Multiscale Curation: Supporting Collaborative Design and Ideation

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Abstract

Design is difficult to learn. Novice designers often suffer from many challenges. This research focuses on addressing these challenges by transforming the ways in which designers collect, organize, and archive their design artifacts. This research proposes collaborative multiscale design curation which uses scale to organize and relate design artifacts to support creativity. Multiscale design curation will be investigated in a variety of university courses through an iterative, participatory research through design approach.

Author Keywords

Curation, design, creativity, multiscale, zoomable user interfaces, participatory design.

ACM Classification Keywords

H.5.m [Information interfaces and presentation (e.g., HCI)]: Miscellaneous

Introduction

Design is difficult to learn and novice designers often suffer from many challenges such as fixation, depth-first thinking, and the unwillingness to discard concepts in search of alternatives [2]. This research focuses on addressing these challenges by transforming the ways in which designers collect, organize, and archive their design artifacts. We
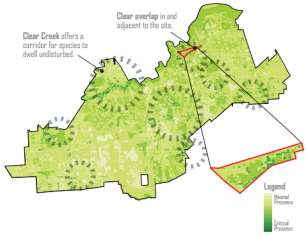
Figure 1: Example multiscale design artifact. A landscape architecture student outlines the specific design site, in red, within the context of the greater city. They include an upscale view of the site, mapped to its outline at city scale.
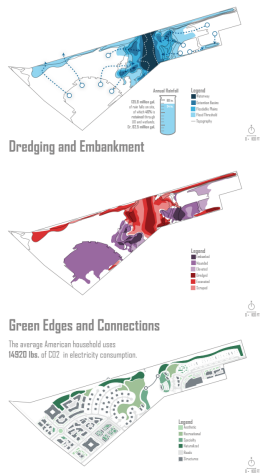
Figure 2: Another example multiscale design artifact. Three multiples of a site map are used to show different processes and information, while maintaining consistent scale.

adopt a framing in which practices of design documentation are viewed as processes of curation. *Curation* is the conceptualization and creation of a context for the purposes of exhibition [12]. *Design curation* is the way in which designers organize artifacts to represent, think about, archive, and communicate a design process. In this framing, design curation methods would include design workbooks [4], pictorials [1], and other such design documentation and/or archiving methods.

This research proposed a novel design curation method which emphasizes the use of scale to organize and relate artifacts. *Collaborative multiscale design curation* involves groups of people working together to visually and conceptually organize artifacts in a zoomable user interface (ZUI) space. This method seeks to use levels of scale to capitalize on human spatial reasoning, to facilitate understanding, communication, ideation, and creativity (See Figure 3). Collaborative multiscale design curation (CMDC) is based on practices of multiscale design (see Figures 1 and 2), in which designers use scale to explore, juxtapose, and communicate relationships among design elements [9]. Supporting CMDC presents new challenges, namely, creating new techniques for *shared awareness* [3] within zoomable environments and for modulating individual and collaborative work, within a shared space, to help prevent design fixation [14].

Background
CMDC builds on *free-form web curation*, a type of new media—designed to support users in creating new conceptual, spatial contexts—in which they discover and interpret relationships visually, while composing a variety of content elements to form a connected whole [7]. Free-form web curation supports visual thinking [10] and creatively engaging with prior work [7].
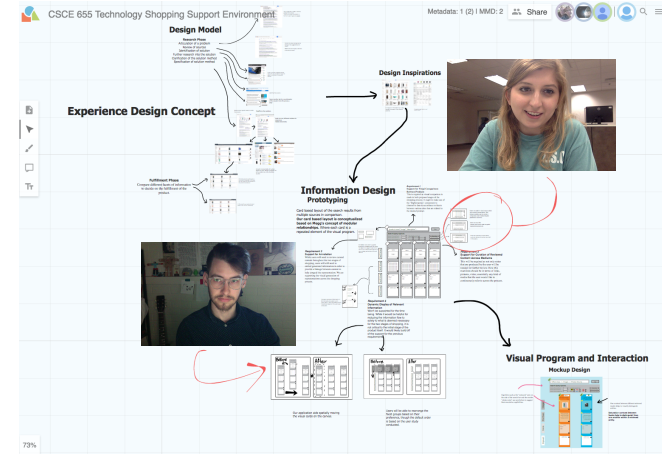
Figure 3: Collaborative Multiscale Design Curation Scenario: Alyssa and Nic are working together on a team software design project. They have collected and shared design artifacts, such as mockups and storyboards. The artifacts are organized in the shared zoomable space and annotated with writing and sketching to indicate relationships and provide elaboration. Live web-cam streams of Alyssa and Nic are positioned within the curation to provide awareness about what they are working on.

Prior research has been conducted on ways to support designers in spatially organizing their design artifacts. Freed was found to help support designers in reflecting on their processes, as well as integrating multiple types of media into a single design artifact, to help prevent fragmentation [11]. The use of sketching within the organization space has also been found to support designer ideation [8]. CMDC will similarly support mixing heterogeneous media types with integrated sketching. We hypothesize that how these features are used will be transformed through through the use of a zoomable user interface and synchronous collaboration.

Figure 4: This example multiscale design curation presents a bike sharing business innovation. Images and writings are assembled into a connect whole through the use of shapes, arrows, alignment, and scale.

Figure 5: This examples design curation is from a student in a digital humanities course for their final paper assignment. Nested in the center of the square is another square which contains text and images similar to the outer area. Interestingly, within that nested square is another, smaller, nested square of curation elements and so on for a total of six nested squares.

Research Objectives

Our *research question* is to understand if and how collaborative multiscale design curation might support design learning, ideation, and participation in novice design teams across a variety university course contexts. We hypothesize that effective CMDC will require new techniques for visualizing and contextualizing collaborative activities within the zoomable curation space. Therefore, we will develop new techniques for supporting shared awareness [3] and the modulation of individual and collaborative work to help prevent team design fixation [14]. New shared awareness techniques will focus on visualizing the activity of others' in zoomable spaces, addressing issues that arise when individual users' view ports and zoom levels can cause much of the shared space to be either off screen, too large, or too small. The support of individual and collaborative work will be addressed with new techniques for defining boundaries and roles within a shared space. Through the use of scale and boundaries, we hypothesize that CMDC will support users in creating spaces analogous to the ranges of interaction within a designer work environment [6].

Methodological Approach

To develop and study CMDC, we will work with design students and instructors across a range of university design and team project oriented courses. We take a participatory approach, working with instructors and students as co-designers rather than as subjects [13]. Participatory design sessions will inform the development of a CMDC technology probe [5]. The technology probe will be used to conduct design interventions within the courses. We will work with instructors to develop CMDC specific assignments which integrate with their existing design curricula. CMDC assignments will focus on ideation stages of design process. Initially, we will focus on single course

and branch out into other design fields as part of an iterative process involving data collection, analysis, and using those findings to further develop the CMDC prototype.

We will begin with landscape architecture courses as that context has sparked our initial understanding of multiscale design practices [9]. Next, we plan to explore CMDC in mechanical engineering (see Figure 4) and digital humanities (see Figure 5).

For data collection and analysis, we take a mixed-methods approach involving qualitative and quantitative methods. Quantitative data will include user interaction logs. Qualitative data will include interviews with students, instructors, and researchers. The planned course interventions will also result in the creation of hundreds of CMDC artifacts. We will evaluate these artifacts and their associated operation logs as both quantitative data and qualitative visual data using a combination of evaluation methodologies: visual grounded theory [10] and curation metrics [7]. In keeping with our participatory approach, we will work closely with instructors to better understand the students' work and learning outcomes.

Expected Contributions

Through this research, we expect the following contributions: (1) collaborative multiscale design curation as a design methodology; (2) new techniques for supporting shared awareness and team ideation in zoomable spaces; (3) new evaluation methods for analyzing creative and collaborative products and processes; (4) implications for facilitating student team design learning and ideation.

Acknowledgements

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