Challenges of Media Integrated Architecture

Categorizing the Illusory Real Architecture

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This paper presents an approach towards a categorization of existing multidimensional graphical output devices within the built environment as framework for future studies. As the near future will witness that every single part of a building be get digitally connected, the buildings themselves can be novel media for communication. The novel kind of spatial topology is seen as the main quality of this architectural element. This is because the architectural element is going beyond pure graphical content. Buildings and cities are about to become gigantic ‘displays’ without frames. Architects should be able to deal with this novel ‘material’. The discipline of CAAD can fill gaps as CAAD is merging technical and conceptual knowledge from traditional architecture and contemporary media technology.

Keywords: Media architecture; pervasive computing; design education.

1. Introduction

Electronic displays in architectural dimensions are found in various applications throughout the world. They become more and more part in our environment. Since Scott’s movie “Blade Runner” in 1982 and Gibson’s novels such as “Neuromancer” in 1984, the topic of an electronically augmented built environment was brought to a larger audience. A subset of this environment is screens and displays in architectural scale. The screen and displays have partly left science-fiction and are found in physical reality.

1.1 Examples

Contemporary examples are permanent and temporary installations for mainly commercial or artistic purposes. The sizes of the displays are varying as far as from using tall buildings ‘down to’ the single buttons of light switches. Although an aggregation is monitored in Asia, the success of electronic displays with architectural impact is considered to be worldwide. Different scales, technologies and applications are used for mainly commercial reasons: advertising in a broader sense seems the dominant content for urban screens, although information and arts do illustrate the variety beyond the possibilities
of classical displays. So far subordinate examples are interactive installations that attracted pedestrians to interact with the buildings.

#### 1.2 Contemporary discussion and approaches for categorizations

The real world installations are manifold. The necessity of an architectural consideration is discussed in architecture and adjacent disciplines such as the movie industry (see Lanzenberger), although the community of architects is not yet integrating public displays as a novel material into education and daily practice. This paper aims towards bridging these gaps.

See table 1 for the three main categories that can be pointed out of contemporary applications.

Examples are spreading as the technology itself is getting cheaper and more adoptable to the context, the visual quality is improving, the public is getting more interested and applications are getting more sophisticated. Context is including culture, climate, background, audience and built pattern. In order to set cornerstones in the broad topic, the relation between technology, form, size and content might temporarily be defined as shown in table 2.

These findings are related to the questions of viewers’ perceptions and financial means. Displays of large size currently have a potentially high price and the same time the viewers are distant, so that e.g. text messages need to have a certain physical size in order to be identified from large distances (see figures 2 and 4).

### Table 1

Major categories of large displays at building scale (Schoch, 2006)

| 1. | add-on displays |
| 2. | media facades |
| 3. | buildings designed with media technology as a main element |

### Table 2

Major rules for technology, form, size and content (Schoch, 2006)

| 1. | the more architecturally integrated the screens are, the simpler the technology |
| 2. | the more complex the form, the more abstracted the content |
| 3. | the larger the display, the more abstracted the content |
Known architectural situations that might be considered as locations of displays can be categorized as shown in figure 3.

2. Exploring a new material

Examining current positions on media and architectural design, general guidelines for media integrated spatial design need to be defined. “There is currently no methodology for designing media walls as an integral part of the urban built environment” (Schieck, 2006). Schieck is particularly focusing on large displays in mainly urban context. Her examples are correct when stating “In Las Vegas, for instance, the signs are designed to attract on different levels: on an eye level, on a car level and finally, to be seen from the highway, some sign forms scattered along the Strip made a distinct landscape of symbols and lights” (Schieck, 2006). She lists the categories of potential application. But she neglects the question of
its architectural context especially in the meaning of the reciprocal impact of the displays on content that they present and back to their surrounding spaces.

As digitally networked media and building technologies are rarely changing the physical formal appearance of space (Schoch, 2005), an approximation towards the novel type of display integrated architecture would include the attributes as listed below. The list focuses only on structural and formal elements. Thus in order to discuss the novel typology of display integrated space:

1. blending of shown content (painting) and architecture
2. design process from ensemble to single parts
3. broad facing spaces
4. spatial differentiation

A first discussion of these four elements aims to fill the gap between technological aspects and architectural integration, which is considered to be a foundation for future studies. It seems obvious that spatial differentiation allows various degrees of privacy, as well as different content (4). This topic of content seems to be most promising to handle difficulties in spatial adoption and user interactivity. Further on, broad spaces are one possible answer towards the sizes of large public displays and its potential users, but this seems to lack other spatial qualities in architecture (3). Blending painting and architecture needs to be translated into the possibilities electronic displays can deliver (1). Mainly the augmentation of space, the illusionary expansion of physical space and the atmospherically change of its surrounding. An overall design from ensemble to single parts seems to be re-established (2). But this is rather a design method – and not an architectural typology nor a novel technology.

### 2.1 New typology or the renaissance of an old typology?

When taking Huang et al.’s statement that “there is a necessity to go beyond existing architectural typologies to create appropriate new kinds of spaces for media integration” (Huang et al., 2004). It seems, that a new architectural typology needs to be formulated. The content of painted illusions of former eras do have attributed relevant to the space that it was presented. Table 3 presents the analyze of attributes derived from baroque architecture in comparison to contemporary large displays. This is used in order to find potential first key elements for a potentially new type of media integrated spaces (see table 3).

<table>
<thead>
<tr>
<th>attributes of baroque architecture</th>
<th>attributes dominantly observed in contemporary public display integrated spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 use of light</td>
<td>Yes</td>
</tr>
<tr>
<td>2 use of shadow</td>
<td>Yes</td>
</tr>
<tr>
<td>3 use of ornaments</td>
<td>-</td>
</tr>
<tr>
<td>4 large-scale ceiling frescoes</td>
<td>-</td>
</tr>
<tr>
<td>5 projections</td>
<td>Yes</td>
</tr>
<tr>
<td>6 shell for painting and sculpture</td>
<td>Yes</td>
</tr>
<tr>
<td>7 illusory effects</td>
<td>Yes</td>
</tr>
<tr>
<td>8 blending of painting and architecture</td>
<td>-</td>
</tr>
<tr>
<td>9 design process from the ensemble to the single parts (Gesamtkunstwerke)</td>
<td>-</td>
</tr>
<tr>
<td>10 construction is only for structural elements leading towards inner shells</td>
<td>Yes</td>
</tr>
<tr>
<td>11 broad facing spaces instead of narrow</td>
<td>-</td>
</tr>
<tr>
<td>12 symmetry</td>
<td>Yes</td>
</tr>
<tr>
<td>13 spatial differentiation by sequences of levels</td>
<td>-</td>
</tr>
</tbody>
</table>

### 3. Findings

Table 3 shows in result what are considered as the missing points in contemporary display integrated spaces: 3. use of ornaments, 4. large-scale ceiling frescos, 8. blending of painting and architecture, 9. design from ensemble to single parts, 11. broad spaces, 13. spatial differentiation by sequences of levels.

### 4. Foundation

The issue of graphical output on buildings is not very new. Ancient wall paintings might be considered as ancestors of the media facades. Examples of the 19th century clearly show the experimentation with electric light and transparency in full building scale.

But electronic displays as mentioned before are heading towards animated pictures and user
interaction. They can change the appearance of a building as well as the appearance of a whole city.

In order to deepen investigations in this topic, a sketch for a foundation is done in order to establish more detailed studies. Various issues are networked such as:

- technology (light source, protocols, resolution, color depth, …)
- structure (the bearing installation, …)
- architecture (the formal integration into the fabric, …)
- content (the subject as well as the design, …)
- context (light, climate, culture, …)

These elements are considered as prime elements of a substantial foundation for further studies. They are presented in networked in figure 5.

5. Outlook

Research in spatial video is undertaken in the discipline of “computer graphics”. Spatial video partly allows the rendering of any arbitrary projection, the positioning of free-curve projection-surfaces and the navigation both in virtual space and time in order to fulfill the geometrical aspects of built architecture (see figure 3). Spatial video editors such as the Blue-C-II editor (blue-c-ii.ethz.ch: January 2007) offer the real-time editing of video recorded in 3D. Therefore it seems, that technical solutions for geometrical problems are about to be available.

Human Computer Interaction (HCI) is the neighboring discipline that allows architects to design systems and content for both small and large public displays. Novel types of interaction can become mandatory as a display in urban scale is different from a personal computer. This is because devices such as a computer-mouse are not applicable in outdoor context. Further on, the ability of displays to handle more than one user challenges the content. As sensors are becoming integrated part of our built environment (www.sensorspace.net: May 2007), software enables novel types of feedback in the context of display integrated architecture. In such a case, the system is the manipulator in addition to human spectators.

As concerns the output of 3D-video, it seems as well, that systems are available. One public example
is the permanent installation created by a multidisciplinary team at ETH Zurich, Switzerland. Their display offers 3D-Video to be watched by a larger public audience in Zurich main train station. On site observation shows, that content is the key element of an installation. In the Zurich case, it is a mainly poor content compared to the huge electronic billboard nearby which shows flat (2d) movies. The 3D screen shows scientific results which are hard to catch both visually and by content. The interactive sketching tool is not taking advantage of the 3-dimensionality, nor is the screen embedded into the architectural context. Therefore it has an appearance rather like a solitary object and screen-saver than an eye-catcher. It proves the argument that for digital devices mainly “content” matters. Although it seems that the technological challenges of handling 3D-video are about to be solved, the issues of space and content in relation to the context are still open.

The disciplines of architecture and urban design are about to be challenged by aesthetical, technological and social issues, when designing with informed surfaces. Questions of spatial illusion are known in architecture at least since the renaissance time. But it might be necessary to get both students in architecture as well as the practicing architects aware of the spatial impact when designing media-enhanced buildings.

The new spatial typology is a key element for the discipline. CAAD is capable to be part of the discussion. The foundation for academic and professional work seems to be set. As stated in the introduction, the driving elements for public screens are commercial reasons. In order to achieve installations of high quality and controlled overall design the overall impact has to be discussed and researched on. Architecture can help to improve and expand the look and application of large displays. In addition, issues on content need to be summarized in near future. The thoughts illustrated in this paper might help for future research, teaching and application.

References