

# What is the value of physical context for virtual interaction? --Swisshouse: A Prototype Physical/Virtual Collaborative Environment

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## 1. Abstract

Much of the current discussion on remote collaboration focuses on the effects and opportunities raised by "virtual" architectures for collaboration. In the excitement of these technologies, most people have neglected to consider the impact of web-based collaborative environments on the "physical" architecture for collaboration—the physical spaces where researchers and scientists physically stand, sit and work together. Will we keep our old labs and office spaces, when more and more of our daily research activities is webified? We believe, like many others, that physical spaces will not disappear for research and scientific collaboration—but they will be profoundly affected by the new horizons created by the virtual. What emerging typologies for collaboration combine physical and virtual, clicks and mortar technologies? What is the value of physical context for virtual interaction? For this workshop on advanced collaborative environments, we present our approach to researching these questions. We describe a case study of a novel physical/virtual architecture for knowledge exchange and scientific collaboration that we designed for construction in Boston: the Swisshouse. We believe the Swisshouse is a prototype for a new generation of collaborative environment that understands the dynamic interplay between physical, face-to-face exchange and technology-enhanced collaboration, discussion, and community formation. It redefines the "collaborative experience" in ways both familiar and new, traditional and innovative—and overall may represent a harbinger of more such hybrids in the future.

## 2. Introduction: Swisshouse

The Swisshouse project began as a donation by Lombard Odier & Cie, a Swiss private bank, to the Swiss Confederation to mark the bank's 200th anniversary. The project had three objectives: (1) to facilitate networking and knowledge exchange among a distributed Swiss scientific community in the greater Boston area; (2) to build a bridge between academic institutions in the greater Boston area and the network of universities in Switzerland for distance education; and (3) to provide a platform for interdisciplinary interaction among participants from research, education, business, law and politics. The original program called for a physical building only. But in order to expand the scope beyond the limits of the physical boundaries and enable the geographically dispersed community to actively participate and cooperate, we proposed a concept that comprised not only a physical but also a virtual component, to be designed together from the beginning.

## 3. Approach

We conceived the physical building as a 3,200 sq.ft. wired loft located in Cambridge, Massachusetts. It provides a sense of place and belonging to the community, and acts as a physical portal to broadcast and receive knowledge. The digital world is a web-based platform for matching distributed interests in the community and fostering continued synergetic exchange. It integrates into the physical space and enables the Swisshouse to reach out far beyond the defined physical walls. Both worlds are intimately connected.

#### 4. Design Principles

The programming, design, and articulation of the Swisshouse reflect its unique nature as a physical/virtual construct. The underlying design principles were the following:

1. Embedded information devices. The information appliances that make the connection to the virtual world are embedded in the architecture and furniture of the building, and become space-defining elements themselves. The devices are social and cooperative in nature.
2. Intimate link between physical and virtual space. The physical building is conceived as a spatial interface to the virtual community. We paid particular attention to the different types of spaces and elements needed to connect with the virtual community.
3. Design of the boundary between public/private space. The boundaries between public, private as well as semi-public and semi-private spaces are clearly defined both in the physical site and on the web.
4. Deliberate use of the senses of perception. The senses of perception—acoustic, visual, touch and smell—are choreographed for enhancing the design principles (e.g. virtual/physical, public/private).

#### 5. Elements

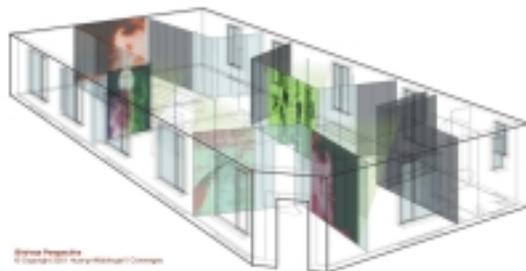
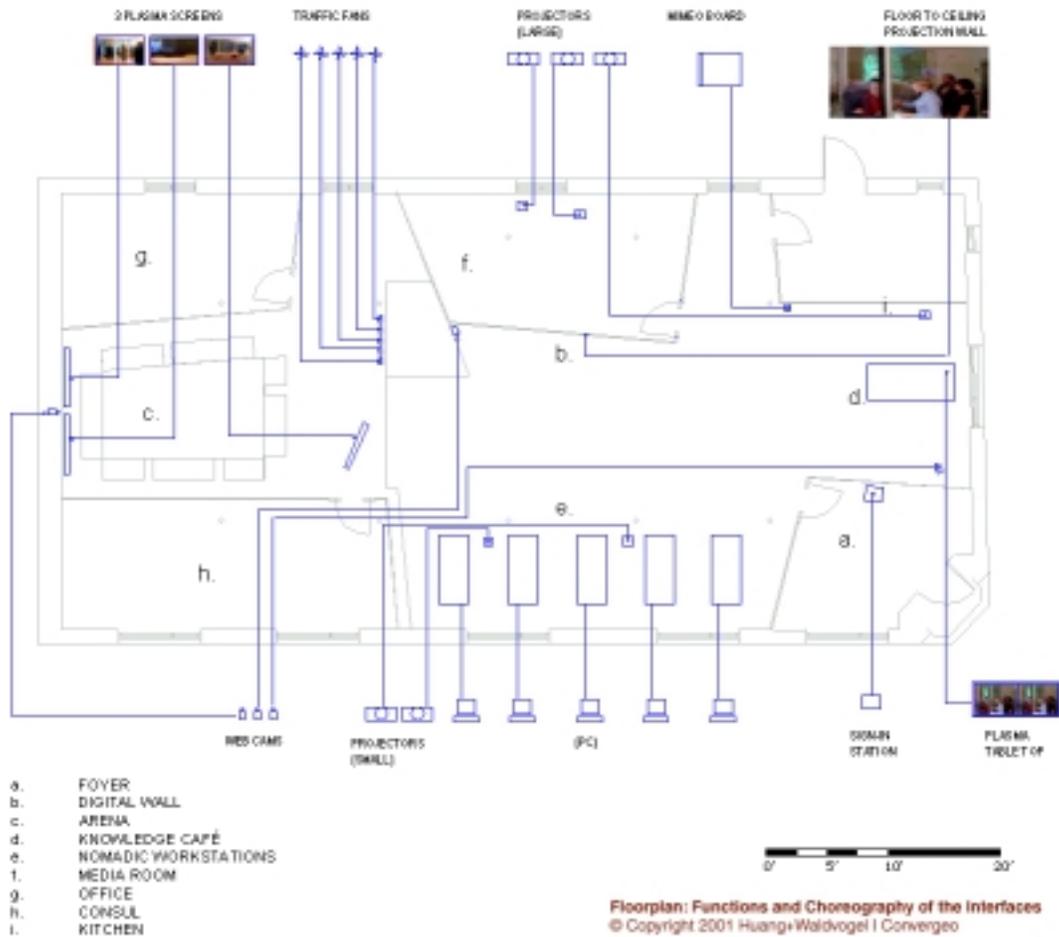
Turning these principles into the reality of practice was a serious challenge. A key concern was to determine which activities should be facilitated by physical infrastructures (hardware), and which activities should be accommodated by virtual infrastructures (software). We devised several collaboration scenarios. To support these scenarios we then designed a series of new types of architectural elements to act as human-computer interfaces. These elements included the following.

- *The Kinetic Arena.* The convergence point in the physical Swisshouse is the “Arena.” The Arena is a trapezoid shape that slowly steps down 3 feet into the floor slabs. This Arena forms the landscape of the Swisshouse. Activities happening in the Arena are transmitted in real-time onto the virtual sites via “net-eyes” mounted onto the ceiling.
- *The Knowledge Café.* The Knowledge Café opens directly to the information space. The tables of the Café are networked media objects, large and long, creating informal groupings and enabling geographically dispersed brainstorming.
- *Media Space.* The media spaces are in glass and open to the loft. They remain visually open to the hall and the Arena, but acoustically separated by a specially frosted glass. In a learning setting, the media spaces are used for breakout sessions and private conversations.
- *Personal Space.* Open nomadic workspaces are distributed throughout the loft-space. Individual learners share the public tables, but each member has his/her own “corpus.” The corpus is personalized storage used in the physical space, and has its counterpart in the digital space.
- *Digital Wall.* The digital wall is composed of three 6' x 10' room-height glass panels with specially coated film for rear projections. The total size is 18' x 10'. The digital wall is used for distance learning, interactive presentations, exhibitions, real-time information, and asynchronous connection with the distributed virtual community. The digital wall is a public element that belongs to and represents the distant audience.

#### 6. Conclusion

Through the integration of these connected architectural elements for collaboration, the Swisshouse is fulfilling an important mission: “reverse brain drain,” i.e., bring the knowledge of Swiss scientists and researchers in the US back to Switzerland. As a large human-computer interface for knowledge exchange, the Swisshouse acts as a hybrid collaborative environment for “virtually” transferring the knowledge of Swiss scientists and researchers back to Switzerland. The Swisshouse has been in full operation for approximately 12 months now, and is serving as a test-bed for studying issues related to the value of physical context for computer-supported collaborative work, telepresence and creation of scientific communities of practice.

## 7. Appendix: Illustrations



*A glass wall showing rear-projected digital images, right, defines the public area of the Swisshouse, a prototype collaborative environment conceived as a large-scale interface between the physical and virtual worlds.*