

Bridging Artifacts: Leveraging Duality to Bridge The Gap between Analysis and Design

Pardha S. Pyla¹, H. Rex Hartson², & Tejinder Judge²

¹ Bloomberg L.P.

New York, NY 10022

² Department of Computer Science, Virginia Tech
Blacksburg, VA 24060

pardha@pyla.name, {hartson, tkjudge}@vt.edu

ABSTRACT

In crossing the bridge from the user domain (the way things are) into the design domain (the way designers envision that things should be), there is a need for a cognitive shift from an analysis mode of thinking to that of a synthesis mode. This represents a gulf that is often difficult to cross by novice designers. In this paper we present the notion of “bridging artifacts”, evolving work products that we can use to bridge this gap between contextual analysis and design. Examples of bridging artifacts include user profiles/personas, use cases/scenarios, user goals and intentions, task descriptions, usability goals, system constraints, metaphors, and domain vocabulary. These artifacts do not appear directly in a design, but they embody design concepts and thereby drive the design. Thus, these artifacts are both requirements and design, and like particles and waves, their use depends on the most suitable perspective for the need at hand.

Author Keywords

Bridging artifacts, contextual analysis, design.

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION AND PROBLEM STATEMENT

Contextual inquiry is an empirical process to understand a user’s work domain. Understanding the work domain means understanding its basic and constituent entities. For work activities situated in the context of an organization’s business process, this understanding should extend to the people, the relationships, the structure of decision-making,

the nature of work, the culture, and organizational policies. Moreover, contextual inquiry requires identifying the perceived deficiencies in the user’s work activities. Thus, pursuing this process goal means getting to know the people doing work and the potential interactions they have with other people inside and outside their immediate work scope. It is especially important to understand how those people use technology—computers, telephones, etc. in their everyday work activities.

Contextual analysis is an inductive (bottom-up and data-driven) process to interpret and consolidate the user work activity data. Contextual inquiry and analysis activities work together to gather, organize, and structure the user work activity data, primarily in the form of a flow model and the Work Activity Affinity Diagram. The flow model is a picture of existing work processes in the work domain being analyzed for a new design. As such, a flow model is a diagram of the flow of work products, information, goods, and services within the work domain. The Work Activity Affinity Diagram is a hierarchical representation of all themes and relationships among work activity data depicted as clusters of atomic notes representing each idea identified during contextual inquiry. By grouping these notes by similarities and common themes, work activity affinity diagrams, guided by the emerging flow model, help consolidate contextual data and generalize from instances of individual user activities and issues. This highlights common work patterns and shared strategies across all users.

The objective of contextual inquiry and analysis activities is to provide deep immersion into the users work activities in order to help designers understand the needs and requirements of the users. The overarching goal is to create a design that solves the users problems and helps them be more productive in their work domain. However, the designer can no longer take the outputs of previous stages and systematically transform them into a new set of outputs, as they more or less could do in the contextual inquiry and analysis processes. They have to start with a blank slate and create a system design that somehow accommodates all the needs and requirements of users.

This switch from analysis to design is difficult because designers need to internalize vast amounts of data from the

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contextual inquiry and analysis phases and implicitly use that data to bring a solution into being. They need to translate the terminology and concepts from the work domain into the vocabulary of the design domain (e.g. windows, icons, menus). This cognitive switch needs to happen while respecting a host of constraints both technological and social. In practical terms, designers should be able to look at analysis artifacts such as affinity diagrams and flow models representing the complexity of the work domain and create sketches and prototypes of what the envisioned system would look like.

BRIDGING ARTIFACTS

To aid designers with this transition between analysis and design, we take what we know about the users and build “bridging artifacts”, evolving work products that we can use to bridge the gap toward design. Bridging artifacts are not ends in themselves but a means to design. Just to be clear about our terminology the term “artifact” here refers to developer work products (like usage scenarios), not UI artifacts or objects (like buttons and menus) in the interaction design.

These pre-design elements include user profiles, user class definitions, user personas, use cases, usage/design scenarios, user goals and intentions, task descriptions, usability goals, system constraints, metaphors, domain vocabulary, and design ideas. From here, it’s only a step away to conceptual design and initial screen designs, while also being only a step away in the other direction to contextual analysis. It is all part of a chain back to user work activity.

Bridging artifacts do not appear directly in a design, but they embody design concepts and they drive the design. Thus, these artifacts are both requirements and design. Like particles and waves, their use depends on which perspective is most suitable for the need. In the next sections we provide examples of bridging artifacts.

HIERARCHICAL TASK ANALYSIS

Hierarchical task analysis (HTA) is used to specify the tasks and the structure of, and relationships among, tasks and subtasks that users perform with a system. The data that feeds an HTA comes directly from the work activity data in the contextual analysis phase. As a bridging artifact, an HTA not only describes how tasks are done but also how tasks need to be supported in the envisioned system. The description of how users currently do tasks affords insights into how the design can be improved. What tasks in the HTA can be allocated for automation to the system in the envisioned design solution? What tasks in the HTA are primary candidates for optimization in the new design? What kind of optimization can we provide? Accelerator keys? Large buttons for key actions? Therefore, as designers sketch out the HTA, they cannot help but think about design. The intertwining is always there.

SCENARIOS

Scenarios describe key usage situations happening over time, being deliberately informal, open-ended, and fragmentary. Interaction designers use these scenarios to gain a better understanding of the system usage in the context of the user's actual experience. Information used in formulating the scenarios comes from the contextual data, observation of the user's work context, and from a solid understanding of the system purpose and function. Tasks defined in task analysis become the heart of each scenario, which attempts to capture a representative description of the actual task performance. Scenarios are envisioned design solutions that make use of the object of design.

Scenarios are a nice concrete and narrative way to drive participatory design. They go hand-in-hand with and evoke ideas for screen designs. Since scenarios by themselves are linear stories without pictures, they can benefit immediately from accompanying storyboards and screen sketches; both early manifestations of design.

DOMAIN VOCABULARY

Yet another bridging artifact is the domain ontology for the envisioned system. This starts with what we call information objects that are identified during task analysis. These objects are props (e.g. documents, forms, voice messages, etc.) used in the work domain to accomplish user’s tasks. As these information objects flow within the enterprise business process, they are accessed and manipulated by people in work domain. These information objects can also be closely related to the high-level usage goals. In a graphics drawing application, for example, information objects in the application might be rectangles, circles, and other graphical objects that are created, modified, and combined by users.

Identifying relationships among the application objects—sometimes hierarchical, sometimes temporal, sometimes involving user work process flow, etc. provides clues on how to represent those objects in the design. In conceptual design we also have to think about access methods, or how users get at information objects; from the user perspective accessing usually means getting an object on the screen so they can operate on it in some way. Then designers can think about what kinds of operations or manipulation will be performed and how to afford those actions on the user interface.

CONCLUSION

In this paper we discuss the cognitive gap that exists between analysis and design activities in an interaction design lifecycle. We introduce the concept of bridging artifacts that are both analysis and design entities. Leveraging this duality provides clues and insights into getting started on design and connecting back to user data. We conclude with three examples of bridging artifacts and describe how they help in getting started on design.