Interaction design is increasingly about embedding interactive technologies in our built environment; architecture is increasingly about the use of interactive technologies to reimagine and dynamically repurpose our built environment. This forum focuses on this intersection of interaction and architecture. — Mikael Wiberg, Editor

Interaction Design Meets Architectural Thinking

Mikael Wiberg, Umeå University

The architecture that surrounds us defines a crucial part of our everyday lives. It shapes and defines the frames for our lives, the rooms in which we live, work, socialize, do our shopping, and spend our leisure time [1].

Architecture is the classic, established approach to the design of our built environment. For hundreds of years, architects have focused on the design of our physical surroundings to define the frames for our lives. In doing so, architecture has established itself as the tradition of working with the material and artificial aspects of our physical surroundings to support the social and cultural aspects of our lives. With this as its primary focus, architecture as a discipline and a practice shares several characteristics with interaction design. Architecture is people-centered yet design-oriented; it deals with the intersection of human factors and artificial matters—that is, the material, designed aspects of our everyday lives.

In a similar way, interaction design contains a number of aspects deeply rooted in the field of architecture, including a concern for our physical surroundings as well as a focus on supporting activities and the flow of people, information, and interaction by means of designed artifacts.

While architecture and interaction design have traditionally dealt with ontologically different matters—the physical vs. the digital—this distinction is now being challenged. Ubiquitous computing, embedded

systems, and the Internet of Things (IoT) are just a few examples of how interactive technologies are increasingly integrated into our physical surroundings. This at a time when we are spending more and more time online in “architectures of interaction” [2], including the wide range of social media systems that provide the frames for how we meet, communicate, and stay together online.

So, while architecture used to be about the structured way of arranging and defining “the frames for our lives,” that is more and more the agenda for interaction design as well. At this intersection, interaction design is concerned with more than just the online aspects of living, communicating, and interacting, and architecture is concerned with more than just the arrangement of physical aspects of our surroundings. Beyond any simplistic or categorical distinctions between the two areas, we should rather dig deeper into how architecture is becoming a concern for interaction design and vice versa.

Against this background I propose “Interaction and Architecture” as a theme for this forum. I view this as a broad label for the practice where

interaction design is deliberately done in relation to our built environment. It might be for the purpose of reimagining and dynamically repurposing our built environment, it might be for the purpose of embedding interactivity into our built environment, or it might be for the purpose of augmenting our built environment. As such, Interaction and Architecture is about the design of interactive systems that takes an architectural understanding of interactive technologies as one point of departure, and how such technologies might operate as architectural elements in the creation of interactive experiences as another point of departure. In short, it is about bringing the design practices of interaction design and architecture together.

ARCHITECTURE MEETS INTERACTION DESIGN—A PARADOX?

Ubiquitous computing, embedded systems, and the IoT do indeed point in the direction of a complete integration of computing into our built environment. From this perspective, it is natural to focus on the intersection of interaction design and architecture.

One might think that an interest in architectural or spatial aspects of interactivity is just the latest trend in HCI. However, if we review the history of HCI over the past 30 years, it should be acknowledged how we, as a community, have systematically worked through a wide repertoire of explorations of the spatial and architectural dimensions of interaction design. This repertoire includes

Insights

- Architectural thinking provides a new ground for interaction design.
- Interactive technologies can work as architectural elements.
- At the intersection of interaction design and architecture we can start to think about how to “architect interaction.”

View of the Kunsthaus Graz from the Schlossberg.

explorations of spatiality under the notions of virtual reality (VR) and 3D worlds, game design (including 3D games, platform games, and arcade games), mobile computing, ubiquitous computing, smart/intelligent environments, location-based and context-aware services, augmented reality, and, most recently, mobile augmented reality, notions of proxemics/proxemic interaction, device ecologies, and—at architectural scale—interaction design for smart buildings, interactive architecture, and even smart cities and urban computing.

Going back to the early days of the graphical user interface (GUI), we can notice how the core ideas behind GUIs not only enabled us to imagine and design interfaces in which we organized

interaction graphically, but also, and more fundamentally, came with a clear agenda for the spatial organization of information and interaction (for a more in-depth discussion of architectures of interaction, see the work by Heather Wiltse and Erik Stolterman [2]).

So, while one can argue that technology enables us to bridge geographical distance, which introduces a seeming paradox for the exploration of spatial dimensions of interaction design, the history of HCI tells us there is, contrary to this position, a very interesting design space to be explored related to how we can reimagine and repurpose spatial dimensions of our built environment at the intersection of architecture and interaction design.

Beyond being an interesting topic for further exploration, it has also been acknowledged in our community that we do indeed need a better integration of interaction design and architecture. As formulated by Sengers et al.:

“Imagine a world without architects, where only engineers construct buildings. With a keen eye toward functionality, these engineers would make sure the buildings were sound, but something would be lacking.

People would miss the richness of architecture—the designed connection to their lives, history, and culture. The designed experience of these buildings would be irrelevant to their social and personal concept of buildings. Yet this is the world researchers are inadvertently creating with ubiquitous computing” [3].

A GROWING FIELD OF EXPLORATIONS

It is not only through technological developments (including ubiquitous computing, embedded systems, and the IoT) or via the history of HCI that we can see a recurring interest in blending interaction design with our built environment, or in reimagining spatiality through the lens of interaction design. During the past few years, we can also notice a growing academic interest in the intersection of interaction design and architecture. This interest stretches from published books and academic papers explicitly focused on this intersection (see, for instance, [2,4,5,6]) to the arrangement of two recent CHI workshops explicitly focused on the intersection of interaction and architecture, including “Ar-CHI-itecture” at CHI’12 and

While architecture and interaction design have traditionally dealt with ontologically different matters, this distinction is now being challenged.

(left) Wireless device (AllCall) + RFID card. AllCall receives a message and notifies its user. (right) RFID card reader.

working across these two fields and how that might work in terms of using interaction technologies to reimagine spatial aspects of our built environment and geographical flows of people, objects, and information.

One example of how interactive technologies can be configured to redefine the flows in a physical environment can be found in my hometown, Umeå, located in the northern part of Sweden. In this town, we have a quite interesting newly opened restaurant. When you arrive at the entrance, you get a special plastic card with an RFID tag to be used during your stay at the restaurant. You can then move around freely to different stations within the restaurant and use this RFID card to order different dishes or beverages; for each order, you swipe this card at the corresponding station. After ordering a dish, you then get another electronic device to bring with you to any available table. When the dish is ready to be picked up, it is communicated wirelessly to this device, which starts to blink, indicating that you can go and get your dish. When you've finished eating, you check out from the restaurant by swiping and then returning the borrowed RFID card, then paying for the items registered on the card.

This example not only illustrates the design of an RFID-based order/payment system; it also illustrates interaction design that is tightly integrated with the architectural program of a restaurant. We can observe how the design interplays with the overall architecture of the restaurant, including the different stations and the spatial layout. We can also observe how this interactive system allows for a unique flow of people, service, and payment within the restaurant, and, further on, how this enables an alternative organization of the staff (a number of different stations, each with its own chef; no waitstaff serving tables, but instead a check-in/check-out counter; etc.).

From the viewpoint of interaction and architecture, it should be highlighted how guests with their borrowed RFID plastic cards in fact become “mobile

Solar-powered wireless parking meters in Bloomington, Indiana.

“Interaction and Architectural Space” at CHI’14.

On the empirical side of things, interest in the intersection of architecture and interaction design is growing rapidly. Newly established notions such as smart cities, smart buildings, interactive architecture, and the deployment of public displays and digital signage are all examples of an interest in thinking architecturally about interaction design and vice versa.

But there are also many ways in which architecture and interaction design are becoming increasingly blurred on a more subtle or abstract level. For example, Wiltse and

Stolterman [2] have described how digital systems can also work as “architectures of interaction” and, accordingly, architectural thinking is currently finding its way into pure digital design.

In this forum we’re interested in all these different ways in which architecture and interaction design are becoming concerns for one another, and how this changes the world around us. Such changes might be about the deployment of new interactive technologies in physical environments, or digital systems deliberately designed to work as stable structures for ways of interacting (to guide certain behaviors, activities, or flows of information). We’re also interested in lessons learned from working with design projects across these two fields, such as the importance of a precise design language and ways of working with style, formats, and materials (including digital materials). To further explore the intersection of architecture and interaction design, it is important that we also look at the history of design (ideas).

ON DOING ARCHITECTURE AND INTERACTION DESIGN

Given there seem to be clear advantages to further exploring the intersection of architecture and interaction design, we might also need concrete examples of how architects and designers have already started

tokens” in this environment. This contrasts with more traditional interaction design, which typically bypasses spatial aspects of the built environment, for instance, by sending bits across a restaurant to serve stationary guests, which is a much more typical restaurant implementation. Especially today, where the traditional restaurant layout is complemented by modern restaurant systems to bridge distance (including billing systems, table management systems, mobile menu/order systems, etc.).

Another example here might be the newly installed parking meters in Bloomington, Indiana. These meters are solar powered and wirelessly connected, allowing for credit card payment at each parking lot. As such, online payment is linked to each specific parking lot, making both parking and payment easy.

Beyond these simple examples, the theme of interaction and architecture might also be thought of in terms of how to use the built environment as part of interaction design (in this case, to utilize the environment as a design resource). Here, pervasive games or other location-based games might work as illustrative examples. Another approach for working at the intersection of architecture and interaction design might be to think about how to overlay information/interactivity onto the built environment (as in augmented-reality applications or in media-facade projects; see, for instance, the Grazer Kunsthaus-Fassade). These projects focus not only on the development of a digital tool, digital device, or digital service, but also on how the interactive technology will work as an architectural element in the built environment.

MOVING FORWARD

In wrapping up this forum, we should note that although there are numerous signs of how architecture and interaction design are increasingly intertwined, we are still at the early stages of exploring this intersection. There is still much to

be explored and much to be learned. For example, it might be interesting to combine architectural thinking with explorations of the potential of interactive technologies, or to look closer into what we can learn from the long tradition of imagining and reimagining what interaction design can be about when situated in our built environment. Further on, it might be interesting to explore what architecture can be about when we bring in interactive technologies as architectural elements. And finally, a key task will be to address all of the contemporary technology-driven approaches to the design of interactive environments (for instance intelligent environments or smart homes) from an architectural point of view.

With this challenge in mind, I would like to end with an open invitation to submit your work to this forum. Let us continue to explore the intersection of interaction and architecture together!

ENDNOTES

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