

# A Prototype Design Tool for Participants in Graphical Multiuser Environments

Carol Strohecker,  
MERL

Barbara Barros,  
MIT Department of Urban Studies and Planning

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## Abstract

With the “WayMaker” software construction kit, users can design layouts for virtual spaces. These layouts are arrangements of structural elements described by Kevin Lynch in his book, *The Image of the City*. WayMaker transforms arrangements of districts, paths, edges, nodes, and landmarks into street scenes. The initial prototype fits roofs, facades, and other scene components into perspective views of pathways through an imaginary place, which resembles paintings by Cezanne. Our focus on the act of construction and on the use of Lynch elements as building blocks may suggest a model for users’ extensions to graphical multiuser environments.

## Context

In “The Lessons of Lucasfilms’ ‘Habitat’,” Morningstar and Farmer describe how the “inhabitants” of virtual environments need to feel comfortable in the domain, to the point of developing a sense of “ownership” (Benedikt, 1991). In MUD-like environments,<sup>1</sup> people typically develop this sense by creating objects, characters, and rooms or other spaces, and adding them to the environment for others to enjoy (Curtis, 1992; Rheingold, 1993; Bruckman & Resnick, 1995; Mitchell, 1995; Turkle, 1995). This constructive component is the basis for considering such virtual domains potentially interesting as learning environments (Harel & Papert, 1991; Kafai & Resnick, 1996; Moshell & Hughes, 1996; Strohecker, in press).

The work described here focuses on participants’ development of the space itself. Our “WayMaker” construction kit enables people to create and/or extend representations of a virtual place. We use the metaphor of a village or city because it enables us to think of the space in both structural and social terms.

## Contribution

WayMaker is based on Kevin Lynch’s foundation work in the field of urban planning and design. He studied how people think about the layout and important features of their cities. From verbal and pictorial records of these conceptions, he derived five basic elements of the city image: districts, paths, edges, nodes, and landmarks. Representations of these elements are the building blocks in our software kit.

Lynch’s work is basic in the training and practice of urban designers. His elements have become a pictorial vocabulary that urban designers use to develop and communicate their concepts and plans. WayMaker may prove useful for urban designers, but its simplicity and highly visual nature should appeal to a range of users.

Researchers are considering spatial metaphors and organizational frameworks as they develop systems for automatic layout of web-based information. Lynch’s framework may lead to interesting solutions in this area. The work of another urban planner, Christopher Alexander, is generating interest as well (Alexander et al., 1977).<sup>2</sup> Our application of Lynch’s work bears similarities to approaches that involve pattern languages in the design of virtual spaces. We hope that our relatively modest focus on structural elements will help us to avoid the banality of result that troubles Gabriel (1994). Limits of our system would seem to pertain moreso to the extent of the image database than the conceptual elements, their representations, or the construction techniques.

## The “WayMaker” Prototype

In *The Image of the City*, Lynch describes five elements that people use to organize a mental image of the city in which they live. *Districts* are broad regions, such as neighborhoods, that have some common, identifying character: brick sidewalks, for example, or rows of brown-stone buildings. *Paths* are the channels along which the observer moves; they may be sidewalks or roadways. *Edges* are boundaries between one region and the next; they may function as barriers or seams. *Nodes* are strategic points, foci

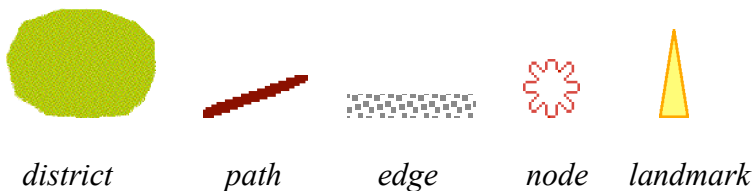
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<sup>1</sup> MUD stands for "MultiUser Dungeon" (or “Domain” or Dimension”); MOO means "MUD Object-Oriented." These loosely structured games typically have some associated programming language with which participants can add areas and objects to the environment.

<sup>2</sup> In fact, Alexander’s “pattern language” is the theme of one of the CHI’97 workshops.

to and from which the observer travels. *Landmarks* are punctuation points used for general orientation; they may be distant or local.

WayMaker users construct images from malleable representations of these elements:



These abstractions pertain to perceptible features of the “real-world,” human-scale built environment. Their meaning in the WayMaker virtual domain results from three transformations: of representation, of scale, and of view. To help the user understand these transformations, the software shows the elements in alternate contexts and forms.

In WayMaker’s terms, a familiar image can be abstracted by transforming the view from street level to bird’s eye, the scale from human to city, and the representation from a recognizable scene to symbols indicating placements of structural elements.<sup>3</sup>



In the above example, the image at the right represents a district with an edge, a path, and a landmark. Constructions in WayMaker typically include several districts combined into a single representation of a “city” image:



The user can stretch a “walkway” through such a layout. The software interprets the walkway as a sequence of a street-level scenes, simulating views that a person would experience from that walkway in the virtual space. Rendered as perspective views, these scenes are composites of image components such as ground, sky, facades, and roofs.



The flavor of the scenes changes as the viewer proceeds from one district to the next.

## Consequences

As people work with these tools, we should be able to get some sense of how they think about and organize virtual space, what kinds of virtual places they would like to “inhabit,” and whether

<sup>3</sup> The street scenes are from (Machotka, 1996).

manifestations of Lynch's elements could become useful, feasible additions to the repertoire of tools for graphical multiuser environments (e.g., Anderson et al., 1995). Some of the data should be interesting from a cognitive science perspective as well: Lynch's elements are essentially topological. In using them to plan the structure of virtual places, users may deepen their understandings of this type of mathematical relationship (Papert, 1980; Strohecker, 1991).

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