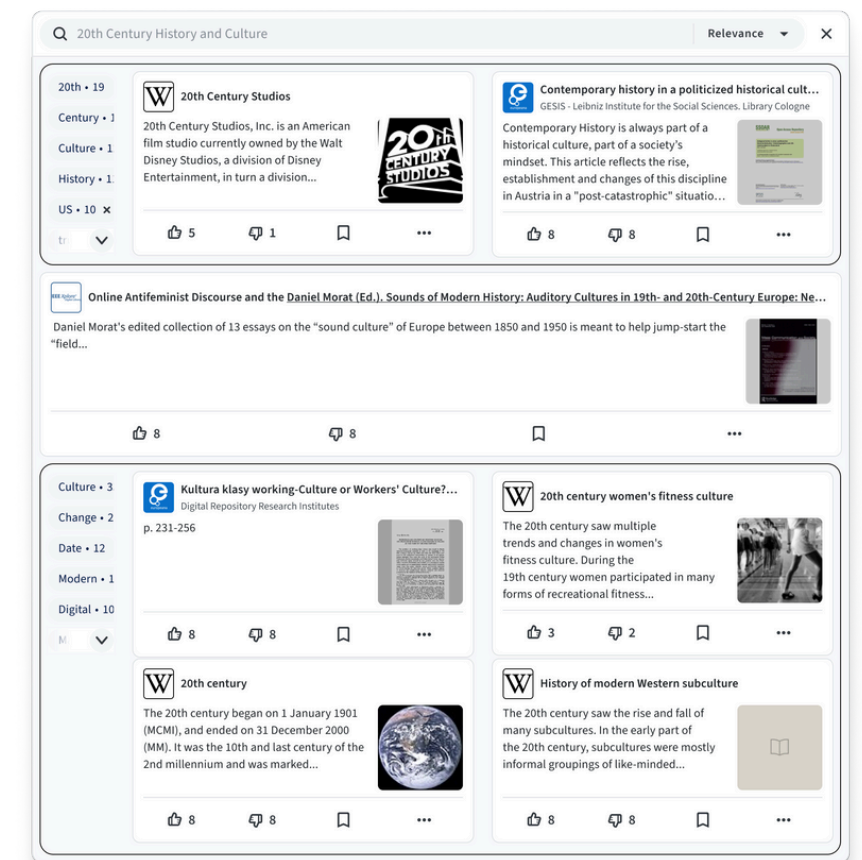

Tab based

Streamlined

Bento Box

Dynamic Topic Clustering

APPROACH

**Visualization enhancement of search result presentation**

- **Source Icons & Provenance:**
  - Presented unique glyphs (verticals' icons) next to each search result's title to visually represent its origin, aiding quick source identification.

- **Clustering & Gestalt Principle:**
  - Gestalt Principle of Closure is used to represent the clusters.
  - Extra metadata for each cluster explains what it entails.
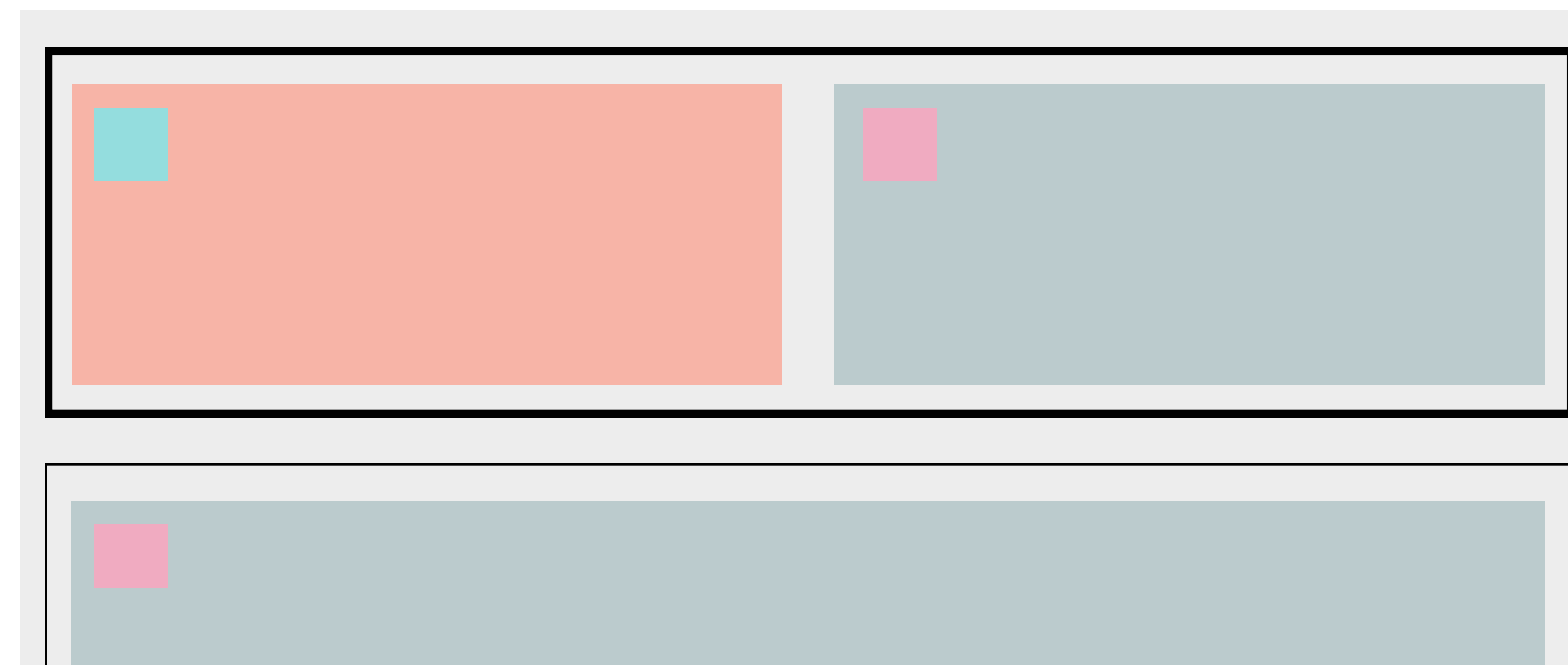
APPROACH

**Structured, Iterative Research Approach**

- **Phase 3: High-Fidelity Prototype Development (current state)**
    - Integration of systems, selected designs for software development .
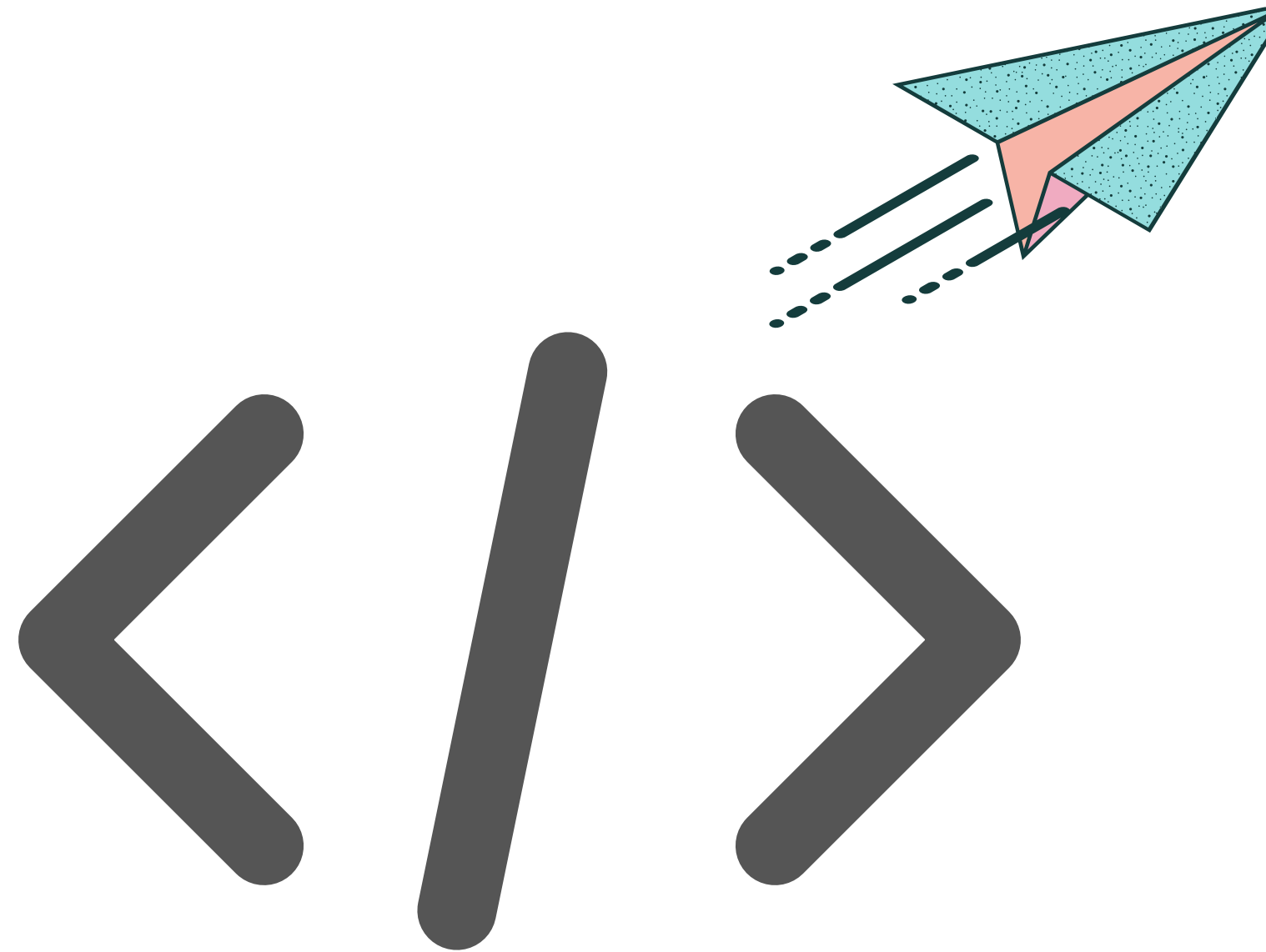
RESEARCH METHODOLOGY

Diagram of how to run the study.

- Independent Variable:
  - Interface type
    - levels: Tab-based, Streamlined, Bento Box, Dynamic Topic Clustering

- Dependent Variables:
  - Efficiency, Effectiveness, User engagement, Satisfaction, Usefulness, Ease of use
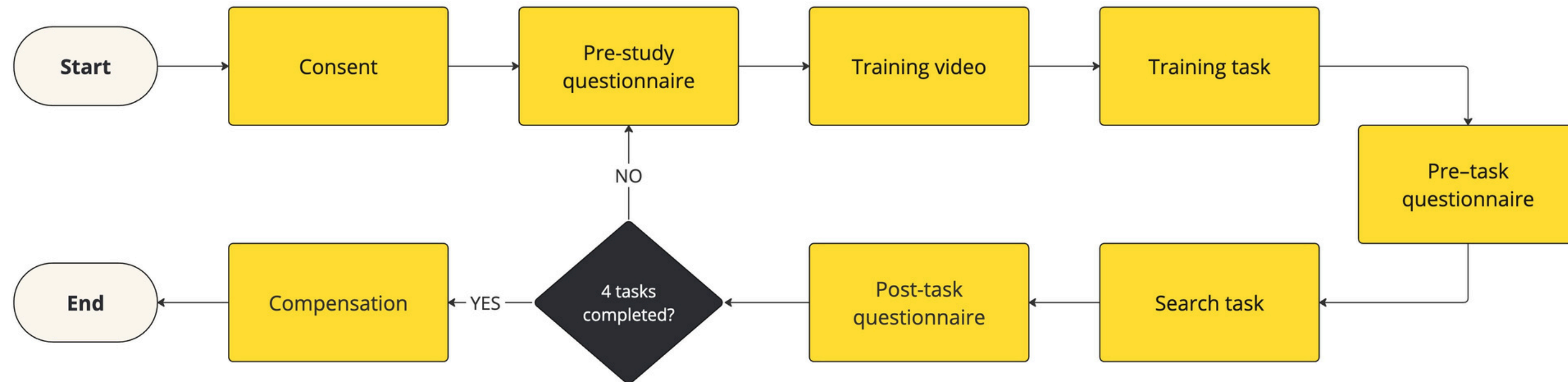
EVALUATION

How will I measure the dependant variables?

- **Experimental Design:**
  - 4x16 Greco-Latin Square design to ensure balanced and fair comparison across 4 interfaces and 4 tasks, mitigating order effects.

- **Ethical Considerations:**
  - Completion of the first draft of the REB Application

- **Participant Recruitment:**
  - Plan to recruit 32 participants

IMPLICATIONS

Broad Contributions of this Work

- Introduction of user-centric visual representations to enhance search result aggregation and presentation.

- Empirical evidence-based approach to improve provenance of information, fostering greater user trust.

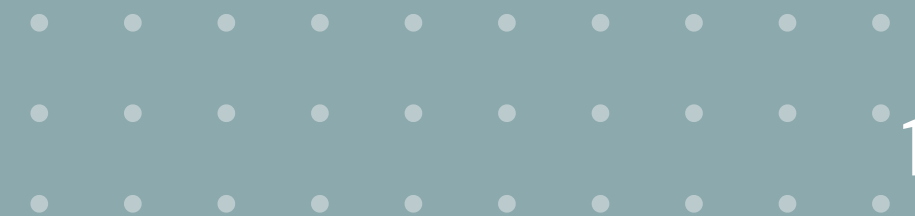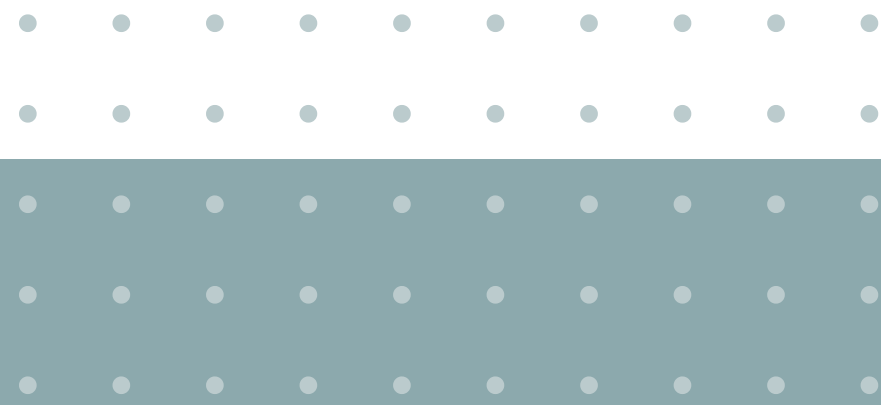- Examination of result diversity's impact on perceived trustworthiness, providing insights for optimization.

FUTRUE PLAN

What is next?

- Finalize development of search interfaces, focusing on visual provenance (RQ1).

- Evaluate the method through laboratory study (RQ2).

- Explore the impact of result diversity on trustworthiness in a controlled experiment (RQ3).

- Secure ethical approval for all research activities.

THANK YOU

Have any question?