

A Traceable Design Knowledge Infrastructure for AI-Assisted Workflows

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Abstract

Artificial intelligence (AI) is becoming increasingly integrated into design practices, influencing not only image and text production but also how evidence is gathered, interpreted, and used to justify strategic decisions. Yet, the market signals, user research materials, technical notes, images, and videos that contribute to AI-assisted workflows are often unstructured, fragmented, and poorly documented. As a result, the same artifacts may be reused under different assumptions or incorporated into decision-making without a clear trace of how they were produced or modified. This paper addresses the issue as an infrastructural problem rather than merely a concern of data quality. Therefore, we propose a practical knowledge infrastructure consisting of three interrelated components, i.e., an operational taxonomy aligned with core design tasks, a hybrid harvesting approach, and a cross-modal quality assurance framework to organize and validate unstructured design data before it enters AI-supported workflows. The contribution of this work lies in repositioning unstructured design data validation as an infrastructural condition for responsible AI-assisted design practice. By enabling evidence to remain legible, contestable, and traceable, the proposed framework supports consistent decision-making and sustained reuse of design knowledge within evolving digital contexts—advancing what this paper terms knowledge sustainability: the capacity of design judgments and their evidential basis to persist, remain auditable, and accumulate responsibly over time.

Keywords

AI-assisted workflows, design knowledge infrastructure, knowledge sustainability, traceability, unstructured design data.