

Media-surface design for urban regeneration: the role of colour and light for public space usability

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The best use of media surfaces, urban screens and digital technologies in relation to urban communication leads to a massive use of lights and colours to make architecture visible and perceptible and they are thought to be communicating social, cultural or political messages aiming to astonish people and capture their attention. The consequences of this evolution are to be seen in the changes regarding the city's physical aspects and the role of culture in the public environment. The media architectural surfaces can be useful means to stimulate people and invite them to have a deeper cultural sensibility. The aim of this paper is to describe the new design approaches to the use of chromatic and bright technology for the construction of media architectural surfaces. Especially it analyses the communicative and perceptive role of colour and light in the urban context and the relationship between architecture and its users.

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Introduction

“Right when the magnificence pervades most of the work, the conventional description is replaced by means of cinematographic devices. Architecture expresses itself both as an event as well as space.” (Bernard Tschumi, 1996) [1].

From the visual point of view (moving pictures), the great diffusion of bright and colourful urban screens that cover many architectural facades engenders urban dynamics. The goal of these surfaces is to increase the visibility of architecture in the urban environment already invaded by the visual chaos of night-time lighting (street lighting, car headlights, spotlights etc., electric/electronic signs and so on) and colours of daytime advertising (billboards). To distinguish an object or architecture in the midst of this explosion of urban static advertising, the architects try to attract the viewer with increasingly dynamic and astonishing projects. Colour and light are the perceptual tools to reach this goal. In this evolution and research to amaze, we experience the most advanced technologies and materials, originated from the fields of industrial chemistry, electronics, nanotechnology, aerospace, and smart systems.

Nowadays, the great evolution of the LED technology allows the creation of high-resolution screens, where the perception of the image is dynamic, and above all, instant. The high resolution of the screen, made up of millions of pixels, allows the usability of the event and the perfect perception of the whole image even when the spectator is close to it. The evolution of the LED screens or displays leads to the creation of media surfaces with smart technologies, which adapt themselves to the weather conditions and which are often powered by the combination of lighting systems (LED, optical fibres, etc.) and photovoltaic films.

One of the oldest examples of urban screens with high-resolution dynamic images is the historic screen of Nasdaq Market Site (eight floors high) built in 1999 in Times Square in New York. More recent are the glass brick towers integrating a LED system such as the ones created for Crown Fountain (2004) in Chicago. It is a digital tower designed by Catalan artist Jaume Plensa and executed by Krueck+Sexton Architects (Figure 1). New products are LED-integrated systems like Mediamesh® (a stainless steel wire mesh interwoven with LED lights that can transform any building into a dynamic, vivid experience of communication), and Illumesh® (GKD metal fabric illumesh uses outboard LED stripes to project imagery onto the architectural stainless steel façade surface) or transparent media façades like Lamellae® by the German company ag4 media facade (that in 2009 became Kronhagel Mediatecture) conceived together with GKD, a specialist for industrial meshes. For example, an urban digital screen or media façade made with the Mediamesh® system was installed in Milan's Piazza del Duomo in front of Palazzo Arengario during its restoration from 2007 to 2010 (Figure 2).

As regards the examples mentioned above, the colours used are the ones of the additive synthesis, the ones used for the computer systems and for the digital screens: RGB—Red, Green, and Blue—in several tone and intensity variations and exploiting the LED brightness.



Figure 1: Crown Fountain, Chicago, Jaume Plensa and Krueck+Sexton Architects © Photo: Krueck+Sexton Architects (right).

Figure 2: M.I.A.—Milano in Alto, temporary urban screen, Milan © Photo: Francesco Carcano (left).

Another kind of planning approach to media surfaces in urban space is based on mega-pixel and on the so-called low-resolution urban screens. This type of screens is often used to create real media and architectural façades not only for temporary digital screens covering partially the façade. Of this kind of urban screens and low-resolution media surfaces there are many world-famous examples created by realities:united, a group of German artists. The studio realities:united patented the BIX system applied to the exterior of Kunsthaus Graz (Graz Art Museum, 2004) and then to the light and media installation SPOTS (2005) in Berlin. As regards the Graz building, the architecture itself became a communication and interaction media. It works by means of hardware and software devices enabling the users to send messages, which appear on the building façade. This way the Art Museum has become a sort of landmark in the Graz skyline, a symbol attracting the attention of the whole city to the architecture (Figure 3). In this case the colour of the façade's plastic covering is green-blue, from whom the sources of the neon light shine through, and which are circular and white as if they were big pixels. The final result is a big white and black screen whose images are created by turning on and off all the lights. For this reason the transmitted images could be seen only at great distance, that is, from the city centre. The exterior colour was selected in balance with the green typical of the natural landscape around Graz.

Today the media surfaces are comparable to a television screen, transmitting to the user image and sound information in the form of an electronic signal visible on a display. In this case the user plays a passive role: he/she is a spectator. This is the way that many urban screens and media surfaces work because they have only a commercial function and they are not interactive.



Figure 3: Art Museum Graz, by day and (left) and by night with activated BIX system (right) © Photo: Katia Gasparini (left) and realities:united (right).

Therefore, media surfaces are often created without any planning research, no matter if they are sensorial (synaesthesia), perceptive or semantic (regarding the hidden meaning of words and of the graphic signs such as logos, symbols and pictures).

The tools, which are available nowadays to achieve the semantic content of these façades, are the application of advanced graphics tools, high interactivity of electronic systems, cognitive concepts, and neuromarketing to coerce the user. For this reason, the design and the implementation of the communication of digital surfaces require a detailed study for setting programmes reserved for the user communities. To plan the contents to be shown on the urban screens and media façades (e.g., movies and advertising), the specialists utilise research results from environmental psychology and advertising psychology.

The project about the subjects and the design of the media surfaces should take first into account a survey of the chromatic and luminous perception devices and their leading role as regards the analysis

of the accessibility, usability, transparency, synaesthesia and relational capacity requisitions of the subjects transmitted by the screens.

These requirements can be described as follows [2]:

1. *accessibility* and usability of media surfaces: guidelines can be thought to applying ideas related to meta-advertising or one-to-one oriented communication language;
2. *translucency content*: physical transparency equal transparency of media (content=message);
3. *synaesthesia*: implication as regards multimedia works and the use of visual, auditory and olfactory signals;
4. *interpersonal skills*: relational skills; ability to create interactive works, teaching and research programmes using integrated media system and architecture.

This approach was applied to the project M.I.A.–Milano in Alto (Figure 2). Unfortunately everything about it was managed according to essentially commercial and institutional needs as well as sports events [3].

For the realisation of these requirements a planning method project of urban screens and media surfaces is necessary and it has to be connected to the urban communication and to the social and environmental background. This new approach uses as its principal communication device colour and light for active support, and architecture for static or dynamic support. This seems to be an evolutionary approach to what has so far characterised the setting up and communication of the digital city. Before today buildings had only the function of passive support of the urban scenes as, for example, M.I.A. in Milan (Figure 2).

Nowadays the urban communication is typically commercial. Digital technology is at the service of small trade and of self-referring façade systems as video walls, urban and interactive screens.

Can we give a useful and social function to communication tools such as media façades and urban screens that apparently seem to be used only for advertising?

The urban screens are now widespread and published in architectural magazines. They represent the translation of print advertising onto digital screens.

What is the difference between these various façade types?

A video wall is a set of video screens linked together such that every screen shows only a piece of the whole picture, alternatively, the same image is reproduced on every screen.

The use of video screens, first analogical then digital, and the realisation of video walls dates back to the second half of the nineteen sixties when video art and video installations were spreading. At that time the images were black and white, only later on the first colour television with the cathode ray tube started to spread.

The relationship between video installations and informatics and electronics devices that are used to produce, elaborate and spread images are nowadays integrated in the interactive façade installations. It is about installations able to change in relation to the user, who acts as principal actor during the work creation.

Urban screens are created with digital technologies. The aim is to transmit information by means of videos and movies (whose duration and form are always different) about commercial, cultural, and educational topics. They are systems which can cover partially or totally the building and the shop windows.

The interactive areas are used as covering or casing of contemporary architecture. They are made with interactive systems. It is about systems whose items and space are able to relate themselves with the individual, social and environmental changes (user's movements). They are made of electronic technology and intelligent systems based on the use of sensors.

The application of the kinetic and embedded systems on the architectonic surface, whose aim is to create a relation between the user and the environment, seeks to create a kind of architecture, which can be defined as interactive or responsive or cybernetic [4].

Anyway, thanks to the spreading of portable screens such as mobile phone, laptop computers and other network-connected media, the urban area is being invaded by portable screens of different sizes.

Locative media are digital means of communication applied to real places and can cause real social interactions. They are characterised by the exclusive use of mobile technologies such as Global Positioning System (GPS), laptops and mobile phones.

They are devices used for the creation of media space. “Locative media is a term used to indicate the set of all place-bounded communicative activities, generally collective and collaborative, which consist of different forms of geo-spatial annotation and experiential mapping (Bleecker & Knowlton, 2006), or also of art, narrative, recreational or theatre events as well as the several applications allowed by the local social networks (from Gowalla to CriticalCity), whose different location and positioning technological advices (GPS, RFID, wireless networks, pc, smart phones provided with location-based software such as wearable and Bluetooth) are critically re-used according to an anti-corporate, user-oriented and bottom-up perspective (Hemment, 2006; Townsend, 2006) generating new forms of active urbanization” [5].

Integrating in this way the concept of Locative Media with the one regarding the urban screens, is it possible to bestow a socially useful function to a cognitive device being apparently useless (only commercial) as, like for example, the media surfaces and the urban screens?

Nowadays urban screens are widespread and they stand for the translation of the paper advertisement into digital screens. Not only in the form of urban screens. Media architecture has become icons (landmarks) and symbols of a commercial reality. In this sense, there are many examples such as the colourful and brightly illuminated stadiums conceived by Herzog & de Meuron in Basel, Munich and Beijing, and above all, the pavilions built for world expositions that have taken place in recent years.

Urban potential of architectural surface and its colour and light elements aren't absolutely adequately valued and socially used. The integration of the technologies regarding the urban screens with the ones linked to the locative media could change the fruition of the urban experience into a new 'increased' space dimension. It is enough to think in this sense of the role played by location devices such as GPS, which makes the real and the virtual space correspond to each other by means of an active mapping. The problem, which has popped up recently, is that the user can no longer take his/her eyes off the smart phone. Then, how can the architecture interact with him/her?

Maybe it is time to think about a new planning approach linking the building to the city from a communicative point of view. This approach should be thought to develop media devices allowing social and multicultural integration during the conception, planning and construction phases of the architectural media surfaces.

For this reason, a planning model can be thought of which integrates three different approaches according to the intervention scale:

- *a social and ecological approach* to the relationship between architecture and city users;
- *a design approach*;
- *a building approach*.

The model proposed is based on three levels with the following goals:

1. *perceptual and cognitive surface media accessibility*: for example, the study of social utility aiming at incorporating social content, interactivity of human-urban contexts, and the impact on sensory and cultural perception (dynamic and coloured images);

2. *modular construction* of urban screens based on the context of urban environment and architecture (integrated in the building). The aim of the modular construction is the realisation of an integrated citywide corporate;
3. *customer-oriented and sustainable service of urban screens*.

The interaction between users, cities and architecture

The media surfaces are made up of three systems. These systems are conceptually and objectively different from one another: architecture, art and media. At the heart of the systems there is the user.

These three systems are interfaced with the environment and interact with the user through formal, cultural and social aspects. The interaction takes place concretely through the perception of verbal and pictorial messages realised with the aid of technology, and colours and light.

The cultural and social integration is realised with the use of proper tools referred to each of the three systems identified. They are: the monument (for architecture), the advertising (media tool) and the meta-advertising (for art). Specifically, tangible tools are: construction, advertising screens and messages transmitted by the artwork. The communication between the three systems integrates a real dialogue between the building and the place, using the vocabulary of media communication.

This way of working requires a medium to long-term monitoring of the dynamic media surfaces to assess their impact on social and urban streams (re-territorialisation), on the popular and productive hybridisation (functional) and the adaptability of the system in the context in which it is located.

The integration of the three systems (architecture, media, art) is clearly visible during two national and international events such as Expo Milano 2015 and *The Floating Piers*, an installation on Iseo Lake in Italy from 18th June to 3rd July 2016.

For Expo Milano 2015 as well as for other exhibitions, art and architecture regarding the different pavilions were communicative devices for the countries they represented. Each of them was the symbol of the nation and its culture. Every single pavilion was therefore a representative icon, with a deep impact on the user, which is visible thanks to forms, colours, materials and lights. Expo pavilions can be compared to communicative devices linking visitors and environments (local social integration and the interaction with the nation's specific culture).

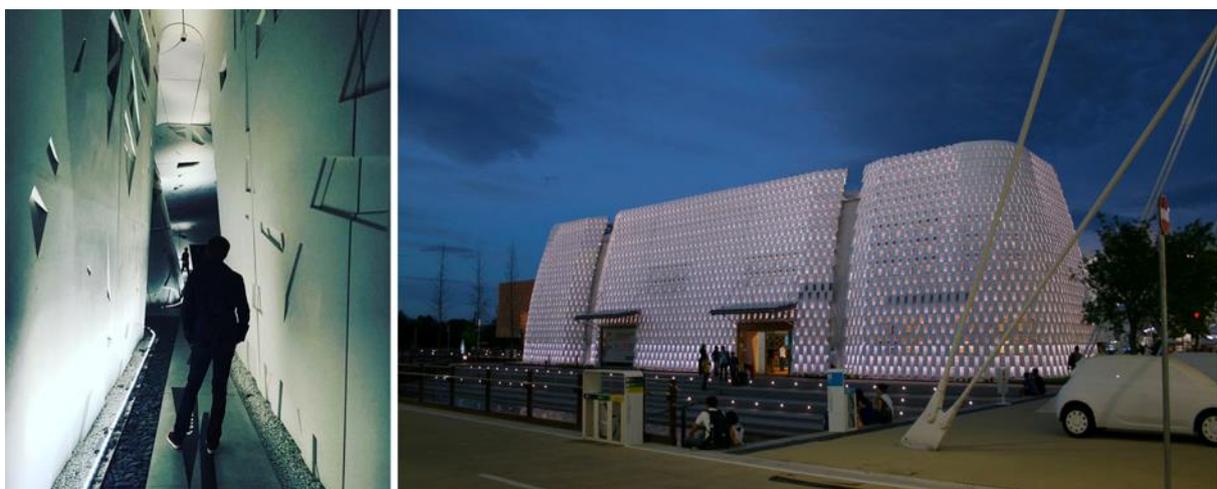


Figure 4: Expo Milano 2015 (left), Italian Pavilion, interior view with white LED lighting ©Photo: Federico Bulfone Gransinigh.

Figure 5: Expo Milano 2015 (right), Intesa San Paolo Pavilion, night view with white LED lighting ©Photo: Alessandro Premier.



Figure 6: Expo Milano 2015, Kuwait Pavilion (left), night view, with RGB LED lighting ©Photo: Alessandro Premier.

Figure 7: Expo Milano 2015, Enel Pavilion (right), night view, with RGB LED lighting. Architect: Piuarich, Lighting Design: Claudia Lacopo-Esa Engineering ©Photo: Claudia Lacopo.

According to this aim, during Expo Milano 2015 several chromatic and light technologies were used: from the monochromatic casings, the eco-friendly ones, to the colour-light performances. As regards the Italian pavilion, the Intesa San Paolo Pavilion, the Enel Pavilion and the Kuwait Pavilion, they surely differ in the type of light used. (Figures 4-7).

These pavilions focused on the creation of an almost monochromatic casing (white), made of different materials, but differing one from the other in the treatment of light. The white light of the Italian Pavilion and Intesa San Paolo Pavilion played with the shadows and achromatic colours, while the Kuwait Pavilion performed coloured lights at night.

It's still a white light that characterise by night the red pavilion of Vanke China designed by Daniel Libeskind. The form of the corporate pavilion for Vanke China recalls the symbol of the Chinese dragon. Actually, Wang Shi, Chairman of Vanke, states that with this pavilion the Vanke society proposed the concept 'shi-tang'. Shi-tang means 'canteen': "We just want to express our idea of urbanisation and community by means of the experience of food. Food is one of the best ways to understand the culture of a nation: the ritual of eating together and of talking to each other is important because it allows everybody to get to know each other" [7] (Figure 8).



Figure 8: Expo Milano 2015, Vanke Pavilion, by day (left) and by night (right). Architect: Daniel Libeskind © Photo: Katia Gasparini (left), Federico Bulfone Gransinigh (right).



Figure 9: *The Floating Piers* by Christo and Jeanne-Claude, 2016, Lake Iseo, Italy. A temporary land art installation ©Photo: Katia Gasparini.

Christo and Jeanne-Claude's installation "*The Floating Piers*" on Lake Iseo (Italy) is a land art design (Figure 9). It is a temporary project and a floating 3km long pier, a freely accessible walkway across the Lake Iseo waters made up of a modular floating dock system of 200,000 high-density polyethylene cubes covered by 70,000 square metres of yellow-orange fabric.

The orange sign spreading over the lake's water and surrounding San Paolo Island reflects the pier sign in the lake basin and is visible from everywhere. The colour of the fabric is a hot and golden yellow-orange that sometimes thanks to the sunlight becomes iridescent and sparkles on the water.

The impact of the orange *Floating Piers* on the green-blue lake water creates a contrast of complementary colours, which is highly visible and plays an iconic role.

This installation stands for the integration of art, landscape and user, as the user himself/herself is actor and at the same time an important part of the whole installation.

The installation has almost become a social phenomenon, overcoming the concept of media. Large crowds visited it: almost 70,000 persons per day, so access had to be constantly controlled. The installation increased its visibility and gave it worldwide exposure.

The design process between colours and light

Nowadays the interaction of user–city–architecture (or user–landscape–architecture) seems to have become increasingly widespread and connected to different *devices*. This evolution leads to the construction of a digital map (network) overlapping the *urban map* and finding convergences of locative devices and virtual tags, both in dialogue with screens located in the urban space.

How can this project be approached? Taking into account two essential points of view: a planning-constructive one and a psychological one.

- a. From the *architectural design and building construction point of view* it is deemed essential to make an analysis and classification of both the architectural systems involved in urban communication (temporary architecture, urban screens, media facade, media event, site-specific wall screens or video walls, etc.) and the materials and technologies available today: iridescent coloured coatings, saturated colours and the prevalent use of primary colours, self illuminating materials arising from smart materials, etc.
- b. From the *sociological standpoint* the analysis is related to the sensory quality of the urban communication systems and urban context. The physiological and psychological effects of the transmitted images, their acoustics, their tactile, olfactory and mostly visual (colour and

light contrast) properties become important, because they produce a state of comfort or discomfort. They are important to the way in which people process the visual and sensory perceptions in urban environments and in the spaces populated by objects and artefacts recognised as useful for the performance of specific activities (from the psychological perceptible).

In relation to point (a) it is useful to define the role of technological innovation rather than technologies used in traditional architecture.

Here it is of strategic importance to define the role of the colour-and-light approach in urban communication. What colours are most suitable according to the place, the target of the architectural façade, the contrast, saturation and surface reflection? It is very important to define the reflectivity of urban surfaces surrounding the installation, because it completely changes the proper message perception. Similarly important are the degree of usability and security of the urban area, and the user's potential cognitive orientation or spatial disorientation.

In parallel, the illumination and the artificial brightness level of the components technologically interact with the perception of content, visibility and usability of the area. It would be useful to classify the types and components for media facades in use and define the innovative technology. It is therefore useful to draw up a design tool for the definition, classification and realisation of the urban communicative envelope. This is to enhance the previously described architectural surface as passive support to a communication system.

The operational steps regarding the media surface according to these standards can be:

- the number of media-surfaces, their geographical distribution and the technical and typological models currently in use;
- the definition of targets for which the tools and intervention procedures are set;
- the definition of technical, functional and social factors determining the level of life quality (social analysis);
- the identification of assessment of physical, technical and functional criteria of the surfaces identified and the causes of social decay of the settlements;
- the development of procedures, tools and techniques of urban regeneration based on the adaptation of the conditions of accessibility of areas and façades related to new needs and new user profiles;
- the definition of technologies to improve functional efficiency, relational semantics and media surface;
- the feasibility study of 'multifunctional' solutions designed to introduce in large urban areas surfaces with different destinations intended to 'regenerate' the suburbs identified as 'dormitory districts' or in a state of high social and cultural degradation.

The operational steps identified here make explicit the three intervention strategies aimed at creating integrated media surfaces for the urban, social and construction environments of the city. As stated above they are:

1. *strategies to improve efficiency communication and relationships;*
2. *strategies to improve technical performance of virtualisation and accessibility;*
3. *strategies to improve usability and semantics.*

Strategies to improve efficiency communication and relationship

These are:

- *identification of integrated strategies* for the improvement of media-surface communication currently carried out and the realisation of new projects;

- *feasibility study of communication* and relational strategies identified as applied to the case in point and to other European countries considering the effects on the regulation of communications and on the financial mechanisms;
- *dissemination of the results* may be used for future generations of Urban Pilot Projects and/or Demonstration European Projects.

Strategies to improve technical performance of virtualisation and accessibility

As inherent to Computer Science and Electronics these strategies can be pursued in two moments:

- verification and data comparison collected and analysed in the case studies with those developed by other research units;
- definition of verifying tools for parameters associated with the technical quality (software and hardware used in the creation of media surfaces), and the technical tools for planning and events (art media, interactivity, external links, etc.) management for redevelopment, regeneration and valorisation of big screens in urban areas, intensive housing or high-traffic areas.

Strategies to improve useability and semantics

They are related to the disciplines of Psychology and Perception Science as follows:

- definition of the ideal characteristics best suited to ‘exploitation’ of a media-architectural type that will become a significant asset in economic and social terms;
- setting up an exhaustive tool targeted to the pursuit of usability, an analytical tool correlating skills and following the complexity and interdisciplinary connections for the redevelopment of media surfaces;
- definition of strategies, performance models and applications for the improvement of usability and communicative usability (by means of semantics) of media surfaces placed in areas of high intensity or high-use housing in order to integrate culture and multi-ethnic peoples.

Generally speaking, during Expo Milano 2015 many pavilions tried to integrate the project with the society and its culture and made an attempt to identify each national culture by means of architecture taking into account the (apparent) idea of sustainability.

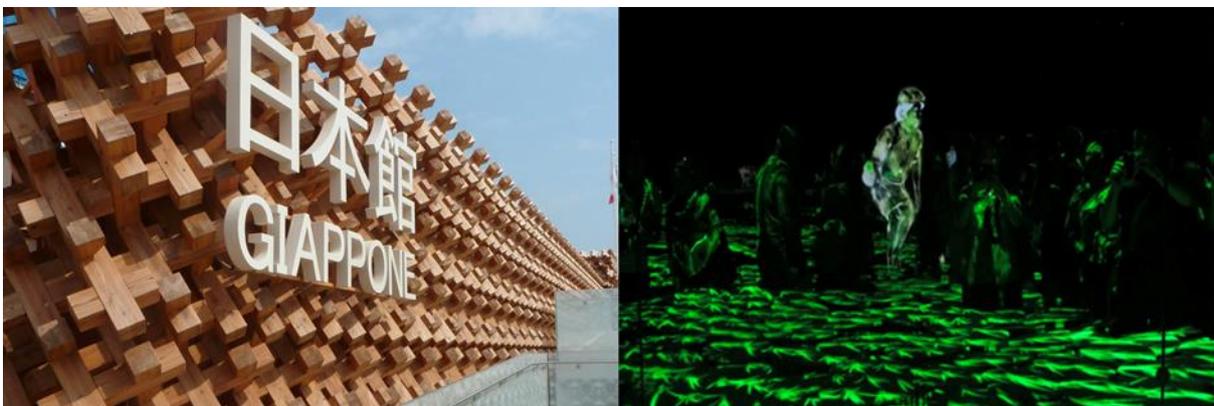


Figure 10: Expo Milano 2015, Japan Pavilion external (left) and internal view (right). © Photo: Katia Gasparini, Alberto Piva.

Some pavilions were built with eco-friendly materials or according to technological techniques typical of each territory, therefore they were almost always of wood and bamboo.

Despite the use of an external wooden envelope, Japan focused on the use of digital displays in the indoor side (Figure 10). The lighting and chromatic effects obtained indoors produced a total user-architecture interaction. Inside the pavilion the prevailing colour was bluish.

Conclusions

As Charles Landry says, the contemporary city is under the spotlight [8]. Today the city is a media event and the city branding is the process by which you ensure media attention. Today the city is regarded as any over-the-counter product in the supermarket, like a car, a computer or breakfast cereal. Architecture applies the same techniques of marketing, today evolved in neuro-marketing. We have witnessed the development of digital landmark parties from Agbar Tower in Barcelona to Bayer Tower in Leverkusen. It looks like a competition to see who gets higher, with the most visibility, and the most surprising results. There is no longer an architectural project because it is supplanted by pure urban advertising. Architecture now is a medium in which the marketing function has replaced the housing function.

Expo pavilions are meaningful according to this concept, here applied intensively, but then they extend their application within the cities in a more restrained way.

As in places of consumption described by Ritzer [9], also in the city and digital media we tend to disorient the user who loses the sense of time and all ties with social reality becoming vulnerable, and then the user becomes absolutely commercially manageable.

This new building way concentrates outside the cities (for example, Expo Milano 2015), creating the so-called 'edge city', that is, the city forms the edge of the metropolis. These cities have arisen as appendices to urban cities where the cost of land is less and fewer building constraints.

The consequence of this is that the traditional 'city form' of European culture—rationally designed from the centre containing monuments that symbolise power, culture and religion—is in crisis. So the city centre weakens its role, becoming a nostalgic show.

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