
Rethinking Interaction Design for Hybrid Urban Space

Matthias Wölfel

Faculty of Digital Media
Furtwangen University
Germany

matthias@wolfel.de

Ulrich Gehmann

Research group Formatting of Social Spaces
Institute of Historical Studies
Karlsruhe Institute of Technology (KIT)
Germany

ugehm@t-online.de

Marco Zampella

Institut for Postdigital Narrative
University of Arts and Design Karlsruhe
Germany

mzampella@hfg-karlsruhe.de

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Abstract

Hybrid urban space requires significantly different approaches to interaction design. The interaction design challenge will be to include spatial, ethical, personal and wider societal concerns as well as the *conditio humana* into the design model by understanding human values and needs.

Author Keywords

user experience, human-computer-interaction, new interfaces, ambient intelligence, smart environments

ACM Classification Keywords

H.5.2 User Interfaces; H.1.2 User/Machine Systems

Introduction

Because different definitions exist, we would like to first define, in our understanding, what a *hybrid urban space* (HUS) is, or could be. Usually, the term hybrid is used to refer to something that is composed of parts that genuinely, if seen from their original context they are stemming from, do not belong together. In the literature, the term hybrid is added to the term space to refer to spaces of functionalities of the most diverse kinds: work vs. leisure time, private vs. public, analog vs. digital, or physical vs. virtual. The idea of the collage characterizes a HUS since this kind of space is assembled out of fragments and therefore *utopian* in a literal sense: a non- or nowhere place. In case of HUS,

Space of Flows

... is a high-level cultural abstraction of space and time, and their dynamic interactions with digital age society.

Location-Based Services

... are a general class of computer program-level services that use location data to control features.

an original context, namely that of a historically grown real space (and place), becomes "de-constructed" –to recur to that beloved saying of post-modern discourses – and re-assembled by an individual moving within that real space. That individual, central for our occidental self-understanding and *conditio humana*, thus has turned into a "user" of that real space. In such a way, a former – and still existing – real context becomes transformed into another, seemingly *individualized* context, that of the (individual) user.

For this paper we refer to HUS as the digital augmentation of space, merging the borders between physical and virtual space. As one consequence amongst others, the hybridization leads to a new situation where the former coherent urban tissue becomes opened to a variety of individual purposes and thus, of usage. But as regards to the coherent perception of urban spaces, this tissue is in danger to become dissolved for human perception – at least in the *gestalt* which is essential for generating identity, and a sense of belonging; and which characterized traditional urban spaces [1].

A HUS apparently is supposed to have other impacts on the human mindset than those of living in a 'non-hybrid' space. We believe that the ways in which this hybridization is integrated into the environment, and of how we interact with the provided services and devices will significantly impact the human very nature, or *conditio humana*. To know what is real and what is not real is fading. It is a phenomenon that has already become a reality for digital images: it is not clear if an image has been taken (photographed), computer manipulated (photoshopped), or computer generated (rendered). A hybrid, digitally augmented, city apparently is supposed to require other interaction

paradigms as in "classical" human-computer-interaction approaches where the digital is clearly separable and not seamlessly integrated into the environment.

Status Quo (Bridge Devices)

The use of computers and the way of interaction are changing constantly, and types of applications are radically broadening. We see an ongoing diffusion of technical devices in all parts of daily life. As regards to this development the predominant perception of urban space has transmuted from a space of flows into a space of signs – of traffic, of advertising, of historical places – and digitalization – of qr-codes, of displays, of sensors, of augmentation.

In particular, the increased use of location-based services [5] raises the question about their "bridging" function: what is bridged with what, and resulting out of this, what is the *perceived reality*? Since apparently, these "bridges" are in the process to generate realities of their own. For instance, when digital avatars like *Cortana* or *Siri* are telling me what is important within the "old" real urban space; and if I, the user living within the terms of a "post-digital" society, am using these devices in a "normal", i.e. unreflected and self-evident way?

Since these devices are all based on the user's current location, the location became the functional parameter of prime importance. The apps became a point of reference for the users where, the functional segmentation has already started to influence the user's behavior and notion of relevance: the world based on personal preferences in individual functionalities gets projected on the urban context [6]. The mobile devices work as a bridge between the analog and the digital

Explicit Interaction

... describes the interaction of a user who operates a system knowingly to achieve a certain goal.

Implicit Interaction

... describes the interaction of a user who isn't actually aware of the interaction.

Affective Computing

... can recognize, interpret, process, and simulate human affects.

world, opening a window (framed by the screen) into a space of information. This results in a new kind of space and of spatiality as such; not confined to the dimension of physical space alone. Hybrid, as we understand it, imposes that we live in both worlds at the same time.

Rethinking Interaction Paradigms

While these developments offer great possibilities and have already started to change our personal and professional lives, we are mainly still using interaction paradigms derived for *graphical user interfaces* using a keyboard and mouse. Pointing – for selection – is likely the most used interaction to interface with the digital. For *natural user interfaces* – which primarily refers to touch input – this interaction principle has not only been well adapted, but is even a better fit than for its original application. All the more since there seems to exist a strong desire to make the "new spaces" of the hybrid to become more adapted to our original human condition, namely to rely on *sensuality*. And through that, giving the procedures involved a more 'natural' look and 'feel'; for instance, by using 3d gestures (provided by *Kinetic Space* [7]) instead of using a keyboard and a mouse through a graphical interface.

We have to think about, how new technologies and services might be integrated, may influence and how they change the environments, in which they will be used [3].

Design Challenges for Hybrid Environments

We have already witnessed a change from a merely ergonomic focus to cognitive designs as well as affective computing and hedonic designs (which involves more than fun). Design is now though "in terms of the

weighing up of the various moral, personal and social impacts on the various parties who will be effected by the proposed technology" [4]. In addition to these aspects, in our opinion, HUS requires an understanding and insight of various other factors, some of which are shared with other fields such as ubiquitous computing or augmented reality and some are specific to the HUS:

- **Invisibility dilemma.** When embedding access to digital services in the HUS the original function, look, and feel should not be changed. Users, however, must still be able to identify digitally enhanced artifacts. [5]
- **Implicit vs. Explicit Interaction.** While traditional interfaces assume explicit interaction HUS can react to implicit interaction. When to use implicit interaction has to be chosen carefully. [5]
- **Opt-In vs. Opt-Out.** Implicit interaction with particular services (or companies), might not be wanted by every users. How to register that somebody does not want to use it has to be determined.
- **Self-Determination.** If relevance becomes the solution of a computable optimization problem, an algorithm decides our actions. The idea of freedom for actions that are "up to us." is in risk. How to provide smart services but the user keeps the control has to be answered.
- **Acceptance and Trust (Personal Data).** HUS requires that an array of sensors is currently collecting information about the environment und users. How to communicate what information is collected, stored or processed should we address.
- **Overcoming Metaphor.** Using (real-world) metaphors to convey concepts and features of an application has been a key design guideline [2]. Applying this guideline to real-world objects, however,

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causes a conflict and might lead to a misunderstanding. We, therefore, have to overcome this design rule if designing for urban environment objects.

- **Self-Explaining.** Those interfaces and services must be self-explaining because no user manual or tutorials are available and in addition the user is not willing to take this learning effort for one time usage.
- **Fit to the Environment.** The defined interaction has to fit and seamlessly integrate into the natural environment.
- **Public vs. Private.** Seamless integration requires to present information on public displays. How to keep this information private and to determine what information can be public shown has to be solved to not embarrass people.
- **Functional Segmentation.** The services in use today are functionally segmented: There is an app for finding restaurants, an app for messaging, an app for dating and so on. This segmentation becomes obviously frustrating and complicated in particular if more than one serves the same function. Therefore, HUS, must be designed such that fragmentation cannot be employed.
- **Mental Model of Technology.** Short technological life cycles resulting in fast changing mental models of technology. A mental model of how technology works, built in a former time when technical devices were far less ubiquitous and complex, should neither interfere nor be a requirement to proper interaction with devices currently or soon be integrated into our environment. Considering such mental models is of utmost importance for understanding hybrid spaces in their connection with an urban context. For a critical reflection of these matters, it is referred to [8].

Conclusion and Outlook

Also technologies become more and more an integral part of behavior and living spaces, the design of user interface and interactions, not only in regard to the HUS, is still a challenging task. Taking into account the interdependency of virtual and real spaces, forming a hybrid space, we have to be aware that this might cause a change in mental models in the user of how the world works. We believe that this mental model is in particular influenced by the interface and the way of interaction required to 'communicate and experience' the virtual space and therefore how, or if, our mental model is changing. Last but not least we have to be aware that the HUS is not only defined by the offered services accessible through the interaction with the interfaces, but it is also always determined by the political system, the socio-economic levels and the underlying legal framework. And first and foremost by habits, perceptions and world views which are culturally grounded. These are consolidated by socioeconomic forces, and again, are strengthening the 'technical' forces described here. This too applies to "hybrid" urban spaces with their long European history, a history we have to respect and to preserve. The hope is that the devices described here will significantly contribute to an enriched, and hence deeper understanding of these spaces which are not only a part of our cultural heritage, but at the top of it an intrinsic part of our human identity. If used in such a way, the devices and aspects outlined here could be a real enrichment. Moreover, a big chance of hybrid spaces could consist in a new perception of sociality, by providing new ways of community-building and through that, provide the traditional notion of a *public* space with new meaning.