

Interactive Media Façades In The Urban Context

**Master Thesis submitted in fulfillment of the Degree
Master of Business Administration
in New Media Information and Management**

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May 2011

1. AFFIDAVIT

I hereby affirm that this Master's Thesis represents my own written work and that I have used no sources and aids other than those indicated. All passages quoted from publications or paraphrased from these sources are properly cited and attributed.

The thesis was not submitted in the same or in a substantially similar version, not even partially, to another examination board and was not published elsewhere.

Date

Signature

2. ACKNOWLEDGEMENTS

I am obliged to my mentor Dr. Reinhard Zuba, CMO at VIPnet Croatia, who enabled my participation at the MBA course. The grateful support and patience of my family helped me to complete the course successfully in time. Many experts in the fields of advertising, media, and architecture contributed valuable inputs by means of several discussions and by providing materials, especially Peter Pakesch and Dr. Andreas Schnitzler (Kunsthhaus Graz), Dr. Oliver Schürer (TU Vienna, Institute for Architecture Theory), Architect Christine Bärnthaler, Hans-Jörg Hosp (COO Gewista) and Robert Theuermann (Media Austria). Last not least I would like to express my thanks to my tutor Dr. Astrid Dickinger for several fruitful feedback and discussion meetings.



Figure 1: NASDAQ building at Time Square, New York; (Reuters, 2007)

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3. FOREWORD

Graz. When I visited Kunsthaus Graz for the first time in 2005, I was puzzled. How does such a strange building fit into the old town of Graz? How would it be accepted by the local community? And what is the role of the pixel façade? In the meantime we had a couple of successful projects, in cooperation with A1 Telekom AG (formerly mobilkom Austria AG), the company I have been working with since ten years.

London. My favorite walk is the Thames Walk on the southern Thames bank, leading eastbound straight to the docklands: Gabriel's Wharf, Butlers Wharf, and many smaller wharfs following behind the Tower Bridge. In between, right in opposite of St. Paul's Cathedral resides the Tate Modern, a contemporary museum in the hull of a previous power plant. This area is a typical example of gentrification of industrial satellites in former industrial cities. This phenomenon is observable in various European cities.

Bonn. In the nineties, I worked for Alcatel Austria AG, in the presales department for fiber optics backbone networks. Once I was assigned to a project for Deutsche Telekom, to plan the hybrid fiber optics access network for MATAV, Hungary. I was electrified by this project. It was the first time to learn how a comprehensive network layer is being planned as an invisible communications layer across a city.

In conclusion, my motivation for writing this diploma thesis is threefold. I am convinced that understanding the public media façade as an instrument for art representation, advertising, voting and much more lies on the intersection point of urban morphology, architecture, and communication theory. I am fully aware of the fact that these topics imply a huge complexity – enough to fill books. Nevertheless I will try to walk through this topic, developing a concise theory. Also, I will try to critically reflect the pros and cons of practical media façade utilization from various perspectives. Especially, the awareness for “light pollution” came up in the last decade, triggering a wide debate how to preserve a dark and non-dazzled night sky. Certainly this topic is closely linked to the carbon dioxide and energy waste theme. Here, the critical question arises, whether media façades can be justified from this standpoint.

4. INTRODUCTION

4.1. DESCRIPTION OF THE PROBLEM

Buildings are usually categorized according to their intrinsic function: Sacral building, apartment house, school house, sport building/arena... the functional typology of buildings has a tradition lasting for centuries. Alterations or extensions of that typology occurred by social, political or industrial development. One example is the development of suburban dwellings during the industrial revolution in British cities in the 19th century. The determination of a novel building type requires a critical debate as far as general requirements for architecture, urban planning and special planning are concerned (Haeder, 2001).

When we consider the relatively new term “**Media Architecture**”, it becomes evident that it is not supposed to mean a certain building style or a type of building. There are only few examples for media architecture so far, and these examples are quite heterogeneous. To highlight two recent examples in Austria, ARS electronica (Electronica, 2011) is not at all associated with the Kunsthaus Graz BIX Façade (Joanneum, 2010). From the aspect of typology, media architecture spans many types of buildings, such as office buildings, cultural buildings, museums, hotels, shopping malls, industrial buildings. This implies the presumptive consequence, that basically every type of building could be “public media capable”. Although, the utilized types of display technology are rapidly developing, generating several ways of media architecture implementation. Media architecture has always to be seen in the context of the category the building belongs to. However, media architecture forms a new class of buildings which turns towards communication theory, apart from its functional and formal representation. Some forerunners in this field call this new discipline “**Mediatecture**” (AG 4 media facade, 2011).

“**Media façades**” are contemporary protagonists of Mediatecture, getting in contact with the public audience - the public spotter - by optical methods. Recently, they open

up a contemporary discourse on urban planning, architecture and media theory. This underlines the interdisciplinary character of this matter. The interdisciplinary nature of the topic is indicated by the name of the conference stream “**Media Urbanism**” (Tscherteu, et al., 2010).

The conference “Large Displays in Urban Life - from Exhibition Halls to Media Façades” which was scheduled for May 7, 2011 taking place at Vancouver, Canada, deals with the following key questions (Hinrichs, et al., 2011):

- How can we design installations that endure people’s attention past the initial novelty effect and direct the interest toward the content?
- What design strategies can be applied to promote an active individual and social exploration and discussion of the presented information?
- How do different interaction methods shape people’s experience of large display installations in urban spaces?
- How do interaction methods differ from each other in terms of triggering interaction and engagement with the presented content?
- How can we evaluate the "success" of large display installations in urban spaces?
- How can particular aspects of public large display installations such as engagement be evaluated?

From these and many more questions, the need of an in-depth investigation of the underlying media theories and media concepts arise.

4.2. AIM OF THE THESIS

From the introductory considerations it becomes evident how complex the economic and cultural environment of media architecture really is. The main dimensions are: urbanism – architecture – communication – narration. In the current debate, media façades are mostly analyzed from their architectural perspectives. Communication theory, applicable sender-receiver models are rarely touched. Furthermore, media façade content is currently seen as a kind of illuminated piece of architecture, and not as an instrument for mass marketing, public relation, and advertising. Public

interactivity is still in its early beginnings, and mostly driven by museums or art event managers. The far reaching consequences like democratization of urban public space are touched seldom.

This thesis aims to encircle this complex subject from an interdisciplinary approach. The maybe most relevant question is: **“What are the social, commercial, technological and architectural perspectives of contemporary media architecture, and will they establish as widely accepted media for urban mass market communication?”**

So, this thesis will try to triangulate this question from the dimensions architecture, urban sciences, communication theory and marketing communication. Therefore, the following approach will be applied to this topic:

- Literature study
- Case Study of recent projects
- In-depth expert interviews

The **“Grounded Theory (GT)”** (Strauss 1987, p.22ff) will be chosen as the main scientific method. The questions typically being asked in context of a GT are "What's going on?" and "What is the main problem of the participants and how are they trying to solve it?". The practical approach is to categorize the findings by dimensionalizing and sorting them. Afterwards, core categories were defined according to the findings. Having identified the appropriate categories, the deductive generation of the theory may be started with. GT seems to be the right choice for a topic, where many conceptual ideas exist, and still no deductive theory or closed formula exists. Other researchers may try to verify the hypotheses that are generated by constantly comparing conceptualized data on different levels of abstraction, and these comparisons contain deductive steps. This approach has already been carried out by (Sauter, 2004), who defined the basic forms of media façades.

Finally, some ideas for research are given in order to encourage further research on this fascinating topic.

4.3. MEDIA FAÇADE - DEFINITIONS

“**Media Façades**” are defined via their surfaces, skins or membranes, which address the public audience with their visual electronic program. The origin of the term “façade” is derived from “facies” (*lat. face*), which implies convertibility, adaptability and responsiveness to external influences, like it is the case for human faces (Sauter, 2008).

Authenticity with respect to the type of building and its primary use case is required in most cases. From this basic condition, a couple of consequences arise. Media façades must not be an artificial skin, make-up or mask, but should rather fulfill esthetic requirements for façade and media façade in parallel. This applies for all static components of the façade and its transition parts to the media façade areas (Sauter, 2004), (Jaschko, et al., 2010). Further, the façade is being composed by the functional and esthetic master plan of a building. The media surface is the new component emerging in addition to the classical façade approach. The terms “media façade” and “media architecture” grew in parallel to the rapid development of their physical artifacts. Currently, they can be regarded as monumental displays which have two important attributes: Firstly, they are an integral part and symbiotically linked to the façade and secondly, they are driven by ICT platforms.

Looking back, monumental orchestrations on large façades were already common since the beginning of the twentieth century. Classical static elements such as light, pictures and text were utilized in order for accentuations or for public advertisements. The basic idea itself is not new. However, ICT brought the big step forward in terms of active media content representation. The hypothesis is: **“The transformation from the static towards a dynamically controllable content presentation designates the beginning of media architecture in the contemporary context.”**

The example Empire State Building and its Big Apple sheds more light on the fundamental difference between illuminated architecture and media architecture. Since 1964, the three upper parts of the buildings are illuminated from dusk to midnight. Dependent on the event, up to 208 lamps of 10.000 watts power each spotlight the top of the tower. The medial message is rather striking and easily

understood by the citizens: White light on normal days, red on Valentine's Day, green on St. Patrick's Day, red-green during Advent, orange at Halloween. The New Yorker knows how to decode the color-coded messages. The color exchange requires six hours of mechanical lens replacement work (Dunlap, 2001).

In 2007, a LED based illumination was installed on the northern side of the Empire State Building, which can be seen as a forerunner version of today's media façades. A computer platform driving the LED elements made mechanical work redundant. In addition, this solution allowed a real time play out of a program. On the left side: static red (arcade) floodlight, installed since 1964, on the right: LED Test, showcasing flexibility in colors and digital real-time controlling.



Figure 2: Empire State Building, New York; (Times Square District Management Association, 2004)

The New Year's Ball on Times Square is a media spectacle since 1907 to welcome the New Year. The ball itself carried in its original version 100 conventional 25watt bulbs. However, in 2008 the first LED equipped New Year's Ball was launched. It carries 32.000 LEDs, providing an endless color variety, like the color-depth on an LED TV screen (Times Square District Management Association, 2004).



Figure 3: New Year's Eve Ball, 1978. The New York Times; (Times Square District Management Association, 2004)

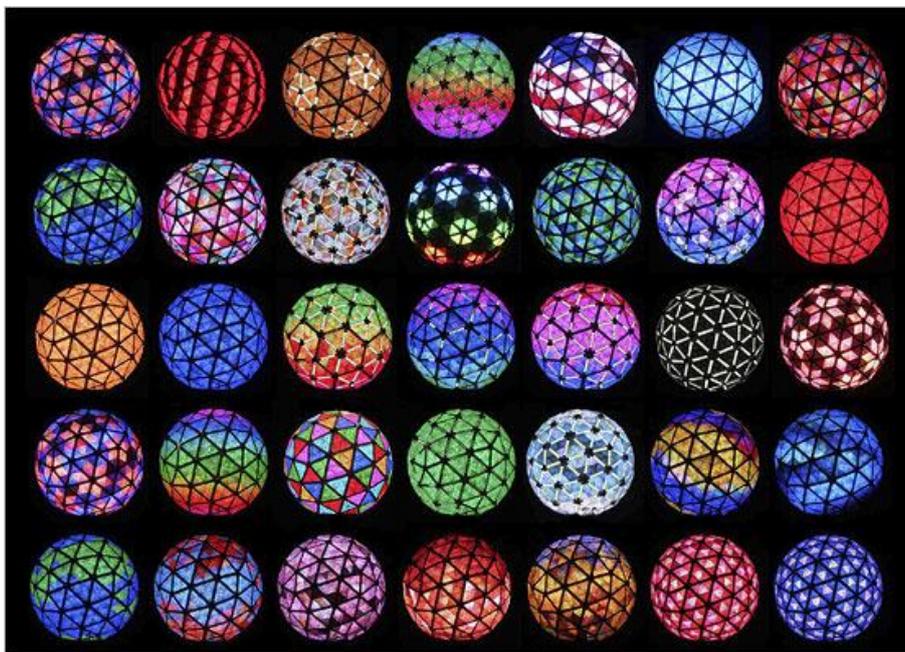


Figure 4: A spectrum of colour, design and programming available for the Times Square ball; (Diamond, 2008)

At Sylvester, the ball is run in an auto-active mode, see *5.2. Architectural development as the driver for media façade development*. However, it is possible to extend the software towards an interactive mode, and it can be expected that this will happen sooner or later especially for art representation purposes or special events, e.g. applause meter application, which indicates the intensity of applause. In 2010, the New Year's countdown was made available worldwide via webcast for the first time, and friends could send their party photos directly to the event video wall on Time Square (Dunlap, 2001).

Both examples depict how illumination of a building is to be distinguished from real time remote controllable media architecture. It appears that the main difference to their ancestors is the ability to be remotely controlled in real time by means of modern communication technologies. The utilized light technology itself is not relevant.

5. LITERATURE REVIEW

Urban places are accumulations of goods, knowledge and people. This requires suitable kinds of mass communication to ensure an efficient public address for political news, mercantile reasons (markets), security (fire alerts), and for religious reasons (church bells).

Since the beginning of building construction, mankind aimed to communicate via building design. Buildings were soon designed in order to fulfill certain communication needs. The efforts made here are referred to as the so called "signal architecture". Modern material sciences open a fantastic variety of new façade concepts. In consequence, new design languages arise (Schediwy, 2009), (Tausch, 2003).

This chapter tries to shed light on the fundamental relationships between the emergences of cities in the medieval Europe, development of urban societies and in consequence the rise of "urban public audiences", and the role of architecture to form urban narrative spaces.

Finally, the media façade enters the scene. Its purpose is to utilize urban narrative spaces for mass broadcast communication. Recent developments are described to give an overview on technological advancements. However, the underlying aim seems to be unchanged: Media façades aim to entertain, to foster enjoyable urban environments, to reflect moods, to spread out information, to collect the public opinion on certain topics, to establish a public playground for multiparty games, and to transfer internal contents of any type inside-out towards the public, e.g. museums and exhibitions, see *6.1. BIX Façade Kunsthaus Graz* and *6.2. Archdiploma Binnale*.

Recent developments enable every individual person equipped with a mobile handset to interact with the media façade. This can be seen as a basis for a democratization process driven by digital interactive public media. The mobile handset is primarily regarded here as a medium for the feedback channel, see *5.4. Communication Models*. Therefore, it makes sense to start with a short analysis of the environment where a media façade is being utilized: The urban space and its evolution. From the conclusions gained here, further ideas to categorize media façade types will be developed.

5.1. URBAN DEVELOPMENT AS THE MOTIVATION FOR MEDIA FAÇADE DEVELOPMENT

5.1.1. SIGNAL ARCHITECTURE

At a first glance, it seems that the media façade originates from classical signal architecture. Signal architecture mainly aims to (Schediwy, 2009)

- attract the public audience, even from a larger distance
- generate a landmark, which is easy to distinguish from the surrounding area
- foster a certain identity
- Communicate/narrate certain intrinsic functionalities (e.g. a lighthouse, church, or ÖAMTC service station)

For instance, everybody would recognize what a lighthouse on an island is (see Figure 5) and for what purpose it has been built for, regardless its individual architectonic embodiment. As far as signal architecture language is concerned, this example has even a second meaning. Every lighthouse has its individual lighting code, which is noted in the Nautical Almanac and on international nautical maps.



Figure 5: Example for signal architecture: Lighthouse at Westerhever Sand, Germany; (Werning, 2008)

In the mid-age, large cathedrals fostered identities of upcoming cities. Location became a differentiating factor for prestige and social distinction (Humpert, 1997). Signal architecture gives evidence that architecture is telling certain messages, or, in other words, is creating a narrative, tangible asset. However, this is not the only concept to derive the invention of media façade so far. In the following, the historical development of human settlement will be analyzed, and the relevant drivers for the development of cities will be derived. The results will be used to explain the motivation and their underlying roots for urban media architecture.

5.1.2. DEVELOPMENT OF THE CITY

The medieval town in the 14th century was a mercantile hotspot, where mercantile interests met social life behind massive security providing town-walls. A patrician

middle-class evolved, gaining more freedom from landlords and serfdom. Towns became hubs for long-distance trade and sometimes formed coalitions to ensure this trade links e.g. Hanse in the northern Europe region (Schindler, 2007). The rural surrounding areas supported the towns with agricultural goods. Craftsmanship and the guilds flourished, attracting specialists from all regions. The ground plan is in most cases a compact layout, combining the most relevant functions, like market places, town hall, church, hospital in the vicinity between the town walls.



Figure 6: High Market at Vienna, 14th century; (Vienna City Administration, 2011)

This vicinity also had several positive effects on communication, see *5.1. Urban development as the motivation for media façade development*. In the nineteenth century, at the heydays of steam power plants, a large number of suburban districts were built up. Far away from the urban financial centers, manufacturing was clustered, and, to minimize space constraints, the working class living blocks were erected in their neighborhoods. These new districts accumulated soon towards suburban industrial satellites. By telecommunication, these manufactures were easily to remote control from the financial centers. This is referred to as the **“hub and spoke”** principle. (Graham, 1996) Telecommunication minimizes time constraints.

Later, in the Fordist city, many of these industrial satellites grew towards new industrial districts. Often, uncontrolled growth led to sprawl, see Figure 7. In the 20th century, this development caused high capacity city highways to cope with crowds of telecommuters in the eighties of the last century (Heineberg, 2000).

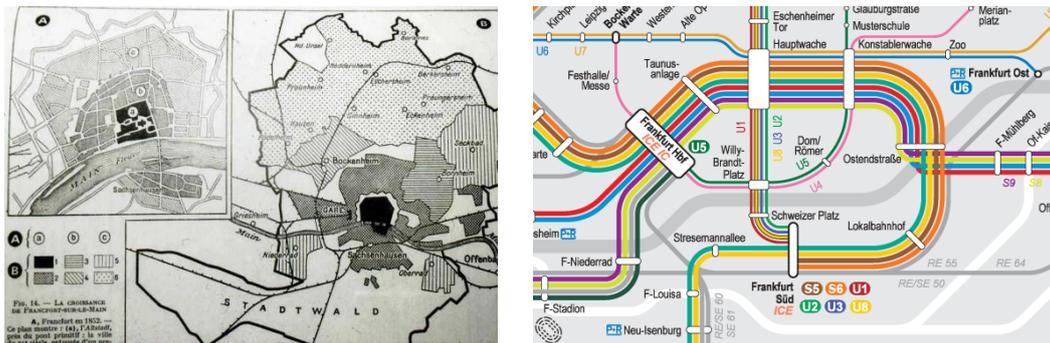


Figure 7: Suburban sprawl during industrial revolution: Frankfurt; (Kimball, 2010), (RMV, 2011)

Figure 7 depicts the city morphology of the 19th century (on the left) and the corresponding metro network of today (on the right). Suburban hubs today are connected by high-capacity metro lines. The borders of the city and the suburban areas have already blurred, only the historical names still mark the former suburban centers. Many families nowadays seek a resting place in the green, hiding away from the stress of the noisy urban areas. This is a new driver or a further development of the hub-and-spoke in large cities, requiring new transport capacities, as well for physical transport and for communication exchange (Graham, 1996).

5.1.3. URBAN PLACES AND ELECTRONIC SPACES

It is worthy to highlight the mid-age here, as one of the main and far-reaching communication revolutions took place in this area. Generally, a hidden transition from a commemoration culture towards a writing culture took place. But still, the main medium was the human-medium: People used to narrate stories and to pass down their knowledge from one generation to the next one. So, the term “**Public**” (Dewey, 1927) was still confined to the reach of the own family, market, church. Global information was not available, and if, it was mostly distorted by interpretation and passing on effects. In parallel, universities were founded at several European towns, e.g. Leiden, Praha, Vienna, Paris and Bologna. But still, major sources of knowledge were confined behind the walls of monasteries. Information exchange took place

mostly on an inter-personal level. One enhancing development was the printing press, but still, handwriting was the most relevant factor for knowledge replication/duplication. To a large extent, cities were developed to optimize communication through special confinement. Distance had a strong frictional effect, as far as movements of goods or information is concerned. The solution was to build towns in a size a single person could easily walk through. This was simply to minimize distance constraints in order to optimize communications. Since colonization and industrial revolution, the scene developed dramatically into a dispersed network of production plants and factories. Mobility suddenly has become a mission critical factor for materials, goods and information. Once built, telecommunication supported the instantaneous mobility and circulation. In terms of their effects on space-time, telecommunication minimized time constraints and that across continents! As a consequence, location became less relevant, as distance was no longer a serious constraint.

There are many similarities between the layout of urban places and electronic spaces. The largest communication hubs were built up in large cities, networking major hubs among others in order to drive information globalization (Graham, 1996). Accordingly, time and space are the main containers for urban life. In Figure 9, two parallel worlds are depicted: Firstly, the tangible and visible town. The media façade is one artifact of this visible occurrence. Secondly, the telecommunication network exists, like a dense woven spider network.

This network is invisible and transports information of any kind in nearly real-time across the globe. So, this invisible layer can build a “**Tunnel Effect**” (Graham, 1996) between content production and public media display. It is a tunnel in urban space-time. Paul Virilio has argued that the new urban area is marked by the use of telecommunications and telematics to support an “**Urbanization of Real Time**” (Virilio 1997, p.9, 15, 20). This follows the previous area of the “**Urbanization of the Real Space**” (Virilio 1997, p.9, 20, 69, 79). Consequently, Figure 9 demonstrates how telecommunication helps to minimize time barriers. A practical example is mobile working or home working, which is now widely established for knowledge workers to avoid the usual time-consuming traffic jams twice a day.

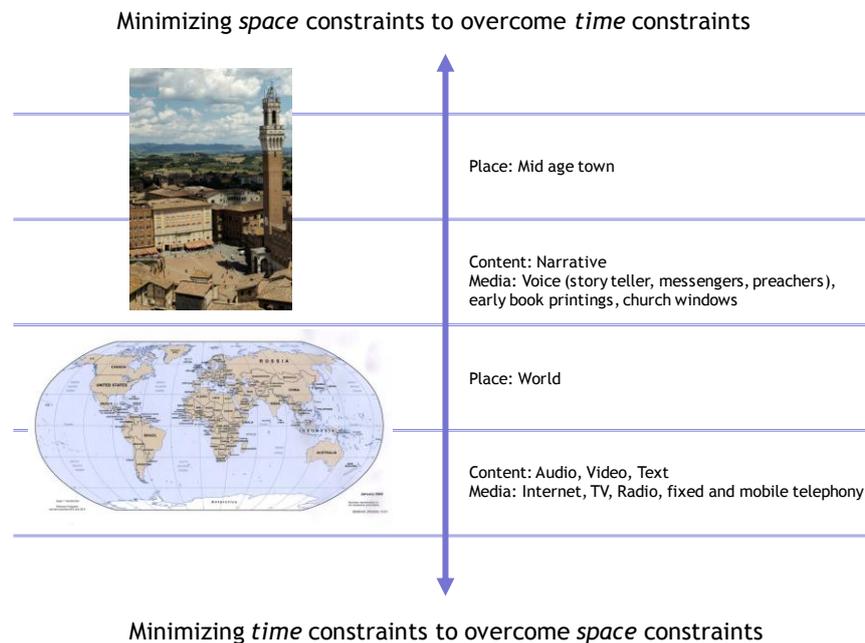


Figure 8: Time and space constraints and their opposites; (Graham, 1996)

This space/time metaphor shows how real-time telematics applications work, as it optimizes all transactional efforts. Pervasive computing, augmented reality and massive-parallel online multimedia are the results. The media façade is more or less the public visualization in the “Cyber Village” at a certain fixed place, tight to a building or to an object. Cities are nothing more than fixed places in the space-time. The media façade is an architectural surface which enables a tunnel view to any place in the network space-time, and thus becomes an architectural representation of the “Networked Cyber Village” (Graham, 1996). A new kind of public space forms a “Hybrid Space” linking material and immaterial space together, see Figure 8. When computational systems become increasingly mobile and ubiquitous, digital information and the use of computational systems may increasingly be immersed into the physical and social world of objects and people. However, the digital, physical and social components that form these hybrid spaces have different characteristics and are hard to understand for users. In addition, users are themselves part in constructing and re-constructing the hybrid spaces – they fuel the hybrid space by their physical movements and online content generation. The resulting hybrid space is constantly constructed and re-constructed by its use and its users (Rudström, 2005).

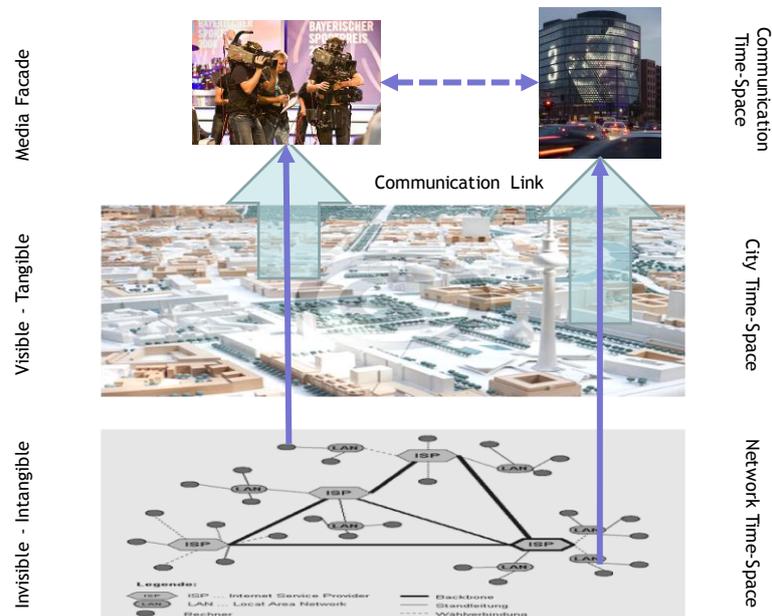


Figure 9: The Hybrid Space; (Graham, 1996)

Blade Runner (1982) shows how the future could look like: It shows a blurred metropolis, only highlighted by advertising from huge media façades. It is a dystopian view, critically discussing which kind of urban environment is worth living in (Bauforum, 2006).



Figure 10: Blade Runner (dystopia, 1982): Advertising Media Façade as vision for 2019; (TV-Screenshot by the author)

5.1.4. FUTURE PERSPECTIVES FOR URBAN DEVELOPMENT

Rural depopulation is a well-known factor since the last decades. In 1950, only 28,8% of the world population lived in cities. In 2010, this share rises to 46,4%. Future projections for 2050 state that this share will further rise up to 69%. In 1800, the average population of the hundred biggest cities in the world was below 200.000 inhabitants, in 1900 this benchmark raised already to some 725.000. In 2000, the average population of the hundred biggest cities was already well beyond 6 million inhabitants. The main reason for this growth is the economic benefits – recently, 80% of the overall GDP is being generated in urban areas. Consequently, large mega polis should prepare for huge growth by planning mission critical issues like pollution, clear water supply, energy supply, atmospheric pollution and food supply.

These are complex issues and require massive investments in new technologies. High speed networks are important environmental prerequisites, especially when it comes to network universities, development centers, and research labs among the population. DDr. Norbert Streitz claims the imperative of the “**Human City**” (Streitz, 2010). He asks “How can ambient and ubiquitous ICT help to contribute to Urban Life Management?” (Bundeszentrale für Politische Bildung, 2010)

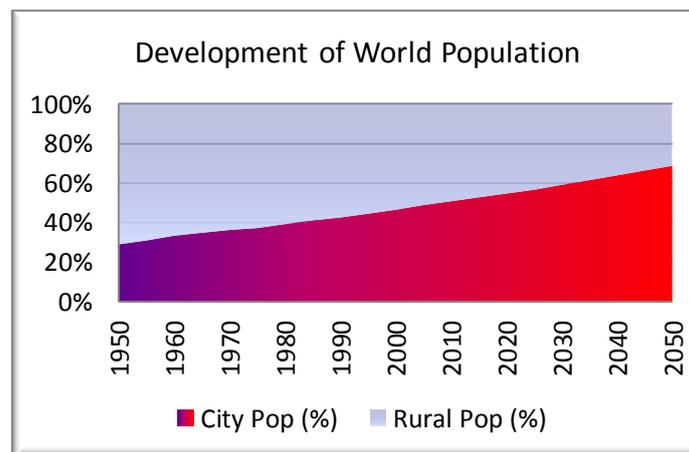


Figure 11: Development of urban and rural population; (Bundeszentrale für Politische Bildung, 2010)

The mass rollout of ICT in the context of future cities is often referred to as “**Smart Cities**” (Streitz, 2010). ICT opens up new novel concepts for Ambient Intelligence and Ubiquitous Computing. The entire environment becomes smart with regard to controllability or acting in an autonomous mode. Recent examples are smart metering, smart home, e-government solutions. Building intelligence is a matter of fact today for security, climate, energy and access control purposes. A consequence is the extension of building intelligence towards ambient intelligence, such as “smart rooms” or “**Cooperative Buildings**”. (Streitz, 2010)

The “**Hybrid City**” (see Figure 12) reflects the status already discussed in Figure 9, although a complete match of virtual and real worlds has not been reached yet. The following phase of evolution is the smart city, which reflects the current status of major efforts in the western world. Initiatives attempting to manage resources in a more efficient way, like smart metering, smart-grid, e-government and e-health initiatives underlie milestone plans up to 2020 and beyond.

The far goal is creating a universal framework for a “**Human City**”, which gives answers to two fundamental questions:

1. How we can manage urban resources/environment efficiently in order support human life optimally and
2. How will an urban society life in knowledge society be, which informational and communication needs will emerge and what will be the attitude towards individuality and privacy.

ICT is being claimed to become finally invisible, however, serving always and everywhere. Consequently, the vision of a “Human City” including classic computers are no longer necessary in favor of a truly experience centric world. Instead of personal computing, the entire environment will become ambient. Almost every surface can act as a display, e.g. in order to have a virtual meeting. The entire environment itself will act then as an interface to the cyberspace, meeting the final goal of convergence between the virtual and the real word.

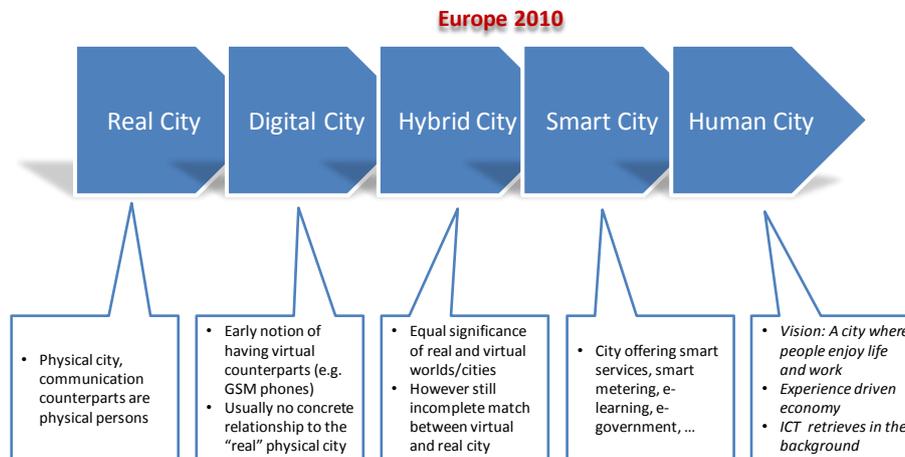


Figure 12: Genesis of the city with account for communication society; (Streitz, 2010)

Chapter Summary:

- The motivation to invent media façades was analyzed by using a historical derivation
- The basis functionalities like attracting, narrating were sketched
- Urban development has been defined as the driving force for overcoming space constraints, as well as modern telecommunication networks are utilized in order to overcome time constraints
- The main consequence of time-space accumulations resulting from the rise of big cities is the "audience", which is the target group for public media of any kind, but for media façades, in special.
- The future developments lead to smart cities, bringing more intelligence to the urban environment
- The far goal is the human city, where ICT becomes invisible and the entire environment becomes ambient. So, everyday places could be turned into ambient social marketplaces.
- In this context, the media façade could enter the urban mass markets and become a commodity as an ambient façade display.

5.2. ARCHITECTURAL DEVELOPMENT AS THE DRIVER FOR MEDIA FAÇADE DEVELOPMENT

5.2.1. INTRODUCTION

A “**façade**” (Online Britannica, 2011) is generally the front of a building but also any face of a building given special architectural treatment. The façade of a building is regarded as the most relevant stylistic element from a design standpoint. In architecture history, the face plan of a building plays an important role. The face plan determines the major axis of viewing and reflexion. Ancient buildings were designed to meet certain esthetic and allegoric aims. In most cases, the face plan was oriented towards a large public place or a street. Today, the term façade comprises various aspects like composition, function, material, and construction. Simplifying, the term façade is a synonym for the outer wall of a building. Media façades become the medial skin of contemporary buildings. The façade as a recent medium is based on four characteristics: **Interactivity, multimodality, connectivity and generativity**. (Kumra, 2006; Schürer, 2009), These characteristics are needed to present content, narration, and form. These four characteristics define the media façade as a medium and demarcate it from conventional media like TV, radio, print.

This new medium is somehow immaterial and synthetic, however, four types of artifacts emerged on this basis (Jaschko, et al., 2010):

- Screen applications, which attract the viewer by animated content
- Interactive objects and installations, which react in some regard to external triggers (e.g. by sensitive surfaces)
- Interactive rooms, which are determined by communications (e.g. immersive media play, media floors, media tables, rooms reacting to visitor behavior or number)
- Interactive architecture, where interactivity plane in its current status is constricted to the outer façade.

In contemporary debate (Hall, 2006), (Fritz, 2010), the façade develops further towards an interactive membrane, a media façade skin, imposing two main requirements: Firstly it should be part of the genesis of the building, not an artificial supplement. Secondly, its expression and narration should fit to the use case of the building. The media façade should definitely not create contradictions to the rest of the building, neither representing unmotivated animations which are in no logical connection to the building. In other words, media façade and building must be a holistic concept with regard to function, esthetics and narration, communication and energy management (Green Public Art, 2011).

This definition has a series of consequences. It leads to a holistic view on what the functionalities of the outer cover of a building are. In the mid-age, the main functionalities were protection against enemies and showing social status. Contemporary skin models include much more functions, like: regulating climate inside the building (breathing function by actively opening or closing façade elements), generating energy (e.g. by actively controlled solar panels), regulating sunlight by automatic shutters, and public communication (light emitting elements forming a media facade skin).

5.2.2. CONTEMPORARY TRENDS & CONCEPTS

Although recent examples are manifold, the final debate on how the media façade will evolve has not been finished yet. In this chapter, some aspects from the Media Architecture Biennale 2010 at Künstlerhaus (Schürer, 2010) dealing with consumption, commercialization, media strategy and public space will be included. In working group two, four directions could be spotted. For each, several specific argumentations were presented.

The architect's fraction argues that media façade's right to exist originates from its art dimension. Media façades were a part of modern architecture, representing individuality of the building and creating distinctive identities. In first consequence, media façades required a coarse resolution fulfilling mainly ornamental design

demands. In second consequence, they must not be like TV screens. Any commercialization concept other than generating building identity for itself should be rejected from the architectural point of view. Noncommercial culture concepts should rather foster public art representation areas, enriching them by enabling public commentaries. The anthroposophical goal is to enrich urban spaces by a democratic culture scene to serve a responsible civil society. - Critical comments to this argumentation line note that even in totalitarian states mighty media façade projects have been implemented, however, without contributing to urban democratization processes. In this context, mighty light-shows deteriorate to state-controlled demonstrations of power and technological effort. The only limitation is surrounding space. In places where that limitation does not occur, huge media façades and even artificial new urban centers could emerge.

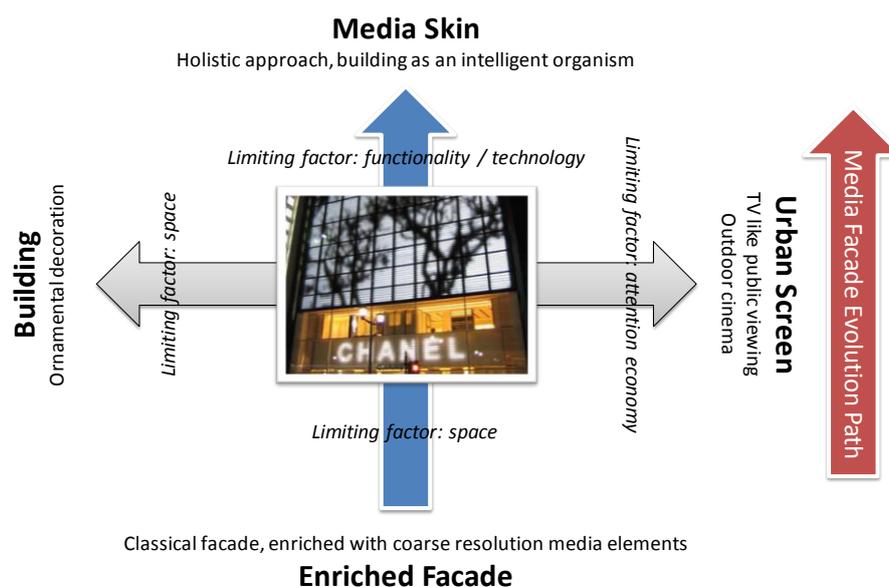


Figure 13: Dimensions of façade evolution; (Conference notice by the author)

More media affine disputants argued that technological effort sketches the path from coarse monochrome media façade elements to high resolution TV like screens, which enable public TV viewing. Urban places would allow public cinema experience on large dimensioned screens (Manovich, 2008). The extreme is denoted by buildings totally covered by TV screens. In this scenario, a couple of restrictions have to be taken into

account. Firstly, light pollution is meanwhile a well-understood threat. Light has already become a commodity and its excessive use could turn quickly into annoyance (Hänel, 2009). Secondly, the limitation is today's fight for attention. All kinds of media tend to grab a small share of the consumer's attendance. However, time budget for media consumption is limited. So, the economy of attendance rules the entire media industry (Teixeira, 2008).

Media research and development create new formats in order to overcome these shortcomings by attracting the consumer by shorter messages. Film makers and media producer doubt that it is sufficient to transfer TV and film formats directly onto media façades. New formats would be required to attract the public audience, and consequently also novel advertising concepts could open the arena for new business models. Taking interactivity of social media platforms into account, a “**public space 2.0**” could be presumed. This idea describes a transformation process by shifting classical physical information interchange into the cyberspace, and bringing back its physical representation to the visible city subsequently.

5.2.3. RELEVANCE OF MEDIA FAÇADES FOR URBAN SPACE AND ARCHITECTURE

It can be justified to regard cities like New York or Tokyo as truly “**Media Cities**” (Kölbl, et al., 2000). Streets and places are no longer being defined via building rows and corners, but more via daylight capable media screens and entertainment ensembles. These media screens are logical successors of the classical billboards, and are mainly utilized for advertising purposes. As already said before, this new kind of public space forms a “Hybrid Space” linking material and immaterial space together. Its target is attracting as much attendance of the public mass as possible – even in very short time intervals. It is no longer the goal to form the public space in a classical esthetic manner like former generations of façades did. Every mega screen competes against each other. The building as such becomes totally irrelevant. It is a competition for attention, which becomes the most valuable and limited public resource *“If economics is about the allocation of resources, then what is the most precious resource in our new information age? Certainly not information, for we are drowning in it. No, what we are short of is the attention to make sense of that information.”* (Lanham, 2006).

That's why media architecture is particularly successful at those places where the public has to stop for a moment or to wait. Then chances are optimal to fetch a short piece of attendance to generate new customers – and commercial welfare by future turnovers. To sum up, mega screens are a special kind of media architecture following strictly a mercantile goal. Their architectonic relevance lies in the urban-topographic formation of a “Mega-City”.



Figure 14: Mega screen in Singapore: Smooth integration within historic ensemble, gaining limited attention; (Sing, 2007)

However, the prominence of media façades for architecture and art can be found in another context: The real relevance starts at the point where they become invisible, become abstract. This can be regarded as a transformation which takes place by a migration process from a façade screen towards a media façade skin. A skin is an intrinsic part of the building, forming a digital playground for media representation.

Building owners play on purpose with elements of superiority, dignity, and transcendence. The extraordinary, monumental is being defined newly by media

architecture. Architects are challenged to exceed borders of common projects. Simone Giostra, architect of the Green Pix media façade in Beijing argues: *„The client in China asked me: Are you sure it has never been done before? So he wanted to be absolutely sure that this would be the first time, something like this would be done in the world“* (Giostra, 2008).

Cost effectively clearly steps behind extravagance and uniqueness – which are necessary ingredients to generate a new identity. This topic will be discussed in 5.5. *Business Models*, analyzing both value chain and brand management.

5.2.4. EXTENSION TOWARDS INTERACTIVITY

“There is no doubt whatever about the influence of architecture and structure upon human character and action. We make our buildings and afterwards they make us” (Winston Churchill)

Smartphone with a touch screen is already a commodity as far as personal communication is concerned (Barret, 2011): Worldwide shipments of tablet computers, 90% of which were comprised by the Apple iPad, in 2010, will reach 44.6 million units this year and surge to 70.8 million in 2012. It is the interface of the human body to the virtual world, the cyberspace. Oscar Neurath postulated already in 1925: *„words divide, pictures unite“* (Cat, 2010). This thesis is currently being proofed in an impressive manner by YouTube and Facebook, where the volume of uploaded picture and video content far exceeds the amount of written text. *“Literal, narrative, horizontal, cloistered, and verbal culture is being replaced by symbolic, interactive, profound, global, and visual culture”* (Lester, 2006).

Although still in its beginnings, are the first remarkable trends already to be observed. Blinkenlights is regarded as a main precursor in the field of interactive media façades, having shown the first interactive project in 2001 on a façade at Berlin Alexanderplatz (Blinkenlights, 2011). 144 windows were equipped with translucent slides and illuminated. The entire ensemble was centrally controlled by a remote computer.

Every window was driven as a single pixel. The applications were playing the classical arcade game “Pong” and sending love letters via SMS messages to a service number.



Figure 15: Blinkenlights 2001, House of the Teacher at Berlin Alexanderplatz; (Hochschule Luzern, 2008), (Blinkenlights, 2011)

Submitted motifs are instantaneously integrated in the spot. This is an impressive example that public participation and advertising storyboarding are not all contradictory. As a side effect, the iPhone works as a reminder and thus as a CRM tool, completing this concept as a perfect example for a successful transformation of a classical advertising campaign towards a Media City promotion.

Another example comes from Amsterdam (Hall, 2011). Apparently, there's a lot of violence against civil servants in the Netherlands. The responsible department in the city hall decided to go for an advertisement campaign in order to gain attention for that problem in the public. The campaign setup was designed to illustrate the inactivity of onlookers having been observed in several violent situations. An interactive billboard was created showing a film scene including heavy violence which was then coupled with live shots of the people looking at the billboard. The result was that the passersby could watch themselves right in the middle of a fictive violent situation.

Once the scene was played on the billboard, practical tips were then provided to educate viewers how to assist civil servants if they witness an assault. The functionality is depicted in Figure 16.



Figure 16: Netherlands Schooled in Art of Assisting in Violent Situations; (Hall, 2011)

Furthermore, project iRiS (Immediate Remote Interaction System) is a joint research project from the University of Saarbrücken, Germany and University of Munich, Germany (Blöckner , et al., 2010).



Figure 17: Ars Electronica: Project IRIS; (Blöckner , et al., 2010)

It was presented at Ars Electronica Festival 2010 (Ars Electronica Linz GmbH, 2010). There are actually two applications, developed jointly by the Universities of Saarbrücken and Munich, Germany: The first one enables the public auditor to give each building block a certain color with a wheel on his iPhone. The second one is a huge, building-size jigsaw puzzle on its façade.

“All interactive media façades do have in common that they create a real auditorium in the urban area, and mostly also parallel on the web. As it was always true for cinema, theatre or opera, a time and space convergence is necessary for every performance. Urban Screens asks for a new urban language with its own dynamic signs and symbols, formed through active participation from various players. New interactive technologies and networked media offer more possibilities for the visual programming of these digital surfaces through the interplay of new display technologies, broadcasting tools, database and content management systems, and sensor technology” (Struppek 2006, p.1).

Chapter Summary:

- Media façades turn the public space into public space 2.0.
- The façade as a recent medium is based on four characteristics: Interactivity, multimediality, connectivity and generativity.
- Media screens are logical successors of the classical billboards.
- Media architecture forms new kind of public space, a “hybrid space” linking material and immaterial space together.
- A media façade skin is an intrinsic part of the building – not an artificial supplement - which forms a digital playground for media representation.
- Modern media architecture may also be regarded as a contemporary type of “sacral building”.
- Interactive media architecture becomes the perfect urban translation of the social web to form the “urban aula”
- Principles of the aula concept remained almost unchanged over centuries – it is all about the masses which are to be addressed.

5.2.5. ARCHITECTURAL CONCEPTS - EXAMPLES OF MEDIA FAÇADES

In the current media scientific dialogue, media façades are being categorized into four main types according to Gunnar Schmidt (Schmidt, 2008) – see Figure 18. The typology has been defined according to how the media façade acts or interacts in urban spaces. Technology or design aspects therefore do not play a role.

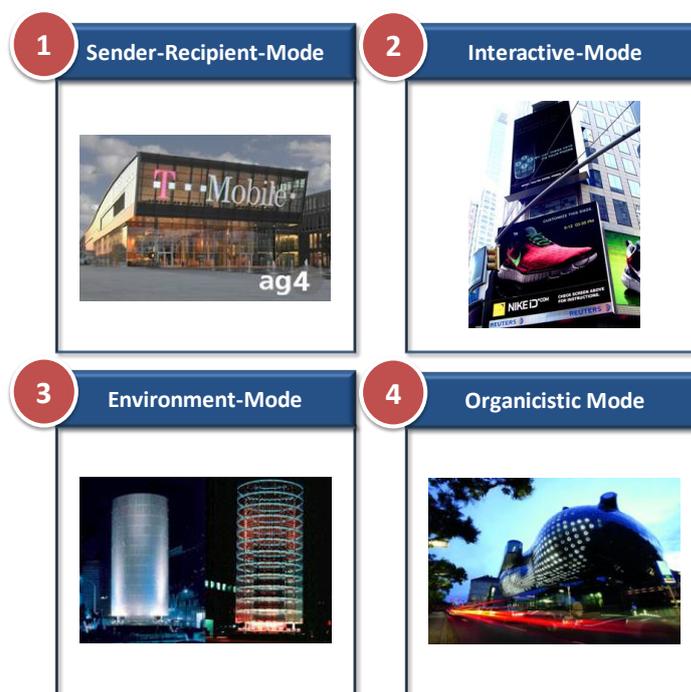


Figure 18: Main media façade types according to Gunnar Schmidt; (Schmidt, 2008)

1. Sender-Recipient-Mode / auto-active façade

This modus simply displays certain pre-defined contents on the façade. One plastic example is the Bayer headquarters building at Leverkusen, Germany. Already in 1999, at the one hundred year anniversary of Aspirin, the entire building was optically wrapped into a huge Aspirin package. Another example is the T-Mobile headquarters at Bonn, Germany.

Bayer's management decided in 2007 to install a Mediamesh[®] façade (see Figure 23) with some 5,6 million LED elements on its surface. Content wise, more than 5000 picture motifs, animations and pictures were produced to provide a repetition less program in a year of operation. Until 2009 it was the world's largest media façade, having 30.000 square meters. The building itself has been core removed, and thus has no further function. That's why this building is regarded as a **“media sculpture”** (Kronhagel, 2010). Its main purpose lies in promoting the company brand and the product brand, see Figure 47: Value chain model for interactive commercial media façade operation. The message can easily be spotted from a distance up to five kilometers. Although the underlying concept concentrates on esthetical and arts considerations, the business motivation is clear: “We come out with a clear message to the entire region, that we foster research and innovation and act forward-looking” says Bayer CEO Werner Wenning (Hans Allkämper, 2009).



Figure 19: Bayer Leverkusen, one hundred year anniversary of Aspirin; (Hochschule Luzern, 2008)

Auto-active mode is a looped video mode, driven by a content management system. A CMS is an ideal basis for a repetitive but easily adaptable program, which might change depending on daytime. This mode is optimally suitable for general information, advertising, brand communication, emotionalizing short narratives.



Figure 20: Media Façade at Bayer Headquarters, Leverkusen / Germany; (AG 4 media facade, 2011)

The auto-active mode uses filtered content and loop programmed content, mostly for miscellaneous marketing purposes. This application follows the classical tradition of the so called light-architecture, well known from entertainment areas, like Las Vegas.



Figure 21: Light-Architecture at The Mint, Las Vegas; (Robinson, 1968)

2.: Interactive-Mode

The interactive mode denotes the subsequent development step towards the interactive city, as it allows direct communication with the façade via a mobile phone. Typical examples are simple Arcade Games (Pong, Pacman, and Tetris) or triggering certain light symbols (AG 4 media facade, 2011), see Figure 22.

Interactive façades aim to attract the public audience and involve them in their life program. They trigger an urban auditorium. Currently, this application is seen as mostly appropriate for arts & culture projects. However, a massive involvement of the public (e.g. by inviting them to send photos from their mobile phones) is not yet fully developed – maybe this will become a commodity in a few years.



Figure 22: Interactive Façade Game Pacman at Bibliothèque nationale de Paris; Blinkenlights Arcade, 2002; (AG 4 media facade, 2011)

There are already various possibilities to drive a media façade in an interactive mode. So, the public audience can actively participate in a playfully, spontaneous and enjoyable way in the program. This kind of interactivity is not only fascinating for the active participant, but also for the passive observer.

3.: Environment Mode / Reactive Mode

This mode presumes the media façade to react actively to external triggers from its vicinity. If modern sensor technologies (weather, traffic, temperature and light) are taken into account, it is not difficult to run a media façade in the reactive mode. In this way, the media façade can “react” to certain external variables. External variables could be several parameters from the city, like weather, traffic density, daytime, or even office activity. In this mode, the media façade becomes an active building skin which reflects actively on its environment. It is able to reinvent itself every minute and develop its own language.

The first groundbreaking example has been developed already in 1986 in Nippon: The “Tower of Winds” in Yokohama (Crain Communications, 2011), (Saucedo, 2011), which is a 21 meter high ventilating tower from a shopping mall, transforms measured wind-strengths into various light animations on its surface. During daytime, the perforated metal surface seems to be compact, but when the dawn comes, the building reveals its dynamics. As various input parameters are being computed in real time according to a certain formula, it is not possible to the audience to understand a simple dependency between a single parameter and the animation. So, the animation remains a mystery never getting predictable and boring.



Figure 23: Toyo Ito, Tower of Winds, Yokohama 1986; (Crain Communications, 2011)

Another good example for a reactive mode is the DEXIA Tower in Brussels, reacting to temperature (Wiederkehr, et al., 2011). Weather Tower is an urban installation from

the Belgian Design Agency Lab[au] (Lab[au], 2010). It forecasts tomorrow's temperature, cloudiness, precipitations, and wind by using colors and geometrical patterns to visualize/transcribe real-time data provided by the Royal Meteorological Institute of Belgium.

The building has a total of 6.000 windows, whereas behind each is a lighting fixture consisting on average of 12 light bulbs, each with three LEDs – a green, a red and a blue – that can be combined into a complete color palette. A color-code corresponds to tomorrow's temperature compared to the monthly average, linked to a scale of color-temperatures ranging from violet (-6° or colder), blue (-4°), cyan (-2°), green (monthly average), yellow (2°), orange (4°) to red (6° or warmer).

Ad 4.: Organicistic Mode

The organicistic mode postulates an „intelligent skin“, which might even be driven by a kind of artificial intelligence. It is about an eco-biotic surface, which develops a life of its own by time by collecting various parameters from the surrounding area. A dedicated sensory environment, artificial intelligence computing power and memory is needed for implementation. If few buildings are equipped in a similar manner, they could even get in interaction with each other, creating a dedicated digital urban reality. Vera Bühlmann calls this phenomenon “companion alien species” (Schmidt, 2008). Clusters emerge from this inter-building-communication.

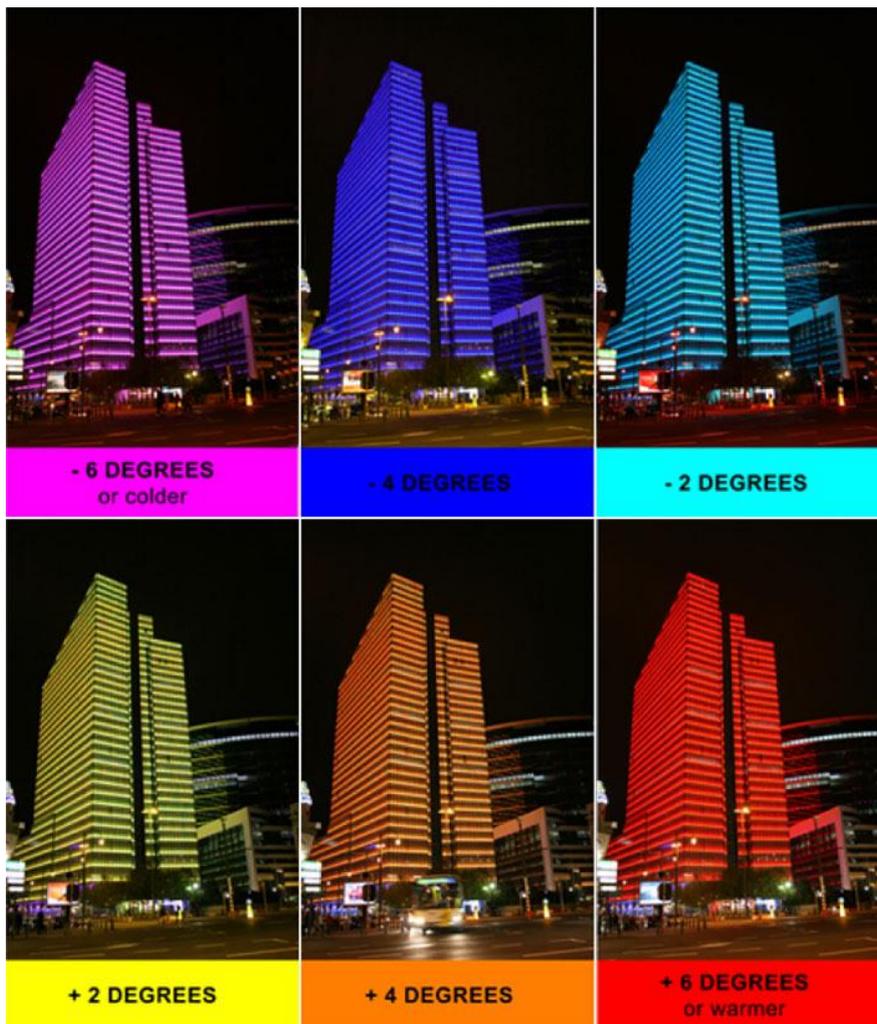


Figure 24: Weather tower, Brussels; (Wiederkehr, et al., 2011)

5.3. STATE-OF-THE-ART TECHNOLOGIES

This chapter aims to highlight recent developments of media façade technologies. During the phase of research, the following topics could be identified:

1. Translucent systems
2. Opaque systems
3. Autonomous 3D elements

1.: Translucent systems. On the Media Architecture Biennale Vienna, ag4 media façade GmbH presented its actual façade technologies. Two lead products were exhibited: Mediamesh® and Illumesh®. The first one is a coarse mesh made of stainless steel, which is flexible but stiff in parallel. LED containing rods are woven into the mesh in equal distances. This product is easily mounted on and removed from existing façades. The resolution is video capable and is run by a computer. The central server is even remote controllable via internet, allowing interactive and dynamic content presentation. The horizontal pixel distance is 4,25cm minimum, while the vertical pixel distance is 3cm minimum.



Figure 25: Mediamesh ®, woven in steel cables forming a complete façade network; (AG4, 2010)

Illumesh[®] utilizes LED elements in the reverse mode, reflecting their light from the steel mesh. This method is optimally suitable for nighttime illumination of large surfaces. Mediamesh[®] is a translucent solution offering a high degree of transparency and flexibility. Both technologies could be even used in an overlay modus, creating a three dimensional impression. (Baulinks, 2007)

The brain of the system is the server computer equipped with the payout software and the content repository. The server drives one master box, which distributes the signals to the slave boxes, which reside at every single row of the façade. (AG4, 2010)

2.: Opaque systems. In case a translucent system is not wanted, this type is appropriate. High power LEDs spotlight opaque diffusor elements from behind, forming a tight surface. Using the principle of additive color mixing, a large variety of coloring can be achieved by utilizing only three types of LED colors.

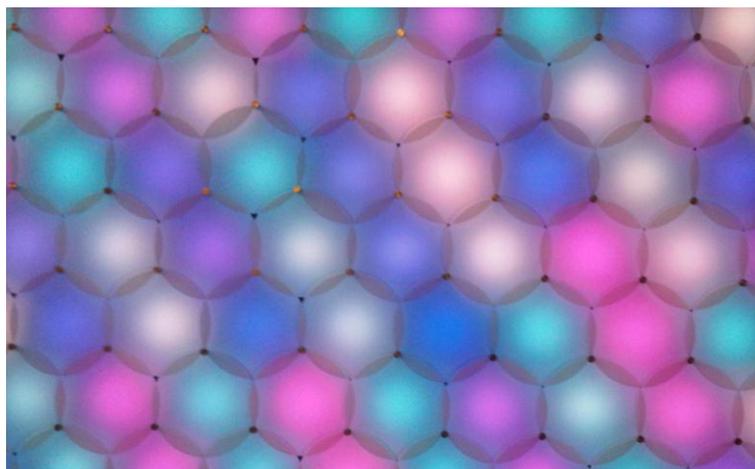


Figure 26: Façade Elements shown at Media Façade Exhibition 2010 Vienna; Consists of LED and plastic diffusor plates (photo by the author)

3.: Autonomous 3D elements. Sometimes, larger 3D installations are wanted. Then, a single element concept is preferred over a flat LED containing mesh concept. Those single elements could be ball-shaped or rhomb shaped plastic bodies. The larger the dimension, the more sophisticated driver logic can be stored in each device.

The skin concept opens a totally new perspective on how buildings can be planned. A building can now be planned as a sustainable living organism, responding automatically to changing outside conditions – which is indeed a major paradigm shift. The recent goal is to even create energy autonomous buildings. As far as media façades only are concerned, the energy autonomy has already been demonstrated by the Green Pix façade in China.

A recent example for autonomous 3D elements is the façade of the Swiss Pavilion at the Expo 2010 Shanghai (ag iart interactive, 2010): The Swiss pavilion at the Expo 2010 in Shanghai is covered by a semi-transparent façade that utilizes high-tech solar technology to produce energy that will be released in LED flashes. The numbers and constellations of flashing LEDs and the length of time for which they emit light will vary according to the intensity and angle of the incoming light: the LEDs will flash for one time, cast colored shadows on the wall behind and move in swarms or other formations across the façade. (Schürer, 2010)

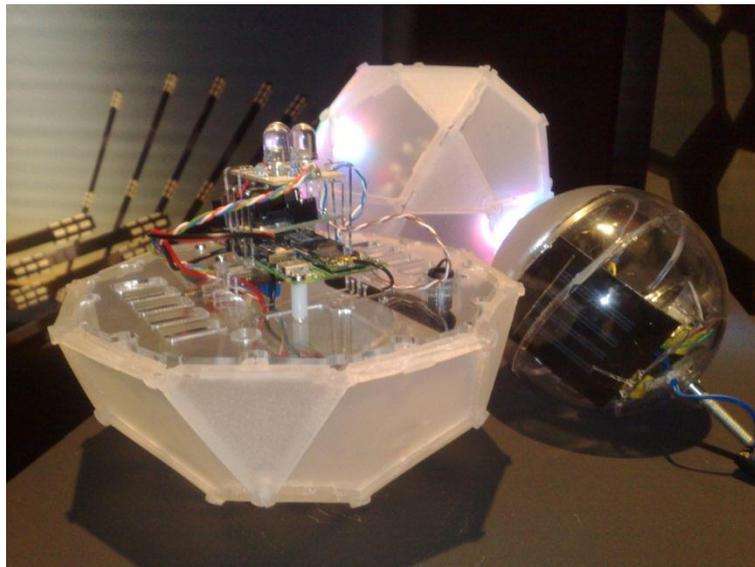


Figure 27: Autonomous façade element, containing driver logic and a photovoltaic cell (photo by the author)

When visitors approach and enter the pavilion, Switzerland's vision of the city of the future will become clear: A hybrid, networked place in which nature and technology,

innovation and sustainability will interact with each other. This refers to the vision of the “smart city”.

The façade, suspended from a height of 20m, consists of a coarsely woven wire-curtain on which 10.000 cells are fixed at arbitrary intervals. Every cell contains an autarkic electronic driving logic, the shape of which resembles the map of Switzerland, and electronic components that assure the façade’s interactivity: solar cells, two double-layered capacitors (especially powerful energy storage), one LED (Light Emitting Diode) and sensors that react to light and the nearby cells. The solar cells generate power that is stored in the capacitors and that is discharged by the LEDs’ flashing (ag iart interactive, 2010).

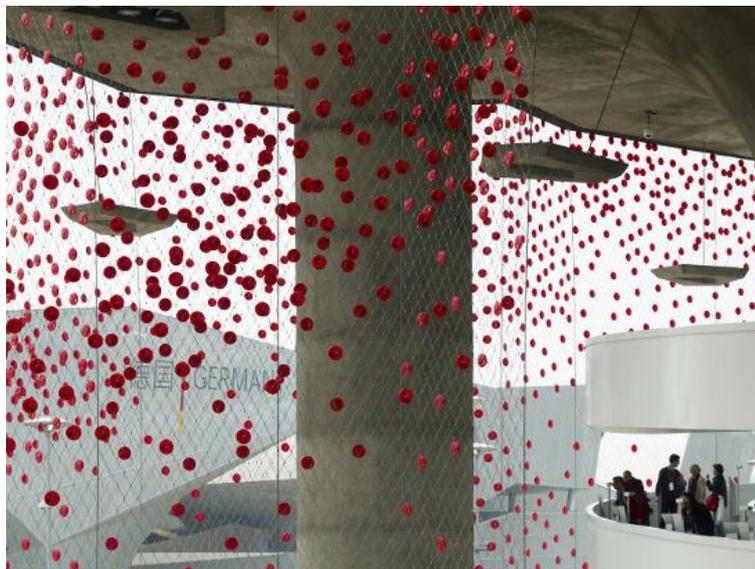


Figure 28: Autonomous Media Façade @ Swiss Pavilion Expo 2010 Shanghai; (ag iart interactive, 2010)

Thanks to the sensors this happens in response to incoming light, varying according to the light’s strength. If the intensity of incoming light increases on parts of the façade, the light sensors create an impulse that causes the LEDs in that area to flash. Depending on the intensity of the light, the cells flash for a shorter or longer period of time. The brightness of the LEDs varies depending on the charge and the luminosity of the surroundings. The cells operate autonomously. However, their in-built microcontroller also causes a reaction between the cells: electromagnetic impulses

during the flashing of each single LED influence the behavior of the cells around them. A chain reaction follows, with swarms of flashes moving across the façade. This makes an interlacing visible that is significant for the quality of life today and in the future.



Figure 29: Autonomous Elements @ Swiss Pavilion Expo 2010 Shanghai; (ag iart interactive, 2010)

One reference project experimenting with a clear human city proposition is "**Ambient Agoras**" (Streitz, 2010) for providing situated and personalized information based on sensing data. The project "Ambient Agoras" (Streitz, 2002) aims at providing location situated services, place-relevant information, and feeling of the place to users, so that they feel at home in the office. This is achieved by using e.g. ambient displays embedded in the environment and mobile devices that are used in a combined way. "Ambient Agoras" adds a layer of information-based services to the place, enabling the user to communicate for help, guidance, work, or fun. It integrates information into the architectural environment by means of smart artifacts. The computer as a device disappears, but the functionality is available in a ubiquitous and invisible fashion. Two types of equipment are used: Firstly, a mobile device for remote control "Viewport®" and secondly, a wall-sized ambient display for indoor use "Hello.Wall®". The goal is turning everyday places into social marketplaces (Greek: 'agora') for human interaction. These can also be regarded as kind of "urban aula" for indoor use.

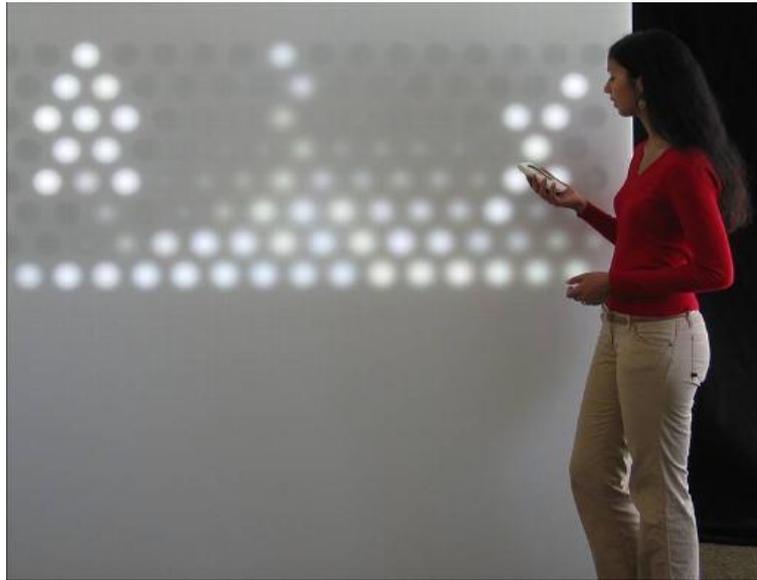


Figure 30: Augmented Lounge with Hello.Wall®, an Ambient Agora Project; (Streitz, 2010)

This project demonstrates interactive communication via ambient displays embedded in the environment and mobile devices that are used in a combined way. "Ambient Agoras" adds a layer of information-based services to the building, enabling the user to communicate for help, guidance, business, or fun. It integrates information into the architectural environment by means of smart and interactive displays. The evolution of "Ambient Agoras" could be considered by extending this idea by introducing interactive media façades. Public art festivals, like digital graffiti, video art, DJ/music art, even sports events and many more could be imagined.

Chapter Summary:

- Three main types of media façade technology have been identified and described: translucent, opaque, and autonomous 3D elements.
- The identified technologies do have in common: LED as a light source, and additive color mixing.
- The pixel distance may vary from few centimeters up to 40 centimeters.
- The driving logic may either be a central server or an autonomous concept, creating a distributed logic concept.

5.4. COMMUNICATION MODELS

The root of the word *communication* originates from “*communicare*” (*lat*), which means sharing with the community (Wiktionary, 2011). Communication is a social act, in order to embrace, to incorporate an audience. The nature of communication has always been of collaborative type. In most cases, this was necessary in order to tackle survival relevant problems which could not be handled by a single individual. No wonder that major efforts in communication development came and still come from military affairs.

The new possibilities described in the previous chapter raise the question: Which are the appropriate communication models for interactive media façades? Generally, signal architecture can be classified into the one-to-many communication type. But also the static media façade behaves like this. However, interactive media façades require a more complex communication model, as they require the introduction of feedback from each individual of the urban public audience.

Shannon & Nyquist Communication Model (Mortensen, 1972)

In the twentieth century, communication underwent a revolution by making radio signal transmission available for the public. The basic inventions have already been made by Heinrich Hertz in 1880 (propagation of electromagnetic waves), James Maxwell (Derivation of the four basic equations describing the electrical and magnetic field in 1865) and Robert von Lieben (developing the first electron tube in 1906), just to mention three typical protagonists (Vogel 1997, p.428). Claude Shannon and Harry Nyquist developed the first theoretical model of the communication channel. For them, the model consisted of three main entities: A sender, a receiver, and a channel (Chandler, 1994). The channel might be ideal if no disturbances are assumed, not a realistic postulate. Therefore, a non-ideal channel is introduced to the model, which adds noise to the transmitted signal. So, the extended model is depicted in Figure 31. The entities are

- An information source, which produces a message
- A transmitter, which encodes the message into signals

- A channel, to which signals are altered/influenced for transmission
- A receiver, which decodes the message from the signal
- A destination, where the message arrives
- Noise is a disturbing factor: Any interference with the message travelling along the channel altering the original signal shape is called noise

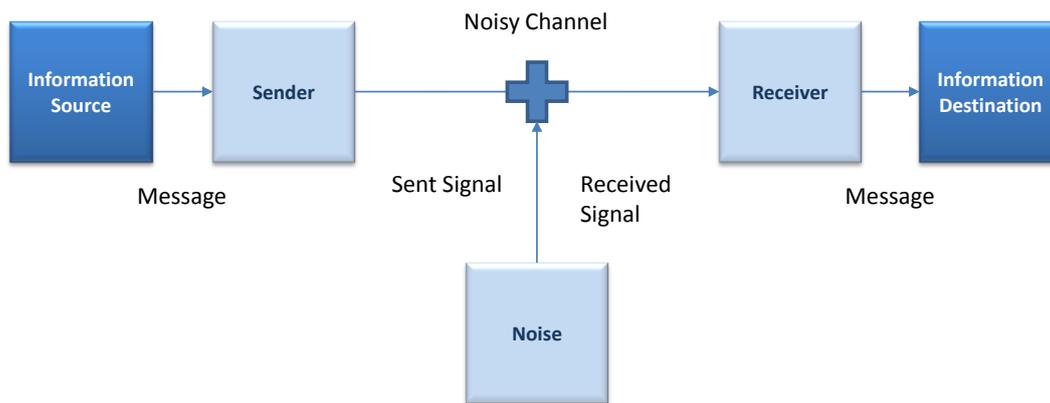


Figure 31: Linear communication model of Shannon and Nyquist; (Mortensen, 1972)

The most relevant results from their research were:

- The transmission capacity of a channel is limited by the S/N ratio (signal to noise ratio)
- If a certain analog signal shall be sampled, the sample rate must be at least the double rate of the highest frequency of the analog signal

The model is based on two main entities, entropy and noise. Entropy is the measure of uncertainty in a system. Uncertainty or entropy increases in exact proportion to the number of messages from which the source has to choose from. In general, the information value of an item in a message decreases in linear proportion to the likelihood of its occurrence. Noise is the measure of information disturbance by additional, unwanted signals. Any additional signal that interferes with the reception of the original information is noise. This noise might be white (evenly distributed in the frequency domain) or colored (Lee, et al. 2004, p.349).

Information is a measure of uncertainty, or entropy, in a given situation. The greater the uncertainty is, the more valuable the information is. This is called “**Entropy**” (Vogel 1997, p.926). Entropy is a measure of disorder, or more precisely unpredictability. In other words: In a situation which is completely predictable, no information transfer is needed.

Strengths of the model

This model, or variations thereof, is the most common communication model used in low-level communication contexts. Coming originally from cybernetics / system theory, this model was soon adopted by social sciences to explain human information exchange. With only slight changes in terminology, a number of non-mathematical schemas have been derived from the original one. For example, Harold Lasswell (Arens 2008, p.198) developed in 1948 a mass media communication phenomenology in five stages: “who?”, “says what?”, “on which channel?”, “to whom?”, “with what effect?”, - Generally, the benefits are simplicity, generality, and quantifiability. It was the precursor for the digital revolution, e.g. development of the music CD in the 1980ies. Another generic advantage is independence of context and culture – the mechanistic principles ensure the worldwide compatibility of digital services and systems today.

Weaknesses of the model

Generally, the feedback loop is missing at all. This is a major drawback even for modeling mechanistic information channel models. (Today this flaw is being bypassed by higher protocols, like TCP/IP which include error correction mechanisms) In fact, it is not even a “communication model”, it is rather an “information-push model”.

But it is a mechanistic model, comprising several simplifications, which does not allow its application to social sciences on a 1:1 basis. The transmission model is not only an over-simplification but also a misleading model of human communication (Kaminski, 2008). This is particularly important since it underlies the 'common sense' understanding of what communication is. Further, their model utilizes definitions from cybernetics and system theory, as far as “information” and “probability” or “likelihood” is concerned. In social sciences these terms are used in a slightly different context.

Furthermore, the model does not deal with semantics, or even spoken word. There is no single fixed meaning in any message. Finally, human communication is still “analog”, without any need for encoding and decoding like in digital information systems. Logical sense is totally omitted here. Human feelings and moods can’t be handled in proper way by this model. That’s why this model is regarded as a relatively static and linear model.

Schramm’s Interactive Nonlinear Communication Model (Mortensen, 1972)

Wilbur Schramm was one of the first to alter the mathematical model of Shannon and Weaver. He conceived of decoding and encoding as activities maintained simultaneously by sender and receiver in 1954; he also made provisions for a two-way interchange of messages. (Kaminski, 2008)

Strengths of the model

Schramm provided the additional notion of a “field of experience,” or the psychological frame of reference; this refers to the type of orientation or attitudes which the interacting parties develop towards each other. He includes feedback to his model: Communication is always a reciprocal two-way process, even though the feedback may be delayed. Further, he included culture and context: A message might have different meanings depending upon the specific context or setting. However, the same message might also elicit different meanings depending upon culture and society. Overall, Schramm moved much nearer to a social reality than Shannon and Nyquist did.

Weaknesses of the model

The Schramm model accounts only for one-to-one communication. The principles of One-to-many communication are not covered.

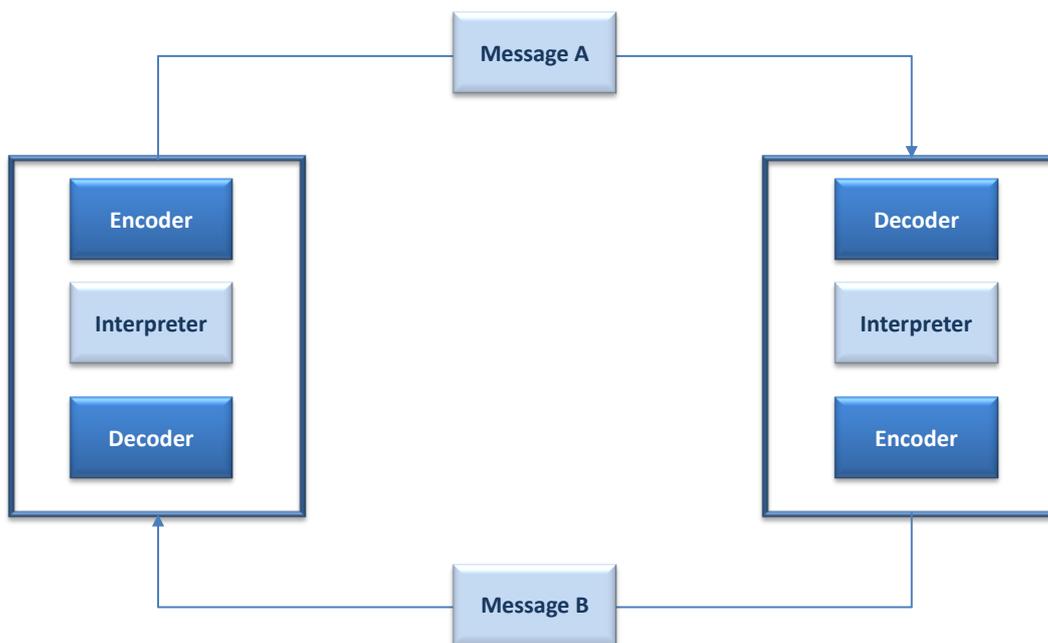


Figure 32: Interactive communication model by Schramm (1954); (Mortensen, 1972)

Berlo's Communication Source-Message-Channel-Receiver Model (Berlo, 1960)

Human communication usually includes the social construction of the self, perception of self and other, language, nonverbal communication, listening, conflict management, intercultural communication, relational communication, and various communication contexts, including work and family. The Berlo Model seems to be more appropriate to model a complex human information exchange process. Berlo's model includes a number of entities in each category (Berlo, 1960):

Source and Receiver: The source is where the message originates.

- Communication skills: The individual's skill to communicate (ability to read, write, speak, listen etc...)
- Attitudes: The attitude towards the audience
- Knowledge: The knowledge/competence about the subject
- Social system – The social system includes the various aspects in society like values, beliefs, culture, religion and general understanding of society
- Culture: Cultural aspects, like which society or target group shall be addressed

Encoder: The sender of the message (message originates) is referred to as encoder, so the source is encoding the message here.

Message:

- Content: The entire message or message elements
- Elements: It includes various things like language, gestures, body language
- Treatment: It refers to the packing of the message
- Structure: The structure of the message how it is arranged
- Code: The code of the message means how it is sent in what form it could be e.g. language, body language, gestures, music and even culture is a code. (Threat: misinterpretation)

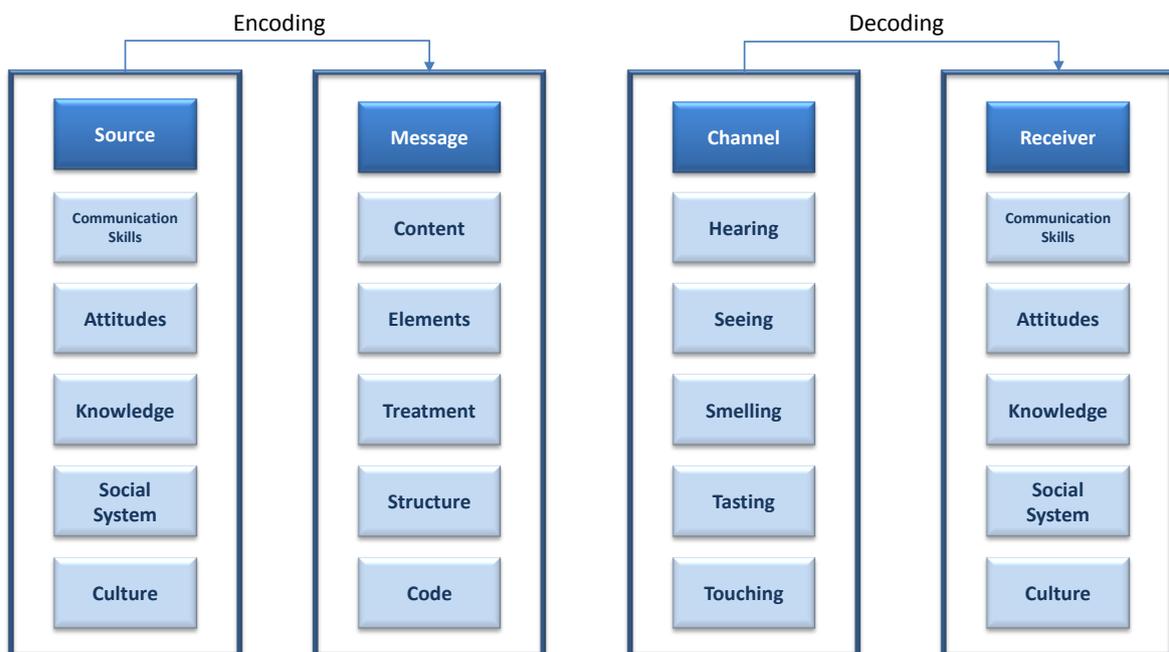


Figure 33: Berlo's Communication Model (1960); (Mortensen, 1972)

Channel: The human senses are meant here (Lucian, 2007): Hearing, Seeing, Touching, Smelling, Tasting

- Hearing: The use of ears to get the message for e.g. oral messages, interpersonal etc.

- Seeing: Visual channels for e.g. media façade displays can be seen and the message is delivered
- Touching: The sense of touch can be used as a channel to communicate e.g. we touch and buy food, etc. But can also be an interactive touchscreen to remote control a media façade, e.g. an interactive tourist guide
- Smelling: Smell also can be a channel to communicate e.g. perfumes, food etc.
- Tasting: The tongue also can be used to taste and communication can happen

Decoder: Who receives the message and decodes it is referred to as decoder.

This model suggests that for an effective communication to take place the source and the receiver need to be on the same level. Only if the source and receiver are on the same level communication will happen or take place properly. Thus source and receiver should be similar.

Strengths of the model

Berlo takes into account the human nature of communication and also human psychology.

Weaknesses of the model

Generally, Berlo's model 1960 is closely related to the Shannon Weaver Model 1948. Thus, the same major drawbacks apply here: Feedback is not part of the model and therefore is a linear model. Also, channel noise is not integrated here. Generally it is a more complex model than the Shannon Weaver Model, which needs the communication partners to be on same level for communication. Overall, this model is not proof for real life due to its simplifications.

Chapter Summary:

- The early communication models are in the inner sense information-push models.
- Linear models have been discussed. They are capable to explain digital data transfer mechanisms but are not suitable to explain the principles of human interaction.
- Nonlinear models do include feedback but are still idealized views on a complex reality.

5.5. BUSINESS MODELS

In the United States, China, Japan, but still merely in Europe, out-of-home media walls are the fastest growing channel for advertising apart from the internet. For 2010, growth rates up to 32% were reported (Publicis Consultants Deutschland, 2008). However, sustainable business concepts are lacking. Their physical formats include a wide variety from public art representation, loophole videos, and accompanying public events. Many public video screens, however, display content which is not appropriately designed for them. Their potential lies in producing better content quality including more specific storyboarding (e.g. with respect to specific target groups) and combining classical above-the-line communication with art work. In the second step, an extension towards public interactivity could be envisaged. So, it could be considered to add questions to the public, which could be combined with a chance to win a prize. Artists and designers would benefit from new exposure and increased reach. That's why it becomes more and more attractive for artists to cooperate with brand companies. In Austria a few remarkable examples of media façades can be found: Uniqua Tower Vienna, BIX Façade Kunsthaus Graz, and Lentos Museum Linz. However, the advertising market seems not to be ready yet.

Media Façades are elements within the stress field of public, urban space, public media space (narrative space), and architecture. The first stress field between "Marketing / Communication / Branding" and "Media Content Presentation" deals with gaining attraction of the masses, generating empathy, recalling learned values

(e.g. via methods of branding), and extending reach. (Hochschule für Gestaltung und Kunst, 2005). This is of main relevance for ad-screens and public e-boards. Oversaturation of traditionally executed and placed outdoor advertisements deteriorates their commercial effectiveness. The targeted public audience automatically filters out the billboards. That's why both media agencies are very cautious as far as their CPM (cost per thousand contacts) estimation is concerned. In order to fulfill the communication needs optimally, new content story boards need to be developed. The combination of commercial advertising content with arts representation seems to be promising.

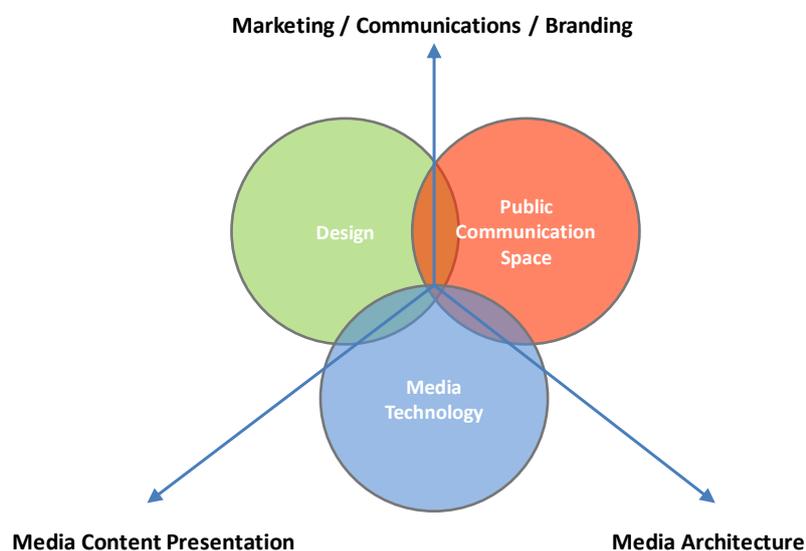


Figure 34: Principle of Media Façade – Commercial Use Case; (Stalder, 2004)

One example is “moments of art” displayed on the Reuters building showing video art and ambient media. This is still in its early phase, however, more and more brands are seeking arts partnerships for image reasons. Art production and brand management seems to be symbiotic when it comes to attract the public with innovative messages. Loopholes are normally used to combine modern art with classical advertising. It is a win-win relationship: On the one hand it is an opportunity for the artist to present his art works, and on the other hand the advertiser profits from improved overall reception of the advertising campaign. Furthermore, this improves brand credibility in many cases. Generally, out-of-home advertising impacts public space heavily. Reusing

TV or cinema advertising formats is possible, but this is not the complete story. Museums and galleries, which are public-private hybrid spaces, are also leading the way in creating dynamic, interactive content in media façades or large media walls. The second stress field lies between the dimensions “Marketing / Communication / Branding” and “Media Architecture”, asking for the composition of public communication space, see also Figure 35. An in-depth view on the value chain of physical media façade buildings shows an unexpected complexity. In the following, the main rules of thumb for media composition will be discussed.

The third stress field lies between “Media Content Presentation” and “Media Architecture”, asking for the applied technologies at recent media façades and their possible future innovation roadmap. To recapitulate, the definition of media façade was large scale, coarse- or mid-resolution displays which are built as an integral part of an existing façade. Their aim is to generate attraction over a wider area in the urban space and to create landmarks in the city. Content can be ornamental, interactive, random (e.g. in form of mood/ambient functionalities), looped video, or text only.

Three central elements of composition could already be spotted out:

- Integration of the media façade in the relevant vicinity
- Presentation of the content (e.g. looped video or interactive applications) including a story which forms the framework: Easiness, recognizability, brilliance
- Positioning of the entire concept (e.g. embedded cross media, media mix, campaign design)

Integration:

The question is how the media façade influences, alters, and moderates the vicinity, the surrounding area. On the one hand, they demand for space, but on the other hand, they structure and develop new structure for existing spaces. Generally, media façades are points of attraction. They intensify attraction of the public and might even shift pedestrian traffic streams from one place to another. Habits could be altered, triggered by media consumption. However, the basic acceptance is generally on a high level, if the integration is being taken care of (Hochschule für Gestaltung und Kunst, 2005).

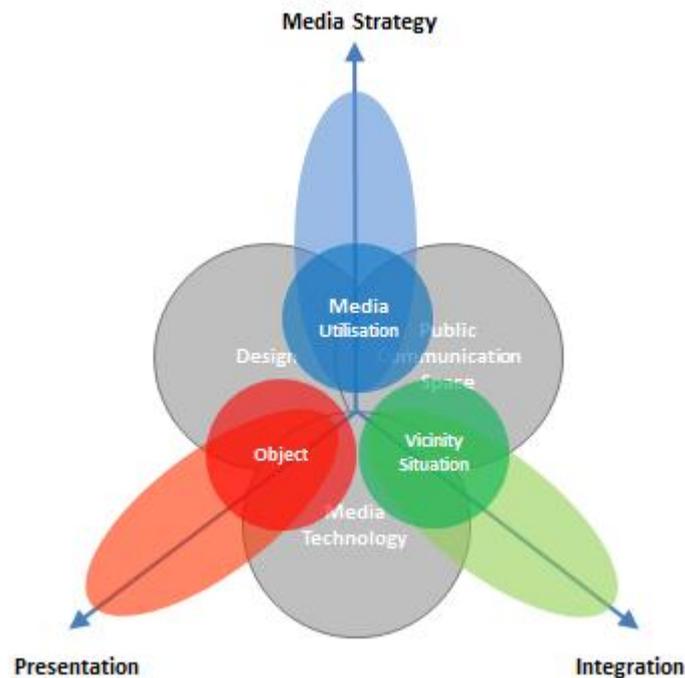


Figure 35: Dimensions of Media Composition for Media Façades; (Stalder, 2007)

Presentation:

Three major aspects play a central role: Firstly, the mechanical construction, design and static robustness of the façade. They must be integrated properly in the existing infrastructure. Secondly, the resolution has to be chosen carefully, with respect to the entire façade size. Thirdly, the content must be produced with respect to the location, the media consumption habits dependent on situation (e.g. public urban pedestrian areas, railway stations, business parks). Interactivity should be planned and designed to enhance involvement and active participation of the public auditorium. Generally, the contrast must be capable for daylight projection.

As far as picture and video material are concerned, simplified and short contents and easy to follow dramaturgy is preferable. As we speak about outdoor façades, the viewing time is generally very short – a couple of seconds only. Another positive aspect is bringing emotions to certain places by projections.

Green Pix is a large-scale display comprising of 2.292 true-color LED light points comparable to a 24.000 sq. ft. (2.200 m²) monitor screen for dynamic content display

(Giostra, 2008). The very large scale and the characteristic low resolution of the screen enhances the abstract visual qualities of the medium, providing an art-specific communication form in contrast to commercial applications of high resolution screens in conventional media façades. To get a feeling about the dimensions and resolutions relevant for media façades, two examples:

Example 1: A standard computer monitor resolution is 1024 x 768. If one LED element was sized 20x20cm, the media façade of the same resolution would be as big as 204,8m x 153,6m.

Example 2: 480x320 (HVGA) is the current smartphone display resolution. If a LED element size was 10x10cm sized, the media façade would be 48x32m. This could be a suitable size for a larger downtown office tower.

Media Strategy:

The modern media façade demands for new types of content. Conventional media types are no sufficient archetypes. It is up to a contemporary program dramaturgy to pick up the public audience from their position in order to guide them through this new medium (Stalder, 2007). Media façades are principally new and thus seen as complimentary to the conventional types of public media (e.g. billboards).

The strengths lay in their ability of situational competence, ability of reflexive operation (see above), and getting the public audience involved. However, very short attendance (1 – 2 seconds only) challenges media producers to invent new forms of narration and dramaturgy.

5.6. LIGHT POLLUTION – A CRITICAL DISCUSSION

Light pollution is a matter of general interest. One of the greatest achievements of our culture is the possibility to lighten our living space during nighttime. The illumination of both public and private spaces has increased significantly over recent years. The motivation for this is manifold: Industry plants are running 7x24h, city highways are illuminated to ensure traffic security, many historical sites are highlighted to attract

tourists and more and more privates are using outdoor flood light in order to prevent burglaries (Fritz, 2010).

However, this development brings also certain drawbacks which have to be critically analyzed. Despite all enthusiasm for new technologies and their benefits for mankind, it should not be forgotten to tip the fingers on critical developments. (Hänel, 2009)

Even UNESCO has declared the sky as a “world heritage” good. NASA continues to research the development of light pollution by satellite photography.

The negative impacts are (Bögl, 2009):

- Light scatterings can disturb sleep when it shines into homes.
- Deteriorated view of the night sky, deep-sky observation becomes increasingly difficult.
- Waste of electrical power – only a small percentage of light is really assumed to be useful.
- Negative impact on the ecology and wildlife, affecting the behavioral patterns of wildlife animals.
- Negative impact on plants, affecting their growth cycles.
- Dangerous impact on migrant birds, which are distracted and getting disoriented over their large distances.
- Billions of insects are dying on the surfaces of public lamps, reducing natural nutrition reserves for birds.
- Offensive advertisings could distract drives, especially during nighttime, evoking rising car accident rates.

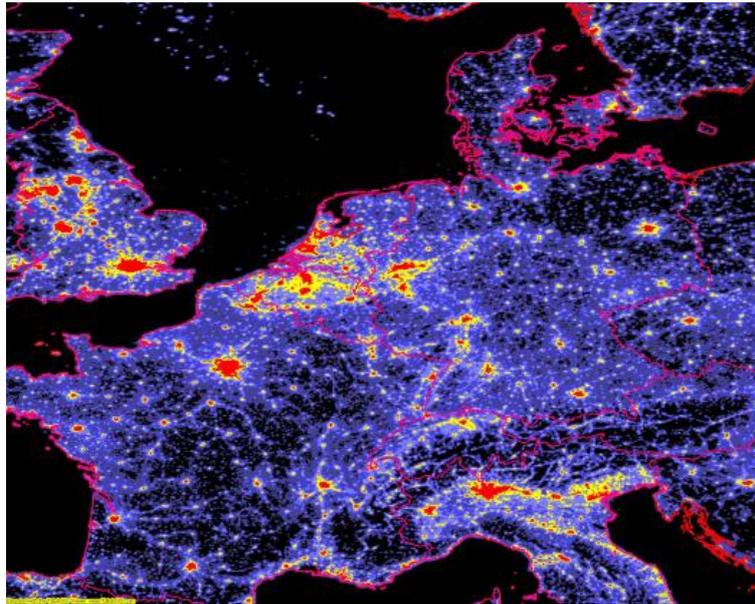


Figure 36: Night sky lightning density in Europe; (Hänel, 2011)

Haze domes or smog domes, which exist usually in the air space above large cities, are natural reflectors/deflectors for scattered light. This effect becomes evident if public lights are positioned towards the sky. In this way, laser sky projectors can be spotted out over large distances. The more aerosols, industry particles, dust or moisture is in the air, the stronger the effect becomes.

The yearly growth rate is in Germany about 6%, in Italy some 10%. The highest growth rates, however, are measured in rapid growing agglomeration areas in the United States, showing values up to 15%.

In many countries, governmental information brochures are already available, teaching how to reduce unwanted light emissions / pollutions by reducing dimensioning, optimizing lightning radiation directions more downward to earth rather than up to the sky.

Consequently, it is a valid question whether or not media façades are really necessary to stay active during night times. Alternatively, the design of the light emitting elements could be limited in their radiation angle more towards earth. This could help to reduce scattering light around a media façade. On the other hand, these

precautions would drastically reduce the media façade's visibility from different angles/perspectives as few light would be emitted in these directions.



Figure 37: Light polluted night sky in Hong Kong; (Pun, 2009)

Chapter Summary:

- Light pollution is already a well-known effect, a downside of area wide nighttime illuminations in large cities.
- Significant annual growth rates are being reported for industrialized agglomeration areas.
- Several negative impacts on humans, wildlife animals and plants have been observed so far.
- Nighttime lightning is a major source of energy waste.
- Optimization rules are already in place for public and private properties.
- Optimization rules should be developed and also applied for media façades in order to treat environment with respect.

6. REFERENCE PROJECTS IN AUSTRIA

In Austria, a handful of media façade projects have been established in the last years. All these examples can be spotted out either in the museum/exhibition area or in the university/media research context. In the following, two examples will be described for reference. In both cases, A1 Telekom AG was sponsoring and technology partner. The thesis author was the responsible project leader from A1 Telekom AG side.

Both examples do have in common that the media façades are utilized in a non-commercial business framework. Their setup has been chosen for art, media research, and attractiveness gain reasons. They are typical exponents of contemporary signal architecture. They aim to attract the public audience from a (large) distance and, in parallel, reflect the online feedback, as far as the interactive part is concerned. At Kunsthaus Graz, realities:united aimed beyond the common questions of multimedia interactivity – it deals with the networking of media, architecture and museum: How can an exhibition building communicate outbound with the help of media and how can it identify itself by the use of media (e.g. for brand identity building)?

Both projects demonstrate new opportunities for an interactive “experience city”. They emphasize hybrid cultural approaches on “performative urban spaces”. Hybrid cultural projects are characterized by a conscious fusion between urban transformation and new knowledge centers, cultural institutions and experience environments. “Performative urban spaces” are characterized by stages for performance, learning and experience.

The performative activity can take on the design of single events or recurring exhibitions. Every project is unique as far as its urban planning importance, its social and cultural content and its architectural representation is concerned.

6.1. BIX FAÇADE KUNSTHAUS GRAZ

6.1.1. HERITAGE

The designers, the London architects Peter Cook and Colin Fournier (Cook, et al., 2004) created a synthesis of their innovative language of form and the historical ambience of the Mur district. With respect both to urban planning and to its purpose, the Kunsthaus functions as a connecting-link at a point where the past and the future meet (Joanneum, 2010)

The unique, biomorphic shape of the building owes its existence partly to the manifest fascination of its creators with the "animal presence of architecture". Originally, the Kunsthaus was planned to be built within the Schlossberg of Graz, where the project designers would have used an organically shaped membrane to smooth out the coarse, complex structure of the walls within the mountain. After the relocation of the construction site, the concept of the dragon's tongue was transformed into the shape of the "friendly alien" which now rests on the right bank of the Mur between the surrounding historical buildings.

The reason the Kunsthaus was finally built in the western part of the city is partly due to considerations of urban design: in its present location, the Kunsthaus can serve as an efficient catalyst for positive changes in the previously disadvantaged half of the city. The BIX-Media façade of Kunsthaus Graz represents a fusion of architecture and Media Technology and is based on a concept by the architects realities:united from Berlin, Germany. Generally speaking, it is a typical example for signal architecture. The BIX-Media façade, located behind the acrylic skin on the building facing is a large three-dimensional urban screen that serves as an instrument for artistic production.

The BIX-Media façade is a very special kind of communication interface. It doesn't merely accompany the artistic program of the Kunsthaus (BIX-projects accompanied already various exhibitions) by transferring the exhibition into the public space. So, the façade has an ambassador function for the art program shown in the Kunsthaus. In

addition, the “communicating external skin” also offers an interactive platform for art projects based on the dialogue between media and public space.

A total of 930 conventional ring-shaped 40 W fluorescent tubes are built into 900 m² of exterior skin, each are dimmable between 0% and 100%. Each lighting ring acts as a pixel that can be controlled via a central computer. The entire façade can be regarded as a low resolution b/w computer display driven by a PC graphic card, although on a larger physical scale. A large work stream of the project was the development of the simulation software to be used for program development. Simulation is always needed due to the complex geometry and the coarse resolution of the display.

The BIX façade, however, does not aim to make any comparison with art historic phenomena: The media façade serves as "low tech" matrix for productions of media artists who engage themselves with work in the public. Coarseness and monochromacity of the pictures are an "advantageous limitation" which enables the Kunsthaus to take a strong and clear position in the current discourse about high-tech media façades. New technology of large screens ages extremely fast. However, by using conventional fluorescent lights as pixels – known since the Sixties as kitchen lamps and a timeless design – the question of up-to-date-ness does not arise. The light rings are not new; they indeed meet the architectural demand for constancy.

No-frills technology guarantees not only the balance between architecture and technology but enables the realization of such a large installation due to comparatively low costs. As a location for artistic accomplishments BIX provokes the development of a new language. It is about a creative form of communication that distinguishes an artistic institution from other buildings and that is diametrically opposed to demands of conventional communicators. BIX is therefore predestined for an artistic context.

The BIX façade BIX is formed to meet the structure of the building and is therefore itself an additional architectural element that complements the Kunsthaus: The light rings are integrated into the complex form of the architecture as flexible technical modules, while when looking at it as a whole the physical borders of the light field can never really be seen. A soft transition of the installation from the outer façade into the area of the entry hall lets the modules fade away at the sides. BIX gives the impression

that not a screen but the Kunsthaus itself renders images and pictures. The complete fusion between architecture and media technology defines a new standard.

6.1.2. PROJECT "WOULD YOU LIKE TO COMMENT?" 2009

In the sixth year of its existence, the BIX façade invites the public users of mobile handsets to interact with the façade. This is one of the first public interactive games of an interactive media façade in Austria so far. Again, the Kunsthaus became a performative public space. With "Would you like to comment", everybody was able to participate, as the concept enabled all types of mobile handsets.

The BIX transforms towards a huge gaming console. This explains what is meant by "experience city". All citizens are invited to participate by sending their individual light pixel to the BIX façade. In this way, new pictures are being created by crowd interaction; old pixels fade away by time to free up BIX space for new creations. The entire BIX display is also being streamed to the Kunsthaus web homepage to allow even remote participation (Joanneum, 2010).



Figure 38: Kunsthaus Graz - BIX Façade at Night; (Kerteu, 2010)

The application running on a central application server has been created by John Dekron, a well-known media artist and researcher. The real time interface to the mobile core network of A1 Telekom AG has been implemented by an IVR application. This turned out to be the most versatile solution, providing the highest compatibility even with outdated mobile handsets and low latency times. The player simply had to call a free 0800 number provided by A1 Telekom AG in order to get his pixel, which could be moved around the BIX façade by 4 – 6, and 2 – 8, respectively (DTMF tones in the voice channel).

Chapter Summary:

- The BIX façade is an example for creating a performative urban space in order to gain an “experience city”.
- The elements are timeless, as coarse, monochrome common fluorescent light rings are used.
- The BIX façade is meant to be a communicating external skin to transform contents inside out to the public.
- Thus, BIX constitutes an extraordinary medium for presenting art and related information transfers.
- “Would you like to comment” was the first project which explained mass interactivity of the public with the BIX façade based on their mobile handsets.

6.2. ARCHDIPLOMA BINNALE

Archdiploma is a biennale presenting the most promising and outstanding Architecture concepts of the Technical University Vienna (TU Vienna) students. In 2009, the Archdiploma vernissage took place at the Kunsthalle Karlsplatz. The host, Dr. Oliver Schürer decided to frame the entire exhibition by an interactive media façade. (Schürer, 2009)

Contrary to the BIX at Kunsthaus Graz, the Archdiploma team used modern LED technology, driven by a modern bus-architecture. All LEDs are arranged in vertical stripes by rubber armed cables, which are easily mounted in almost every type of

event location. Unfortunately, the LEDs have a relatively small angle of radiation; a kind of diffusor had to be installed in front of the LEDs to gain an appropriate light diffusion. This could be solved by using an optical plastic foil. The next issue was to ensure a suitable transmission/reflection ratio in order to generate sufficient backlight to have an indoor picture (although mirrored).



Figure 39: Media Façade Elements at Kunsthalle Vienna, Project “Archdiploma 2009” (photo by the author)

This could be solved by using a plastic which has a certain reflection factor (by dull inner surface). The entire setup could be optimized by wrapping little lamp shades around the LED elements. Figure 39 highlights how simple a media façade can be assembled. In this case, it consists of three elements:

1. The bus architecture (vertical stripes)
2. The light emitting elements (in this case: daylight LEDs)
3. Reflecting, transmitting and diffusing elements (in this case: CNC cut plastic foil)

Figure 39 and Figure 40 give evidence how this media façade are able to communicate in both directions. On the one hand, it acts as a decorative element inwards, and delivering messages to the public outwards. In this aspect, this media façade differs significantly from the BIX, which is an outward-only façade medium.



Figure 40: Media Façade Wall from the exhibition room's perspective (photo by the author)



Figure 41: Media Façade at Kunsthalle Vienna, Project "Archdiploma 2009": Mobile donation application for „Ärzte ohne Grenzen“ (photo by the author)

The first use case was to see this media façade as an ornamental element to emphasize ambient moods in the exhibition room. On the other hand, this media façade communicates with the public audience through the window front of the building. In cooperation with A1 Telekom AG and “Ärzte ohne Grenzen” (Ärzte ohne Grenzen, 2009) a public donation display was implemented.

The application was easy: Every mobile handset owner could send an SMS to a certain 0800 donation application number, containing his name and the amount he/she wanted to donate. Example: “Alex 10”. The result was: Euro 10 were charged on the personal mobile account by A1 and transferred to the donation account. Immediately after that transaction, the façade displayed: “Alex, 10 Euro. Danke!”. - This was a real success story, as it triggered much more donations than other charity activities without immediate feedback to the public audience (see Figure 41).

Chapter Summary:

- The Archdiploma 2009 media façade is a contemporary concept using multicolor LEDs, serving a twofold use-case: Indoor illumination and inside out content transformation
- This façade further serves two types of content: computer generated (ornamental illumination) and interactive content (donation application)
- This concept is extendible on a modular basis in the direction of advertising, public voting or even public TV viewing.

7. METHODOLOGY OF RESEARCH

This thesis analyzes an interdisciplinary topic, which made a mix of various methods necessary. The topic is based on the intersection field between architecture, media industry and urban development. A variety of social, economic and esthetical factors play a relevant role at media façade theory. Apart from these considerations, no closed model does exist today – therefore a deductive derivation seems not feasible.

Consequently a triangulation of theoretical and practical methods has been chosen:

Used Methods

1. Literature study
2. Case Study of recent projects
3. In-depth expert interviews

Ad 1: The literature study gave an introduction to the various aspects of the topic, urban development as the motivation for media façade development, architectural development as the driver for media façade development, state of the art technologies, communication models, business models and light pollution, see *Chapter 5. Literature Review*.

Ad 2: In *Chapter 6. Reference Projects In Austria*, the recent projects in Austria were described and reflected. The author acted as project leader in two projects supported by A1 Telekom AG, cooperating with Kunsthaus Graz and Institute for Architecture Theory, TU Vienna. The projects were an interactive mobile handset game at the BIX façade in Graz (2009) and an interactive donation application on the media façade at the Archdiploma Exhibition Event 2010 at Kunsthalle Vienna.

Ad 3: In order to reflect the insights gained on literature research, four expert interviews were made with leading experts in the field of architecture, media façades, and media business. Valuable inputs led to further conclusions described in *Chapter 8. Interpretation, Summary and Recommendations*, especially as far as the value chain and business models are concerned. In addition, the author participated at the Media

Architecture Biennale 2010 at Künstlerhaus Vienna. There, the main findings were presented and intensely discussed in the discussion group.

Used epistemology: Cultural Constructivism.

Constructivist epistemology (Crotty 1998, p.57ff., p.79) is an epistemological perspective in philosophy about the nature of scientific knowledge. Constructivists claim that scientific knowledge is constructed by scientists and not discovered from the world, by using mental constructs. Constructivism believes that there is no single valid methodology and there are other methodologies for social science: qualitative research. This approach fits to the topic, as the total number of media façades is still below fifty projects (AG4, 2010), (Blinkenlights, 2011) and (Schürer, 2010). Keeping this small sample size in mind, quantitative methods would not bring any additional insight, nor would they generate any generic model (as deductive approaches would generate in nature sciences). Quite contrary to that, positivism claims the authentic knowledge is only based on real experience. Constructivism criticizes objectivism, believing a human can gain evidence of an external “objective” reality (Crotty 1998, p.10, 12ff., 42). Constructivism holds the opposite view, that the only reality humans can recognize is that which is represented by human thought.

Cultural constructivism asserts that knowledge and reality is a product of their cultural context, meaning that two independent cultures will likely form different observational methodologies (Crotty 1998, p.10, 12ff., p.42). Constructivism fits to cultural and arts topics, where human thoughts are expressed by physical artifacts. Therefore, cultural constructivism seems to be an appropriate method to analyze architectural topics, as architecture cannot be analyzed without considering its cultural context.

Used philosophical concept: Grounded Theory.

Grounded Theory is a systematic generation of theory from data that contains both inductive and deductive thinking (Crotty 1998, p.12., 78ff). GT was developed by Barney Glaser and Anselm Strauss (Glaser, et al., 1967). One goal of a GT is to formulate hypotheses based on conceptual ideas. In debate on media façades, the social, architectural and economical aspects are in an early stage of development

(Schürer, 2010). GT seems to be the right choice for a topic, where many conceptual ideas exist, and still no deductive theory or formula exists. Other researcher may try to verify the hypotheses that are generated by constantly comparing conceptualized data on different levels of abstraction, and these comparisons contain deductive steps. Another goal of a GT is to discover the participants' main concern and how they continually try to resolve it – that's why the interviews with leading experts have been carried out. Identifying the possible stakeholders is a mission critical success factor especially for value chain analysis.

The questions typically being asked in context of a GT are "What's going on?" and "What is the main problem of the participants and how are they trying to solve it?". The practical approach is to categorize the findings by dimensionalizing and sorting them. Afterwards, core categories were defined according to the findings. Having identified the categories, the deductive generation of the theory may be started with (Strauss 1987, p.22ff). This approach has been carried out by (Sauter, 2004), who defined the basic forms of media façades.

A categorization of contemporary media façade projects will be shown in chapter 8.8. *Categorization of Example Projects.*

8. INTERPRETATION, SUMMARY AND RECOMMENDATIONS

In this chapter, the personal findings of the author are summarized, reflecting the learnings and insights gained during carrying out this thesis. Finally, recommendations for further in-depth research are given.

8.1. HISTORICAL DERIVATION

In the mid-age, the rate of illiteracy was significantly higher than it is today. In the 14th century, illiteracy decreased by inventing the printing press by Gutenberg in 1460 (Mende, 2008). The church had a strong motivation to spread their doctrines across the population, regardless of age, education and origin. Figure 42 shows a rather unconventional comparison between a gothic cathedrals glass window and the Green Pix media façade in Peking (MAInD, 2008). Surprisingly, both monuments do have the following attributes in common: Firstly, both displays are an integral part of the façade. Secondly, they utilize active light. In the case of the gothic cathedral, sunlight is used, while the Green Pix façade uses active light from LEDs. Thirdly, the gothic façade introduces an iconographical language to narrate scenery from the Holy Bible. The entire setup is even similar to a contemporary photo slide show (e.g. Picasa freeware), while the Green Pix façade seems also to be suitable for pictures of reduced complexity. And fourthly, both displays address the audience in the vicinity of the building in form of a broadcast one-way communication. Both displays are not only capable of transferring information, but also fostering moods and serving entertainment to the audience.

Furthermore, both types occur only in cities and their purpose is to address the urban public audience in the vicinity of the building. A second aim might also be to attract the audience and to cultivate a certain accumulation of people. So, both types of displays might also influence individual's movement (e.g. attract them to visit a certain place). At the first glance, the following difference can be observed: While the gothic cathedral shows a definite architectural language (in Figure 42, the Holy Trinity can be

observed, in each picture and in the entire composition), the Green Pix façade retards this aspect to the absolute minimum: The remaining minimum claim is: The content is the message.

The main difference is as follows: The gothic window façade addresses the **indoor audience**, whilst the Green Pix façade speaks to an **outdoor auditorium**. The gothic window retards the full view to an outside world and it helps to glorify the content taught by the preacher. Their narration is the non-verbal completion to the homily. The Green Pix façade is almost autonomous and completely free of any intrinsic message. The media façade could be even regarded as the message which stands for itself. From these aspects, a direct link between the form of architecture language and the period of mankind can be postulated. Constricted societies, especially in dictatorships, usually develop their own imperial architecture language. This is used to show-off and demonstrate power, and to exaggerate the prominence of the regime and the ideology.

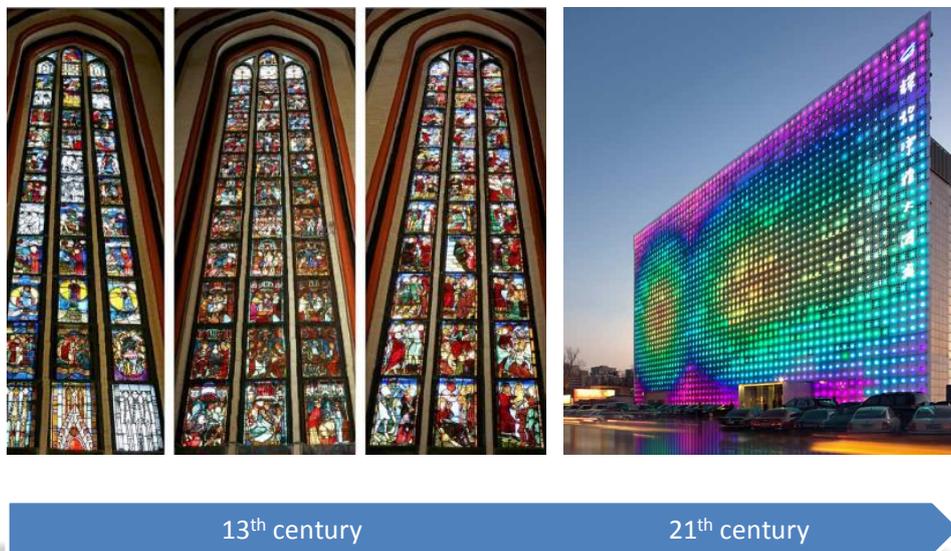


Figure 42: Media façade heritage (illustration by the author)

Open knowledge based societies generally tend to open space for communication.

Interactive media façades or even social medial public walls are not likely to exist in dictatorships. During the beginnings of the 19th century the Austrian State-Chancellor Metternich suppressed opinion freedom, academic discourse and public discussion during the Vienna Congress until the civil revolution in 1848 (Rieder 2006, p.19). Public discourse became common in the last years and created a new dimension of “public audience” in the network space. This is one of the precursors for interactive media façades, as will be described later on. Interactive media façades are still a small sub-segment of media façades, mainly used in the context of exhibitions, museum and arts. This medium has not been disclosed for the broad public as a mass market-commodity. However, it holds a big potential for the future of urban mass communication.

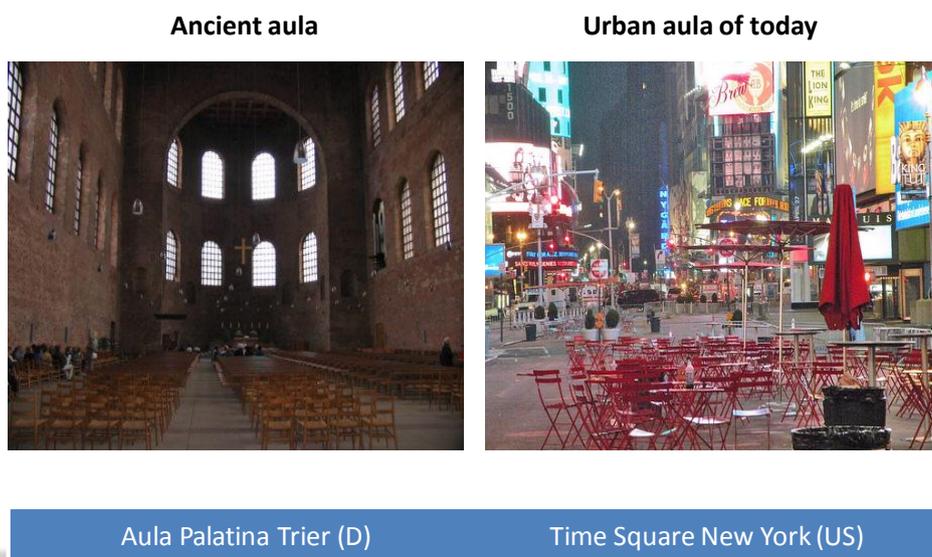


Figure 43: Conceptual evolution of the aula (Illustration by the author)

The conceptual evolution of the aula is depicted in Figure 43. The main functionality of an aula was since its beginnings in the Hellenistic area: Assembly room, but also courtyard. During the Roman Empire, the aula developed towards a representative hall mainly reserved for ceremonial acts. In Christian Basilicas, the aula was the assembly place and praying room for the believers. As already said before, the principles remained the same over centuries: On the one hand, architecture communicates

sacral messages, dignity, augustness, and transcendence. On the other hand, architecture spans assembly areas for communications, sacral or political matters, in order to intimidate or simply to entertain the masses.

By transfer of the ancient meaning of the term “aula” to the media façade topic of today, we can argue the following theory: **The media façade creates a kind of “Urban Aula”, where physical and digital spaces meet. As a consequence, “Hybrid Spaces” emerge, consisting of the physical dimensions, time and the dimensions of communications.**

Driven by the vast penetration of cameras or camera equipped mobile phones, generation of digital content initiated a democratization process in digital media. Basically everybody participates in this process, by making pictures, sending them per email or posting them to a social media platform. **From another perspective, this process can also be regarded as a democratization process of journalism. In this way, a “Digital Publicity” is being generated, which is spreading around the world via high speed fiber networks.**

Digitalization the public space is the logical consequence of this evolution. **Interactive media architecture becomes the perfect urban translation of the social web to form the “Urban Aula”.** This postulate is one major finding of this thesis. Consequently, an evolved communication model will be proposed for describing the bidirectional information flow between interactive media façades and the public urban audience equipped with smartphones.

8.2. EVOLVED COMMUNICATION MODEL FOR INTERACTIVE MEDIA FAÇADES

None of the common communication models are sufficient to describe the various types of public interaction of a media façade with an urban auditorium. A fusion of the Schramm model (Chandler, 1994) and (Kaminski, 2008) with the Berlo model (Berlo, 1960) could generate a major benefit here. Schramm introduces the feedback loop and thus non-linearity, while Berlo brings in the entities which influence the “interpreter”. Applying these concepts in both ways, a contemporary communication model could be

deducted. Feedback can principally be in a totally different setup than the message. This model allows also the feedback messages “B” to be transmitted via a different channel than the message “A” was originally sent with. This model could be even extended towards a circular message-feedback loop, where another effect becomes relevant: Learning effects. Generally, memory effects are not being taken into account in the linear communication models so far.

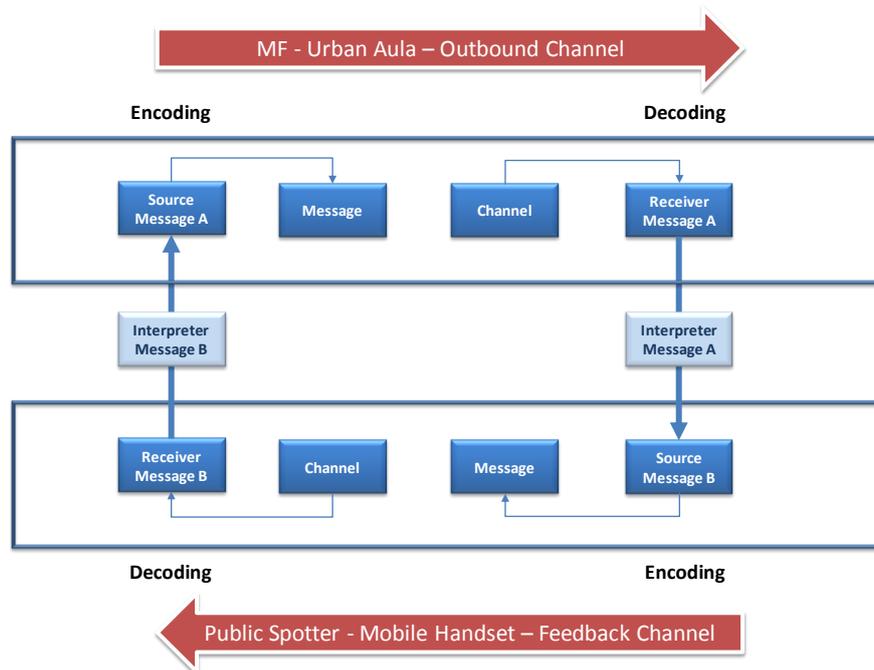


Figure 44: Evolved Berlo-Schramm Communication Model (Illustration by the author)

The proposed model could be the basis for a new “circular, learning curve based non-linear communication model”. This model takes also into account that the channels are not the same in either direction. In the direction off the façade, it is always a broadcast type of channel, which is programmed in a linear or non-linear way. The sender-recipient mode can be regarded as a liner programmed mode, while the interactive mode can be regarded as a non-linear programmed one. Also, the environmental mode is in fact a non-linear programmed mode, see chapter 5.2. *Architectural development as the driver for media façade development.* The back-channel may be assumed to be a mobile handset in most cases.

Consequently it makes sense to model the backward channel totally disjoint from the forward channel. Figure 44 depicts an evolved communication model which describes the media façade to urban auditorium channel and its backward channel more precisely. In the feedback loop, also the data collection and interpretation function is included in the model, refer to “Interpreter message B”. While “Interpreter Message A” is the human, “Interpreter Message B” is assumed to be a computer. It seems to be important to have two separate encoding/decoding cycles in the model.

The “urban aula” determines the effect of the media façade: It becomes the channel itself. A deteriorated “urban aula” means that the communication channel itself is deteriorated.

8.3. IN-DEPTH EXPERT INTERVIEWS

Four leading experts in the fields of architecture, media business and culture have been interviewed. For the interviews, a semi-structured form was chosen in order to ensure a comparison of the answers on the one hand, but also allow unexpected insights and information gains on the other hand.

The learnings from the interviews with the protagonists in media business are included in the following chapters *8.4. Value Chain And Brand Analysis* and chapter *8.9. SWOT Analysis*.

Generally, these interviews show how divergent the ideas and visions are. While architects consider more and more intelligent façades, acting in an increasingly autonomous mode, media business managers fear high costs, low interaction times and thus low commercial reach value, measured in CPM units. Also, there is a severe doubt whether large concepts might be transferred to small markets like Austria. The main argument was: A NASDAQ Tower or an Alliance Arena will never be here in Vienna. However, it might be argued that this view is maybe too pessimistic. In parallel, the architect’s perspective is to invent new materials, new façade designs

fulfilling more and more functionalities, which might be run in either an auto-active, reactive or autonomous mode (Jaschko, et al., 2010).

Arts and culture scene detects a high potential for new forms of communication, media esthetics and instruments to transfer content inside-out (e.g. for a museum or a gallery). For them, technology is only of secondary interest – timeless esthetics and arts representation has first priority.

To summarize, there is no consolidated view on media façades and their future potential for advertising, architectural development, urban development and arts representation.

8.4. VALUE CHAIN AND BRAND ANALYSIS

On the one hand, the building owner of the well-known media façade at Piccadilly Circus London (see Figure 45) is not relevant for the market. What matters here are the advertised brands like Sony, McDonalds, and Sanyo. On the other hand, Uniqua (see Figure 48) as a building owner on the north banks of the Danube Channel Vienna is indeed relevant, as Uniqua promotes its headquarter by a widely seen media façade; in this case, advertising for third party brands would even be counterproductive with regard to making Uniqua prominent as a brand. If a business tower accommodated several companies, the question rises how the media façade space would be split in order to represent all relevant company brands in an appropriate manner.

Another possibility is that the media façade itself has a brand. This is the case for the Green Pix façade in Peking, Piccadilly Circus in London. These façades do have an independent, self-contained identity. The Piccadilly Circus media façade would not alter its identity if the displayed contents are swapped (e.g. the TDK is being out phased against another mass market brand). It is totally irrelevant whether the physical building at Piccadilly Circus is the head quarter of Sanyo in United Kingdom. These considerations show how different media façade brand identities are and therefore may vary the entire media concept or value chain, respectively.



Figure 45: Piccadilly Circus media façade; (University Exceter Blog, 2006)

The most flexible variant is the media façade as an independent brand – all other variants lead to more or less confined media concepts where single companies (owning the building / residing in a head quarter building) are being promoted. Prominent examples for this are Uniqua Tower in Vienna or Bayer headquarters Leverkusen (Figure 46).



Figure 46: Bayer Headquarter at Leverkusen, Germany; (AG4, 2010)

Figure 47 shows the entire value chain model for all types of media façades, which is proposed by the author. This value chain is regarded as the most mission critical success factor for the media façade business.

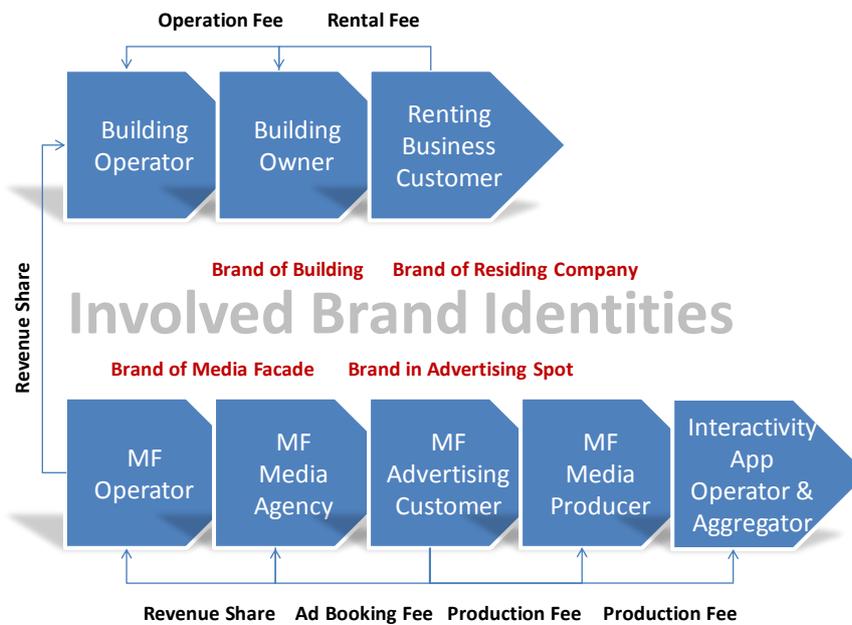


Figure 47: Value chain model for interactive commercial media façade operation (Illustration by the author)

This definition exhibits the boundary to other types of public displays, which are no media façades:

- Media façades are coarse resolution, but high-tech displays which do not interfere with the nature of the building – optimally they are an intrinsic part of the façade or skin.
- Info screens are mid-size public wall mounted LED screens of high resolution. They are already commonly in use at public places, e.g. railway stations, airports, sports arenas. Content is usually video content in a loop.
- Social screens are mid-sized or large wall mounted LED screens, which seem to be interactive screens, but they are not: They are public presentation areas for social media platforms, like it has been shown at the Vodafone D2 booth at IFA, Berlin 2010.

Taking this variety into account, it becomes clear that the entire media production chain has to be reconsidered. For typical formats like billboard or poster, there are learning curves since decades in place. However, the new screen formats demand for new approaches, as far as design, esthetics, narrative and expression are concerned. Methods such as guerrilla or grass root marketing, corporate sponsorship for art projects and events are gaining increasingly momentum (like A1 Telekom AG sponsorship projects with Kunsthaus Graz). Much effort is being undertaken to gain the public audience's attention. As advertising screens at both small and large scales are becoming popular for advertising, video content should also participate here.

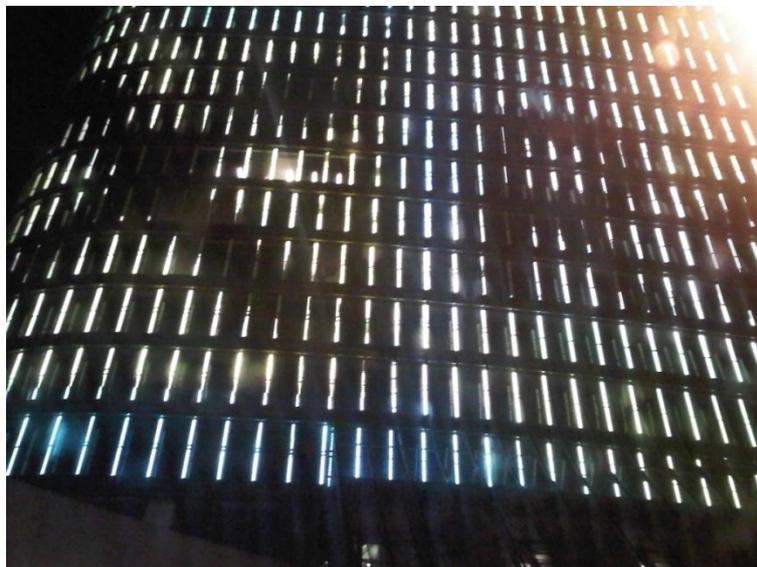


Figure 48: Uniqua Tower Vienna displaying Raiffeisen Logo (photo by the author)

Uniqua Tower in Vienna runs either ornamental illumination in the auto-active mode, or – if at all – image advertisings like shown in Figure 48. The Raiffeisen logo can easily be spotted from the opposite bank of the Danube Channel. Here again, the planners took the geometry of the auditorium space into account for designing the media façade. Without doing so, the reach of such a façade would fade. Other media would win the run for the limited attention of the urban pedestrian.

8.5. INTERPRETATIONS OF CONTEMPORARY SHOWCASES

One learning is that art representation does not at all require really high-tech technologies. The BIX façade is of absolutely timeless esthetics on no-frills basis, only the driving computer server is a recent one. Secondly, coarse resolution is neither a contradiction to interactive gaming, nor to art representation, like shown at several live events.



Figure 49: Litfass Column as a prototype for future media architecture application (Proposal by the author); (Munziger, 2011)

The major learning from the Archdiploma project is, that existing buildings can be easily equipped with temporary media façades within a couple of working days. These types of media façades are of translucent type by principle. Innovative combinations of old-fashioned billboard advertising with new media façade technology have been discussed – **the author proposed a media façade type “Litfass Column”** (See Figure 49).

However, in most cases a proper local analysis should ensure traffic safety in the surrounding vicinity – car drivers should not be distracted too much. This has been considered during the planning phase by Dr. Schürer for the Karlsplatz area in Vienna, Austria.

Interpreting both projects, typical applications of a media façade running in an interactive mode can be categorized into the following types:

1. **Ornamental illumination** - e.g. dependent on time, event or cause
2. **Mass interactive gaming** – rewarding by winning a game or gaining any effort
3. **Public Donation & Public Rewarding** – rewarding by gaining “honor”
4. **Transferring any cultural content** inside-out to the public

Public voting on advertising has been evaluated, but has not been realized so far. This holds the **potential of democratization of public advertising**. Popular advertisings are being pushed forward, while unwanted materials are discontinued from the program. The major benefit for the advertising industry is that the **reach could be measured for the first time really exactly**. Reflecting with the various other international projects, no contradictions to these findings were detected. Autonomous façades running in reactive modus open up another variety of exciting possibilities of reacting to outer conditions of any type (see “Tower of Winds”, Figure 23)

8.6. ANALYSIS OF RECENT BUSINESS MODELS

From the interviews the most relevant inhibiting factors to achieve a successful media façade project become evident:

- Finding an **appropriate place** (comparable with Ginza, Time Square, Piccadilly Square)
- Identifying the **building owner who is ready to transform his façade** towards an (interactive) media façade
- **Attracting business customers willing to invest** in (expensive) advertising media productions suitable for the medium

- **Receiving the governmental approval for installing and operating the façade** with regard to traffic safety, as several governmental restrictions for practical application apply – especially traffic safety is a critical topic

As already explained before, the “urban aula” is part of the channel. The channel determines the reach which can be achieved at a certain location. As far as advertising is concerned, time seems not to be ready by now: Commercial reach value, measured in CPM units, is underdetermined (only Eur 3 – 5). Four brand identities reflect the stakeholders along the value chain: brand of the building, brand of the residing company, brand of the media façade itself, brand of the advertised content.

The three most relevant elements for a successful business model are:

- **The brand: The brand of the media façade determines** the entire business concept and the media concept
- **The location: Integration of the media façade in the relevant vicinity, a content including an integrated story which forms the framework, and the positioning of the entire concept.** The goal is **attracting the masses** in the right moment, e.g. while waiting for the bus/tram.
- **The appropriate program:** The combination of **commercial advertising content with arts representation**

Last not least, the main advertising agencies are the key intermediates between the media façade operators and the advertising customers. It is a matter of proof whether or not a media façade realizes a measurable benefit for the advertising industry, e.g. by meeting key success factors as far as reach and popularity are concerned.

8.7. ANALYSIS OF ARCHITECTURAL & CULTURAL ASPECTS

Although recent examples are manifold, the final debate on how the media façade will evolve has not been finished yet. In this chapter, some aspects from the *Media Architecture Biennale 2010* at Künstlerhaus (Schürer, 2010), Vienna have been considered. Four directions could be spotted, and for each, a specific argumentation

line was presented (see Figure 50). The architect's fraction argues that media façade's right to exist originates from its art dimension. Media façades are a part of modern architecture and represent individuality of the building, creating a distinctive identity.

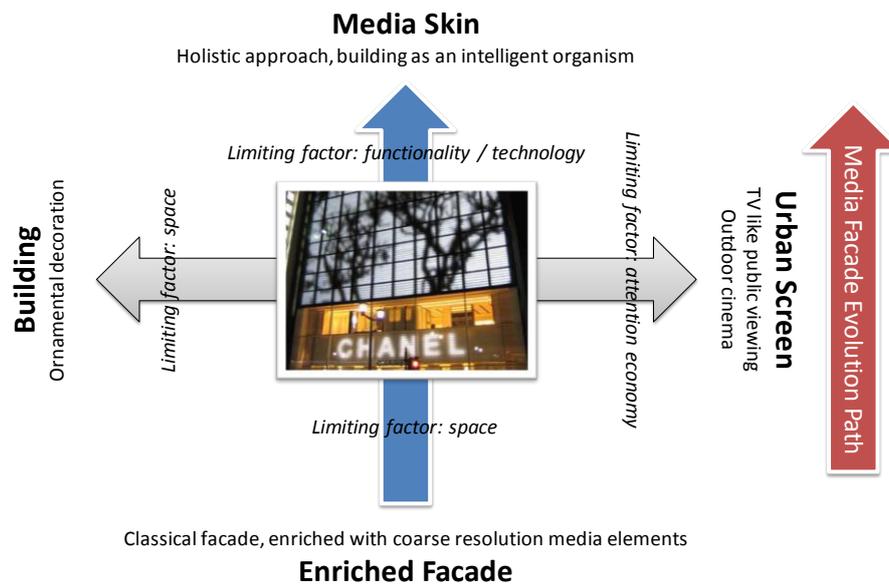


Figure 50: Dimensions of façade evolution (Illustration by the author)

In a consequence, the media façade requires a coarse resolution and must fulfill mainly ornamental design demands and definitively are no TV screens. Any commercialization concept other than generating building identity for itself should be rejected from the architectural point of view. Non-commercial culture concepts should rather foster public art representation areas, enriching them by enabling public commentaries. **The anthroposophical goal is to enrich urban spaces by a democratic culture scene to serve a responsible civil society.** - Critical comments to this argumentation line note that even in totalitarian states mighty media façade projects have been implemented, however, without contributing to urban democratization processes. In this context, mighty light-shows deteriorate to state-controlled demonstrations of power and technological effort. The only limitation is space. In places where that limitation does not occur, huge media façades and even artificial new urban centers could emerge.

More media affine disputants argued that technological effort sketches the path from coarse monochrome media façade elements to high resolution TV like screens, which enable public TV viewing. Urban places would allow public cinema experience. The extreme is denoted by buildings totally covered by TV screens. In this scenario, a couple of restrictions have to be taken into account. Firstly, light pollution is a well understood threat. Light becomes a commodity and its excessive use could turn quickly into annoyance. Secondly, the **limitation is today's fight for attention. All kinds of media tend to grab a small share of the consumer's attendance.** However, time budget for media consumption is limited. **So, the economy of attendance rules the entire media industry.** The **main learnings from the Media Architecture Biennale 2010** at Künstlerhaus are:

- Media façades are elements of the “smart city” concept and the development roadmap will incorporate environmental aspects by means of autonomous energy generation and providing holistic control functions
- The media façade concept on a stand-alone basis will evolve towards interactive ensembles of media façades
- As far as urban development is concerned, media architecture is an important instrument for fostering gentrification processes in development areas
- Technology wise, the media façade pixels will become more “intelligent”, passing through a development cycle from a conventional computer server – bus – illumination rod system towards intelligent autonomous façade elements
- Various types of digital public media will become blurred
- A general challenge lies in the right dose of application. Overplaying might lead to identity loss and annoyance
- Successful media façades are timeless artifacts and a projection area for art representation

8.8. CATEGORIZATION OF EXAMPLE PROJECTS

Following the constructivism approach, the media façade projects shown in the thesis were categorized according to the discussed dimensions of categorization:

Autoactive Type			Interactive Type			Reactive Type		
Purpose	Brand	Name	Purpose	Brand	Name	Purpose	Brand	Name
I	O	Bix - Kunsthaus / Graz	I	O	Bix - Kunsthaus / Graz	I	O	Green Bix / Peking
I	O	Nasdaq Tower / New York	I	O	Ärzte ohne Grenzen / Vienna	A	O	Swiss Pavillon / Seoul
A	O	Bayer Headquarters / Leverkusen	I	L	Ars Electronica / Linz	I	L	Weather Tower / Brussels
A	O	Alliance Arena / Munich	I	L	Blinkenlights / Berlin			
A	O	Uniqua Tower / Vienna						
I	L	New Years Ball / New York						
A	L	Piccadilly Tower / London						

Legend:

Purpose: I: Image A: Advertising
 Brand: O: Organisation L: Location

Figure 51: Categorization of projects discussed in the thesis (method proposed by the author)

Top category is the operational mode of the media façade, which may be alternatively the auto-active, interactive or reactive type. The first subcategory is the purpose, being either brand image or commercial advertising. The second subcategory is brand identity, which may either be an organization's/product brand or a location brand.

Image and advertising are the most dominant use cases in today's projects. The future will show whether or not the autonomous façades running in a reactive mode will find a sustainable business model.

8.9. SWOT ANALYSIS

From all sources, the following SWOT analysis has been derived.

Strength & Opportunities	Weaknesses & Threats
Architecture	
Creating new landmarks / architectural brands	Overplaying could cause declining interest
Reframing of existing buildings	
Urban Development	
Gentrification	Loss of traditional identities
Redefinition of urban spaces – creation of an “urban aula” – in the hybrid space	Increasing light pollution with several negative impacts to humans, animals and plants
Democratization of urban spaces	
Advertising / Public communication	
New way of attracting large groups of urban customers	Rising energy consumption
New way of content presentation: Advertising in combination with arts representation	Business case not feasible in smaller countries yet (e.g. in Austria) due to very low CPM (Eur 3 – 5)
Suitable for mass communication in metropolitan cities	Relatively complex value chain in combination of upfront investment
High frequency change of advertising and/or information material	
Applicable in combination with augmented reality services, development towards “smart city”	
Several new kinds of mass applications: public voting, donation, interactive gaming, art representation, public social media	

Figure 52: SWOT Table (proposed by the author)

8.10. FINAL SUMMARY

Interactive media architecture has been analyzed and discussed from three perspectives; in each dimension - **architecture, urban development and public communication** – certain strengths and opportunities, but also weaknesses and threats arise. Methodology-wise, a triangulation has been carried out, using the following methods: **Literature study, case study of recent projects, and in-depth expert interviews.**

The **guiding epistemology is cultural constructivism**. Constructivism believes that there is no single valid methodology and there are other methodologies for social science: qualitative research. This approach fits to the topic, as the total number of media façades is still below fifty projects (AG4, 2010), (Blinkenlights, 2011) and (Schürer, 2010). Cultural constructivism is furthermore an appropriate method to analyze architectural topics, as architecture cannot be analyzed without considering its cultural context. In debate on media façades, the social, architectural and economical aspects are in an early stage of development (Schürer, 2010). **Grounded Theory** seems to be the right choice for a topic, where many conceptual ideas exist and still no deductive theory or formula exists. A categorization of contemporary media façade projects has been derived from categories discussed in detail, see chapter 8.8. *Categorization of Example Projects.*

Media façades get in contact with the public audience, the public spotter, by optical methods. They can be run in an **auto-active, interactive mode, or reactive mode** (Sauter, 2008). They require optically free viewing space and lines of sight, generating an invisible urban auditorium, forming an “**Urban Aula**”. The definition and its consequences has been derived and discussed in detail. As a consequence, “**Hybrid Spaces**” emerge, consisting of the physical dimensions, time, and the dimensions of communications, see chapter 8.1. *Historical Derivation.*

None of the common communication models of linear types are sufficient to describe the various types of public interaction of a media façade with an urban auditorium. A fusion of the Schramm model (Chandler, 1994) and (Kaminski, 2008) with the Berlo model (Berlo, 1960) could generate a major benefit here. A detailed proposal has been

derived, see chapter *8.2. Evolved Communication Model for Interactive Media Façades*. **The proposed model is a “circular, learning curve based non-linear communication model”, tailor made for media façade analysis.**

Four leading experts in the fields of architecture, media business and culture have been interviewed. For the interviews, a semi-structured form was chosen in order to ensure a comparison of the answers on the one hand, but also allow unexpected insights and information gains on the other hand, see chapter *8.3. In-depth expert Interviews*. However, there is not yet a consolidated view on media façades and their future potential for advertising, architectural development, urban development and arts representation.

Critical aspects have also been discussed. **Economies of attention, information overflow and light pollution are regarded as the most critical points** from a human perspective, while **energy consumption** has to be considered from an environmental view. An important consequence has been detected: **The “urban aula” determines the effect of the media façade: It becomes part of the channel. A deteriorated “urban aula” means that the communication channel itself is deteriorated** see chapter *8.4. Value Chain And Brand Analysis*.

As far as the business models are concerned, **a complete value chain model for all types of media façades has been proposed by the author**. Central limitation is today’s fight for attention. All kinds of media tend to grab a small share of the consumer’s attendance. However, time budget for media consumption is limited. So, the economy of attendance rules the entire media industry. This value chain is regarded as the most mission critical success factor for the media façade business, see chapter *8.4. Value Chain And Brand Analysis*. A profitable operation is not a straight forward assumption. In Austria the applicable **CPM is about Eur 3 – 5 in Austria**, which is very much lower than in the international metropolis cities. Apart from tempting aspects the overall dosing has to be carefully considered. Not every urban society favors living in a Las Vegas-style city, see chapter *5.6. Light pollution – a critical discussion*.

Following the Constructivism approach, the **media façade projects shown in the thesis were categorized according to the discussed dimensions of categorization**: Top category is the operational mode of the media façade, which may be alternatively the auto-active, interactive or reactive type. The first subcategory is the purpose, being

either brand image or commercial advertising. The second subcategory is brand identity, which may either be by an organization's/product brand or a location brand, see chapter 8.8. *Categorization of Example Projects*.

The main learnings from **the Media Architecture Biennale 2010** at Künstlerhaus were included in the analysis concerning the analysis of architectural and cultural aspects, see chapter 8.7. *Analysis Of Architectural & Cultural Aspects*. The author was member of the advisory board and participated actively on this conference were leading experts from the international media architecture scene were present. Finally, from all sources, a **SWOT analysis has been carried out** according the chosen dimensions of triangulation, see chapter 8.9. *SWOT Analysis*.

The main driver for the current media façade development is arts representation and brand image reasons. However, a huge amount of research in various disciplines will be required to foster this progress.



Figure 53: Allianz Arena Munich; (Rademacher, 2011)

8.11. OUTLOOK AND RECOMMENDATIONS

Recent media façades mirror the omnipresence of modern mass media and instruments for interactive mass communication. They can be regarded as forerunners of disruptive developments which can be expected in the near future. Finally, media façades open up a contemporary discourse on urban planning, architecture and media theory. This underlines the interdisciplinary character of this matter. Generally, it seems to be clear that large scale media architecture is still subject to major metropolis cities in the world, where a strong demand for mass market communication exists and a certain affinity and market potential for entertainment and new technologies exist. Therefore, the main developments already took place in China, Japan and the United States. In the following, a few recommendations are given which might lead to foster sustainable business models, and to deepen research for new materials, or applications.

8.11.1. MANAGERIAL RECOMMENDATIONS AND IMPLICATIONS

Recommendations for media managers are:

- Foster value chain development and make lobby for advertising industry (media agencies, large consumer goods companies)
- Lobby with local development offices / city development bureaus to drive gentrification projects and show the full potential of media façades
- Analyze how to transfer experimental projects toward commercially feasible projects
- Calculate investment comparison for digital signage (high resolution screens) and media façade (low resolution façade type)
- Do intense research on advertising programming: A mixture of commercials and art representation seems promising

8.11.2. RESEARCH RECOMMENDATIONS AND IMPLICATIONS

Recommendations for researchers are:

- Analyze long term acceptance of existing projects
- Evaluate public attendance (e.g. with focus groups, with eye tracking glasses)
- Evaluate new forms of democratic advertising (public rating)
- Research on applications for reactive skins – e.g. for energy saving topics
- Research on applications for interactive skins, and how to engage the public audience
- Discuss the appropriate number or density of signal architecture in a city, and the negative implications of an excessive rollout of such projects

8.11.3. INDUSTRY RECOMMENDATIONS AND IMPLICATIONS

Recommendations for material producing industry and architecture are:

- Design new buildings – adapt existing buildings (gentrification process)
- Energy – foster energy autonomous building technologies
- Evaluate “intelligent façades” – energy, mass communication, and individual communication (LTE)
- Develop media façades which are translucent for 3G and 4G signals or even have integrated signal repeaters in order to provide an appropriate wireless broadband indoor reception
- Develop new types of advertising buildings, such as the “Media Litfass Column (see Figure 49)

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9.4. INTERVIEWS

In the following chapter, four protagonists are interviewed on the topic. Dr. Oliver Schürer has organized the media Architecture Biennale 2010 at Künstlerhaus Vienna. Peter Pakesch is the director of Universalmuseum Joanneum Graz and as such the curator of Kunsthaus Graz with its famous BIX façade. Robert Theuermann is senior expert at Media Austria, and Hans-Jörg Hosp is COO at Gewista Austria.

9.3.1. INTERVIEW WITH ROBERT THEUERMAN, MEDIA AUSTRIA WERBEGMBH VIENNA

(Theuermann, 2010)

Mr. Theuermann, how do you appraise media façades as instruments for interactive mass marketing?

Well, I think the entire building becomes an advertising medium. It might even get more powerful than classical billboard advertising.

What are the key success factors from your experience?

At first, we have to consider the location of the building. Location is generally the most critical factor for outdoor advertising. Why? The location determines the reach which can be generated. Reach is defined as people frequency multiplied by individual attention. Viewing times are very short in many cases, often merely 2 – 3 seconds. So, locations where higher viewing times can be achieved are preferred. E.g. “Infoscreen” at underground stations benefit from passenger’s waiting times.

Generally, I think that large surfaces attract the masses for public events. This means that the surrounding area of the building must be taken into consideration. A media façade should “play” with public space and its auditorium.

What do you think about interactivity? Could this be a chance to establish novel ad formats?

I’m not sure about that point. People are in a hurry and don’t like intrusive advertisings. This could turn out quite counterproductive. Generally, there is a chance for new ad formats, however, x-media concepts are lacking. Such a concept must under all conditions be part of an integrated x-media format, which can be run on TV, print, mobile handset and in addition on a media façade. On a stand-alone basis, interactive formats are not supposed to be successful.

On the other hand, events with artists, e.g. techno live events, are very successful. The aim of this kind of event is not advertising in the inner sense.

The biggest challenge to create such integrated x-media ad formats are the companies themselves...responsibility is dispersed between public relation, marketing communication, online portal and product management departments.

How would you calculate the CPM for media façades?

As I have mentioned, the average viewing time is estimated to be 2 – 3 seconds. Car drivers are assumed to look only for 1 – 2 seconds at the

façade. It is absolutely crucial to plan the auditorium, as you call it the “urban aula”. You may assume that some 33% of the public audience will actively watch the screen.

In consequence, very detail reduced subjects, e.g. are preferred. I think this approach suits an image clip best. Content already available for classic campaigns are not optimal for this purpose. It seems to me that the content has to be created tailor made for media façades, a one-to-one transformation from classical ad content is not suitable at all.

Further, we have to consider a couple of parameters. How long is an add active on the façade? How often will it be changed? How long is the playing time in the course of a day? Can the media façade only be watched during dark sky times? How does the time of the year, summer/winter and weather conditions influence the public attention? All these influences can only be estimated roughly, research is rare in this field.

Indoor screens may generate up to Eur 15 – 25 CPM. The well-known “Infoscreen” is prized by Eur 21; so I would estimate the CPM for a public media façade with Eur 3 – 5. That seems quite low, but if you consider the high frequencies in urban areas, this value accumulated to high amounts of advertising spending in total. What does that mean? If the reach on a public place is some 100.000 persons during the active hours of the media façade, the commercial value is Eur 500 per day, or, if projected to the working days of a month, the commercial value is Eur 10.000, respectively.

A big opportunity, however, is the attractiveness for photographers, who spread their pictures across the world via social media platforms. An outstanding media façade building could become well-known on an international level quite soon.

Do you know the “Weihnachtsfenster” at the Café Landtmann façade? This project falls into the category sponsored art project. Although this is

a traditional projection, huge sums are offered to the advertising customers. The reach is regarded as very attractive due to the crowded vicinity during x-mas time.

Mr. Theuermann, thank you very much indeed for your time! - Interview was taken on Nov. 16th 2010 in Vienna.

9.3.2. INTERVIEW WITH HANSJÖRG HOSP, COO GEWISTA VIENNA

(Hosp, 2010)

Mr. Hosp, how do you appraise media façades as instruments for interactive mass marketing?

In my opinion, this topic is very critical from the commercial standpoint. "Infoscreen" is a great success story, but this is an exception rather than the common. Generally, I think media façades are not marketable in Austria by now.

Do you know the Allianz Arena in Munich? Nobody in Austria could afford such a project in Austria, not even Telekom Austria, one of the largest advertising customers, would spend those amounts of advertising budget. The main problem is that the Austrian market is too small for such big projects.

What are the key success factors from your experience?

At first, the location is the mission critical factor. There is simply no place of equivalent relevance of a Time Square. Uniqua did a nice job. This building is remarkable, as it fits nicely into the Danube Channel skyline. However, this is rather an image story. Neither Uniqua nor Wiener Städtische would accept to sell media façade space as a public advertising board. Their interest is more about image and art representation.

Secondly, the situation of the public viewer is of great importance. Why is "Infoscreen" so successful? Passengers in a waiting situation are seeking for a convenient time-killer. So, the watching times go up to one

subway interval (3 – 5 minutes). That’s why the CPM for “Infoscreen” is much more attractive.

What do you think about interactivity? Could this be a chance to establish novel ad formats?

I have doubts about that. Generally, we have to consider the content issue. As far as any animated picture sequence is concerned, we face certain restrictions. The minimum movie setup time is 2 seconds, and the minimum display time is 10 seconds. So, the number of subjects per minute is restricted to five. That has been agreed on with the governmental traffic security board (in Vienna: MA46). The aim of this regulation is not to distract traffic. Static displays are generally uncritical.

The coarse resolution of media façades is in fact an opportunity – it can be argued that the overall impression fades away when you pass by in the very near vicinity.

How would you calculate the CPM for media façades?

As far as the CPMs are concerned, a range between Eur 4 – 5 is realistic. From this it is evident that a commercially sustainable operation is not feasible. Imagine the “Megaboards” along eastbound A4 highway: The daily frequency is some 180.000 cars. The attention rate can be estimated with some 30%. So, some 54.000 persons would watch the ad for 1 – 2 seconds, corresponding to a reach value of Eur 216. This makes some Eur 1.500 per week, or Eur 6.000 per month. A profitable operation is therefore not realistic.

Many places are not really suitable. Either they would disturb traffic, or distract the public. We have learning’s with digital signage at SCS Vösendorf. The attention of the shopping pedestrian is lead to the display windows. If digital signage displays are mounts on the ceiling, they distract the customer’s attention. In other words, the economy of attention is limited. If you do too much, the measures get counterproductive.

But generally, the CPM market level is much lower than the benchmarks for D and CH.

Do you see any opportunities?

Maybe yes, on the long run. My business case would improve if a) the content becomes more short-time stuff or b) the requested content tends to be more video. My staff needs eight hours to exchange all boards in Vienna. We have relatively high operational costs for logistics, such as printing, distribution the paper materials and so on. If an electronically online process based on electronic billboards/electronic façades becomes more efficient than the manual process we have today, my interest rises. But I don't think that's a short term development.

Mr. Hosp, thank you very much indeed for your time! - Interview was taken on Nov. 19th 2010 in Vienna.

9.3.3. INTERVIEW WITH DR. SCHÜRER (TU VIENNA)

(Schürer, 2010)

Mr. Schürer, the Media Architecture Biennale 2010 you organized at Künstlerhaus Vienna was a great success story. What are your personal takeaways from this event?

Well, I think it was the junction of smart urban technology with "green" technology. I am personally not happy with the term "smart city", although I have not found a good alternative yet [thinks]... the smart city concept is not wrong from its principles, but the green aspects were missing in the definition phase. One example: Imagine a modern media façade and trees in front of the building. The smart & green concept claims an integrated approach for watering the trees, cooling down the building by using the chilled air underneath the trees and generating electricity for the water pump and air-condition by photovoltaic cells on the façade. A further step forward is the cybernetic façade. Their mechatronic technology is still a big challenge in terms of robustness

and sustainability. However, it is possible to use dynamic ornamental animations for mass communications – all without LED equipped displays.

The second point is the step from one media façade towards an ensemble of media façades. This is a remarkable step. One example can be seen in Hong Kong. Use benefit lies in sharing the economy of attention among various buildings. Every building gets a certain time slot for its media façade show, this minimizing their interferences amongst each other.

What are the perspectives and use cases of media façades in the next decade?

Generally, I see two fields of application: The first one is about gentrification in urban development areas. It would be possible to upgrade certain areas by contemporary light concepts. So, dark districts could be up valued towards lifestyle areas. The second one deals with reframing of existing urban places. New cultural value could be generated by redefining historical substance by light concepts and new narratives.

What kinds of future aspects for media architecture innovations do you see today?

Interactive media equipped surfaces will spread to other dimensions than the vertical façade only. Why not extending the concept towards interactive floors, interactive tables, or interactive ceilings?

As far as the pixel technology is concerned, they become increasingly “feature rich”, carrying integrated functions like network interface, sensory, and actuators. Product wise, I observe an increasing level of standardization on the market. In parallel, higher resolution is coming step by step, which enables the media producer to run higher quality content.

Generally, I think the various types of media technologies will cease to be distinguished. They reflect the actual state of the art, mainly driven by

technology determinate form factors. However, the context of usage will develop further and consequently, totally new application paradigms will occur sooner or later.

However, what opportunities and threats can be spotted?

I see several opportunities, especially when it comes up to reframe existing buildings in an urban context. So it would be possible to alter or develop complete new identities. This has very much to do with innovative city marketing concepts. The main question is: Is a certain building / an identity a central value or an add-on? Classical urban illumination could also cease in favor an urban ambient illumination provided by façades.

The critical aspects are the threat of diminishing local characteristics. Also, we have to watch the energy consumption, as not all media façades are “green” today. Last not least, we should consider the light pollution matter. If overplayed, media façades could give reason for annoying the citizens.

Mr. Schürer, thank you very much indeed for your time! - Interview was taken on Nov. 22th 2010 in Vienna.

9.3.4. INTERVIEW WITH PETER PAKESCH (KUNSTHAUS GRAZ)

(Pakesch, 2010)

Peter, can you tell me the story of the creation of the Kunsthaus façade.

Peter Cook considered an organic media façade, covering the entire building. At first he had the vision, the development and realization variants were developed later on by Niels Jonkhans. A major challenge was the two dimensional curvature of the surface. LED segments were too expensive at that time, so realities:united came up with an innovative solution: Behind 1069 acrylic façade elements, 930 circular neon tubes should be installed. These are standard type, absolutely timeless.

What kind of programs do you run at the BIX façade?

We run two core areas of activities:

1. *Artists produce and play their programs; we have now some ten programs. One example is Thomas Baumann, who was inspired by Bach's Fuga VII to create an animation on the BIX façade, dealing with rhythm, scale and light. These projects accentuate the entire organic building as such.*
2. *Interactive Projects, where the BIX reacts to the pedestrians. In one project, the BIX reacted on shouting. Actors from outside bring life to the façade, it invites for public interaction.*

What are the success factors for these art projects?

We need first class artists who understand the character of the façade and its musicality and rhythm, electronic imaging, architecture and dramaturgy. Prerequisite is the cross functional understanding of these matters; then it leads to an artistic discussion. The development times for successful projects are minimum one year.

What is your opinion on high resolution media façades?

High resolution media façades are more like commercial TV screens, which often appear a bit tawdry by time. These are commercial screens, not suitable for timeless art purpose. Also, production cost for these screens is much higher, as high quality film material is required here. Only few places are suitable for such screens, like Time Square in New York, or in Tokyo.

Wow would you delimit a media façade from a commercial high resolution screen?

A media façade is already a part of the genesis of a building, and not an add-on. It is meant to be artwork, which is of timeless value. High tech is not in focus, it's more about interaction of the entire building as such with its public audience.

What are the perspectives for the future?

We do not plan technological developments; we have recent driver software which is a universal tool for the artists. I hope that new artists will find new ideas, new ways of interaction, and will create exciting new programs. It is not high tech what's in our focus; we aim lively interaction with architecture (the organic building) and the public.

Peter, thank you for your time and the interview, and I wish you all the best for 2011! - Interview was taken on Oct. 18th 2010 in Vienna.

9.5. ABBREVIATION REGISTER

Term	Description
CD	Compact Disk (for music)
CMS	Content Management System
CPM	Cost per Mille (Measurement for the advertising reach: cost for thousand contacts)
CRM	Customer Relation Management
DTMF	Dual-tone multi-frequency signaling
GDP	Gross Domestic Product
GT	Grounded Theory
ICT	Information and Communication Technologies
IFA	Internationale Funk Ausstellung Berlin, http://www1.messe-berlin.de/vip8_1/website/Internet/Internet/www.ifa-berlin/b2c/index.html
IVR	Interactive Voice Response System
LED	Light Emitting Diode
LTE	Long Term Evolution, mobile communication technology
ÖAMTC	Austrian Car Drivers Association; http://www.oeamtc.at/
TCP/IP	Transmission Control Protocol / Internet Protocol
TU Vienna	Technical University Vienna, http://www.tuwien.ac.at/
3D	Three Dimensional