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Some Observations on the Interdependence of Architectural and Industrial Design

What are the intersections of architecture and social media? *Form* is a main concern of architecture. Is this true for social media as well? At least for the objects affiliated with social media – the *digital devices* – form is an essential aspect, and in both cases – buildings and devices – we address the design of *casings*.

Starting from this statement, the following essay will enquire the interdependence of architectural and industrial design. It is focused on the design of those digital devices that are linked with social media: personal computers, smartphones etc. It will offer possible approaches that are apt to elucidate the phenomenon of such buildings, which, at first glance, one could designate as ›smartphone architecture‹. Finally, this essay will provide a new approach to viewing similar buildings designed over the last 40 years.

Opacity and Inscrutability

In recent years, a particular kind of building can be seen in cities. They seem somehow familiar to us from the time of modernity, yet at the same time they appear unfamiliar and novel. Often these buildings are completely glazed, but nonetheless they tell the observer little about their function and utilisation. They share an apparent demand for distancing themselves from the built environment around them. They indulge themselves in the novel, which lets them appear even newer and the surrounding buildings exceedingly dated. Since they tend to deny scale, they may be perceived as high-tech objects rather than buildings. They often remind us of the designs of digital devices, smartphones and tablet PCs. (fig. 1)

Fig. 1 Musée des civilisations de l'Europe et de la Méditerranée (MuCEM), Marseilles, Rudy Ricciotti and Roland Carta, 2004–2012 (opened in 2013).

A smartphone that slipped under a shelter?

What are the characteristics of these devices? First, one observes basic geometric and stereometric shapes, *flatness* without any projecting or receding parts, and seeming *simplicity* in every respect. (fig. 2) At the same time the radically reduced vocabulary of forms results in the phenomenon that these devices are not self-explanatory for someone who is not familiar to their use and the visual codes they employ.[1] Contrary to other approaches, this design does not immediately communicate the purpose, the capabilities, and the handling of the device. Instead it is presented as a precious black box.[2] There are corresponding examples in architecture, which will be discussed below.

Fig. 2 Digital devices: iPod family.

Basic geometric shapes suggest simplicity, while digital devices are inscrutable black boxes.

Other characteristics are the gently rounded off corners and edges, harmoniously contrasting with sharp edges on other sides of the device, and a tendency towards *underdetailing,* avoiding almost completely any elements that are apt to hint at the scale and the utilisation of the device. Underdetailing contributes to the *integrity of the surface* described here. Furthermore, there are discreetly reflecting dark surfaces, typically enough made from glass. This visual opacity corresponds with the inscrutability of the way these devices operate.

The phenomenon of inscrutable all-over glass surfaces is paralleled in architecture and yet not restricted to recent examples. The characteristics of what today one could call ›smartphone architecture‹ partly can be found in some constructions designed throughout the last 40 years. Such buildings might be regarded as *precursors* to recent designs. The John Hancock Tower in Boston, by Henry N. Cobb of Ieoh Ming Pei and Partners, completed in 1976, is a classic example of an abstract architecture that prevents the observer from a direct understanding of its meaning and use. (fig. 3) Here, the material glass is reduced to absurdity by taking away much of its light-transmissive quality and replacing it with visual reflection. So, if one is looking at the building, one actually does not see the building, rather its surroundings, or just sky and clouds, which serve as a kind of camouflage. The information on the building is *minimized*. It has become type of a black box. In spite of its considerable dimensions – the Hancock Tower is still the tallest building in Boston – it scarcely takes up space. In such examples, the main characteristics of the comparatively new material of sheet-glass prove to be characterlessness and indifference, since the elaborate façade has been replaced by several reflecting screens.

Fig. 3 John Hancock Tower, Boston, Henry N. Cobb of Ieoh Ming Pei and Partners, 1967–1976, detail.

Example of an inscrutable all-over glass surface, not revealing but obscuring the building. Depending on lighting conditions, the reflections nearly may cause the building to disappear in its surroundings and the sky.

In contrast, traditional architecture often presented the observer with a *maximum* of information on the building and its context, employing traditional and characteristic materials. So, the meaning and use of a building usually could be read from the application of particular building types;[3] the owner was represented by heraldic emblems, and his wealth was expressed by the material employed; finally, inscriptions could provide additional information on the purpose of the building, its dedication, the building sponsor, or the year of construction. In this respect, walking through Florence or Rome is like reading a book.

1 The argument of the essay is almost entirely confined to the appearance of digital devices in switched off mode, specifically the industrial design of the casing. For some reflections on the appearance in switched on mode see: Kurt W. Forster, *Above the Trash. Momente eines* objective turn *in Architektur und Design,* in: Jörg H. Gleiter (ed.), *Symptom Design. Vom Zeigen und Sich-Zeigen der Dinge,* Bielefeld 2014, pp. 21–38, here: pp. 27–36.

2 This is a fundamental difference to the industrial design of the machine age, when the function of an engine became immediately visible because of the absence of casings and the motion of its parts. The design historian Gert Selle has written in this sense: »Der Chip ist das epochale Gegenmodell zur alten mechanischen Technik, die, soweit ›unverkleidet‹, sich selbst in ihrer Funktionsweise erklärte: Man konnte ihr bei der Arbeit zusehen.« (»The microchip is the epochal counter concept to the old mechanical technology which explained itself in its mode of operation unless being encased: One could watch it running«; transl. by T. St.) – Gert Selle, *Geschichte des Design in Deutschland,* Frankfurt/New York 2007 (new edition), p. 326 f.

3 In a somewhat different sense Richard Krautheimer, Günter Bandmann and others have pointed out that the building type and the application of particular architectural forms may be a bearer of meaning. Cf. Richard Krautheimer, *Introduction to an ›Iconography of Mediaeval Architecture‹,* in: *Journal of the Warburg and Courtauld Institutes,* volume V (1942), pp. 1–33; Günter Bandmann, *Early Medieval Architecture as Bearer of Meaning,* New York 2005 (*Mittelalterliche Architektur als Bedeutungsträger,* Berlin 1951).

The Willis Faber & Dumas Headquarters in Ipswich by Lord Norman Foster, completed in 1975, is another structure that anticipated the surface expression of today's digital devices. (fig. 4) The office building features a dark and reflective all-over glass surface. Unlike the glazing on the Hancock Tower, the reflections are not achieved by a silver coating but by solar-tinted glass, which brings recent digital devices even more to mind. The appearance of the façade and its degree of opacity depend on the time of day, in other words on the ratio of daylight and artificial light from within the building. During the day, the building tends to reflect its surroundings. This effect was well-considered in the design process, as proven by several drawings. At night, the extensive glazing allows a total view of the interior. One is reminded of the different appearances of digital devices either switched off or on. In ›switched off‹ mode, the building appears rather abstract, erratic and inscrutable, while when ›switched on‹ it provides everyday scenes from its interior that come close to the visual content of social media.

Fig. 4 Willis Faber & Dumas Headquarters, Ipswich, Lord Norman Foster, 1971–1975.

Dark and reflective all-over glass surface. The appearance of the façade and its degree of opacity depend on the time of day (ratio daylight/artificial light from within the building). One feels reminded of the different appearances of digital devices either switched off or on.

Considering current digital devices and their corresponding architecture, one can state that of all materials glass has come to express opacity and inscrutability par excellence. This is true for the digital devices as well as the Hancock Tower and the Willis Faber & Dumas Headquarters, which were designed as abstract buildings. This is why they are contemporary even 40 years after their construction. At the same time they differ significantly from what could be called today's ›smartphone architecture‹ because they still tend to be perceived as buildings rather than *objects*. The reason for which is that they are not yet completely reduced to basic stereometric shapes. The Hancock Tower is a composition of several solids, while the Willis Faber & Dumas Headquarters are the interpretation of an irregular building block. Both building designs are not independent enough from site and scale in order to be denominated as ›smartphone architecture‹.

Shifts of Scale I and Objecthood

There has already been an historical time period, when new technologies and methods in industrial design provided the measure of whether architecture was modern or not: the machine age. The large and airy station halls of the railway, built from iron and glass and erected outside the historic cities, set a new scale and thereby demonstrated the obsolescence of the densely built city centres. The city of Budapest is one example which still today gives an impression of how the railway stations of the 19th century were arranged around the historic city centres.[4] The existing city thereby was confronted with the new constructional possibilities of new materials. These materials – iron in particular – first made the improvement of the steam engine and the development of the railway possible; afterwards engines demanded the construction of new buildings, from the same material, that were suitable for housing them.[5] One example is the station hall of the Nyugati pályaudvar (West station) in Budapest, which was erected by the engineer Gustave Eiffel and his enterprise, and the architect Auguste de Serres in the 1870s.[6] (fig. 5) The station was constructed some ten years before the Eiffel Tower (1884–1889) and brings to mind the parallels between industrial design – the early railway engines – and building design of the machine age. It intimates that architectural design was modified by the findings of the engineers: Architecture was no longer just stone and wood; it became also iron and steel, and it would be instructive to discuss

Fig. 5 Nyugati pályaudvar (West station), Budapest, Auguste de Serres (architect) and Gustave Eiffel/Eiffel & Cie. (engineers), 1874–1877.

A building in which the design approaches of the architect and the engineer are directly confronted. View of the intersection of the iron and the massive structures from within the station hall.

4 There are three terminal stations in Budapest: the Nyugati pályaudvar (West station), Keleti pályaudvar (East station), and Déli pályaudvar (South station). The Józsefváros pályaudvar (Josefstädter station) is another terminus out of service today.

5 The first station buildings of the 1820s still followed the traditional building type of the post station. Later on, in the course of the 19th century, when functional requirements became increasingly important especially for the station hall (in contrast to the station building), the building type of the railway station developed. Early examples of the employment of iron in the construction of the station halls are the Gare de l'Est in Paris (1847), Kings Cross Station (1851) and Paddington Station (1854) in London.

6 The Nyugati pályaudvar has been characterized as »une de ses œuvres majeures« (»one of his [Eiffel's] major works«; transl. by T. St.). – Cf. Bertrand Lemoine, *Gustave Eiffel,* Paris 1984, p. 42.

»En 1875, presque coup sur coup, Eiffel obtint deux travaux importants, la gare de Pest en Hongrie et le pont sur le Douro au Portugal, qui sont, et de loin, les plus grosses affaires qu'il eut à traiter jusqu'alors.« (»In 1875, Eiffel obtained in quick succession two important works, the Pest station in Hungary, and the bridge over the Douro in Portugal, which are by far the biggest enterprises he had to deal with up to then«; transl. by T. St.) – Henri Loyrette, *Gustave Eiffel,* Fribourg 1986, p. 57.

the intersection of the architect's and the engineer's design.[7, 8] Obviously, the engineer was (and still is) employed in such fields where the possibilities of traditional architecture are limited. In the case of the railway station it was the construction of column-free roofing for a large space. With regard to the architectural articulation of the inner façade, the indoor space of the station appears as outdoors. This detail also underlines the independence of the engineer's roof from the architect's station building, which is a parallel to the Parisian passages of the same period.

The autonomy of both parts of the station – the architect's and the engineer's design – becomes particularly visible in the design of the southwestern front. (fig. 6) The station building appears to have two pavilions at the corners, which are separated from the station hall, rather than serving as integral parts of the railway station. This observation leads one to consider the *objecthood* of individual buildings.

Fig. 6 Nyugati pályaudvar (West station), Budapest, Auguste de Serres (architect) and Gustave Eiffel/Eiffel & Cie. (engineers), 1874–1877.

The front of the engineer's central building is flanked by two pavilions of traditional architectural expression, which hardly seem to be influenced by the new possibilities of the engineer's design. The iron-and-glass station hall represents state-of-the-art architecture while the pavilions do not.

The painter Max Liebermann is supposed to have said about Julius Raschdorff's Berlin Cathedral (erected in 1893–1905, reconstructed with alterations in 1975–1980) upon its completion: »Very nice, very nice. Everything can be twisted off.«[9] This statement is not only an astounding confrontation of the two spheres of the sublime and the ordinary; in a nutshell, it is also an indication of the parallels between architectural and industrial design in the machine age, made possible by regarding the individual building as an object. Indeed, the cathedral's cupolas seemingly can be ›twisted off‹ from the cube-shaped structure beneath. This impression results not least from the materials employed: Stone was used for the main structure, and metal for the cupolas, whereby metal implies the notion of discrete removable parts, while stone suggests a traditional structure being assembled from countless individual parts, which therefore is immobile. Thus, Liebermann's statement places the Berlin Cathedral in the sphere of those

7 With its two corner pavilions made from brickwork, and the central nave made from iron and glass, the Nyugati pályaudvar is a classic example of a building at the intersection of architecture and engineering. (fig. 6) »Dans sa *Biographie industrielle et scientifique,* Eiffel présente rapidement cette réalisation: ›Cette gare […] est particulièrement intéressante en ce qu'elle présente l'un des premiers types de l'association du métal et de la maçonnerie […].‹ C'est en effet la première fois qu'est aussi apparente en façade la grande nef vitrée à deux pans qui couvre les voies.« (»In his *Industrial and Scientific Biography,* Eiffel rapidly presents this work: ›This station […] is of particular interest since it presents one of the first types of a combination of metal and brickwork […].‹ This is indeed the first time that the large glazed pitched nave, which shelters the rail tracks, becomes visible also in the façade«; transl. by T. St.) – Henri Loyrette, *Gustave Eiffel,* Fribourg 1986, p. 58.

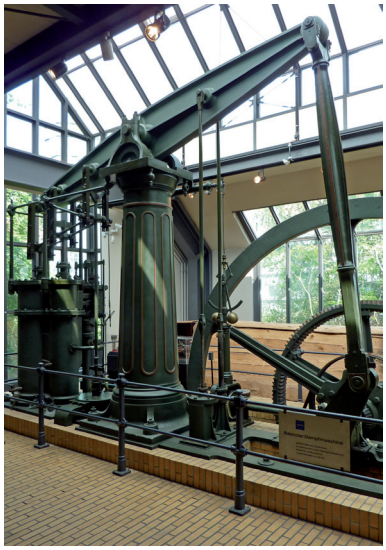

Fig. 7 Beam engine by August Borsig, 1859, Stiftung Deutsches Technikmuseum Berlin, inv. no. 1/87/0286.

The decoration of the column, inspired by the Doric order, symbolizes the reliable support of the balancer and the occurring forces.

steam engines mentioned before[10] whose design is a combination of elements taken from both the architect and the engineer.

To a certain extent Liebermann's is an odd statement. But it allows two conclusions. First, it suggests a *shift of scale*. Large-scale constructions may be endowed with qualities and characteristics of smaller objects. The cathedral may be regarded like a steam engine, and vice versa. The engineer's approach to the construction of a roofed station hall is basically the same as the construction of a railway engine. It results in a design that depends more on the technological possibilities of the respective period than on the particular scale of the design problem.

Secondly, and connected with the shift of scale, one becomes aware of the circumstance that such structures have a strong tendency to be *regarded as an object*. Colin Rowe and Fred Koetter have called this phenomenon »modern architecture's object fixation«[11] (even though pre-modern architecture has obviously produced object fixations as well).

Recalling Venice – a city mainly erected from the Middle Ages until the baroque age – one becomes aware of the case of a great number of *potential* object buildings – the prestigious palazzi – that figure as the elements of a *non*-object urban fabric. In urban design we know that objecthood can be quite appropriate for a small number of particularly representative buildings while the majority subordinates to the urban fabric. But if the tendency to regard every single building as a unique object predominates, it automatically becomes a design object, independent from the significance of the building and the position of the client. This is to be observed especially in our times.

This attitude is supported by the growing possibilities of computational design and has resulted in an increasing number of buildings treated as design objects. Frank O. Gehry and Zaha Hadid are two persons whose development as architects is connected to the development of digital modelling methods. The implementation of so-called *splines* and *NURBSs* (non-uniform rational Bezier splines) in three-dimensional modelling software spread the possibilities to create curved or ›organic‹ designs. They allow the definition of planes in virtually every shape and curvature. These technologies had first been developed in the automotive and aviation industries in the 1950s and 1960s. Since the 1990s they became common in architectural design software, and in computer modelling and graphics software in general. Additionally, 3d modelling tools generally are independent from scale.

Thus, it comes to pass that a car can look like a vacuum cleaner and a trendy detached house like a bicycle helmet. Zaha Hadid's Abu Dhabi Performing Arts Centre of 2007 is an example of such highly developed architectural

8 While the present essay focuses on the adoption of industrial design in contemporary architecture, one should notice that the interchange of formal vocabulary between architectural and industrial design has been occurring in the other direction, too, especially in the course of the 18th and 19th centuries, when new or improved devices and machines emerged. So, in the beginnings of the machine age engines and devices occasionally adopted the expression of architectural elements. A classic example is the beam engine type of the steam engine, in which the balancer is often supported by a column in the shape of a classical order. The Doric order in particular represents a direct illustration of the supporting function of the column. A beam engine by August Borsig (1859, Stiftung Deutsches Technikmuseum Berlin, inv. no. 1/87/0286) is an example of that. (fig. 7)

While Borsig employs a free interpretation of Doric decoration, the *Steam engine with oscillating cylinder* by Ernst Alban (1839, Deutsches Museum, Munich, inv. no. 2341; for a photograph see: Carl Eckoldt, *Kraftmaschinen I,* München 2002 (5th edition), p. 54) is very close to architectural models. Its four columns are precise reproductions of the Doric order and are complemented by an architrave and triglyph frieze – everything made from cast iron. This provokes the impression of a small neoclassical building, for example a sepulchral monument. In connection with this interchange between architectural and industrial design, one notices a shift of scale and a change of materials. A probable model for Alban's design was the delineation of the Propylaea in Athens by James Stuart and Nicholas Revett, particularly the engraving denoted ›The elevation of the Propyléa‹. – James Stuart and Nicholas Revett, *The Antiquities of Athens,* vol. II, London 1787 [1789], chap. V, pl. III.

The central part of this drawing accords closely with Alban's design, especially with regard to the number of triglyphs, the absence of an iconographic programme, the missing roof, and the overall composition. Even the groove at the upper part of the shaft of the Doric columns depicted by Stuart and Revett, has been adopted by Alban.

The disposition of the engine's frame – four Doric columns in a square – is not directly to be found in the Propylaea, but there is a built example that closely resembles the appearance of the steam engine's frame: the portico of the Alter Botanischer Garten (former Botanic Gardens) in Munich by Emanuel Joseph von Herigoyen, 1811–1812. Apart from the parapet bearing the inscription, and the lateral walls, both objects share a striking resemblance. This comprises the (almost) square disposition of four Doric columns, the absence of a visible roof, and the circumstance that the triglyph frieze is higher than the architrave (while in the drawings of Stuart and Revett they are almost equal). The main difference is the unlike spacing of the columns (three triglyphs at the portico's intercolumniation, two at the steam engine's). Nevertheless the similarities let the portico appear as a quite literal model for the frame of Alban's steam

engine – in addition to the model given by the delineation of the Propylaea in Athens by James Stuart and Nicholas Revett.

Optical instruments are another category, wherein columns similarly symbolize a supporting function and therefore sometimes are designed according to the classical orders. Generally, there is a range of devices from the 18th and 19th centuries that adopt architectural vocabulary while simultaneously shifting scale and changing materials. Among them there are *microscopes* (e. g. the ›New Variable Microscope‹ of around 1775 by George Adams, Deutsches Museum, Munich, inv. no. 40290), *balances* (e. g. a beam balance by B. Liebherr, undated, Deutsches Museum, Munich, inv. no. 1611), *toggle presses* (e. g. a toggle press of 1845 by Maschinenfabrik von Chr. Dingler, Deutsches Museum, Munich, inv. no. 24/52217), and *fire alarm boxes* (e. g. of 1895 by Siemens & Halske, Deutsches Museum, Munich, inv. no. unknown). The column seems to be the main element adopted by early industrial design, and indeed in most cases it is not only a decoration but an expression of the support of forces.

Already before the 18th century architectural orders were adopted for the surface expression of objects. A classic example are the wooden cabinets (Fassadenschränke) of the Renaissance. But while furniture is *within* the field of architecture, the devices of the machine age and today's digital devices are not. – Thanks to Eduard Führ, who pointed me to the subject of note 8.

design. It is a matter of fact that today's computer technology and modelling software determine architectural and industrial design to a certain degree. Frank O. Gehry, who designed some early buildings using splines and NURBSs, founded a software enterprise named *Gehry Technologies*. One of the applications, called *Digital Project: Designer*, offers »free-style surface modeling (NURBS)«[12] as a key feature.

Shifts of Scale II and Adoption of Objects I

With the rejection of postmodern and partially also deconstructivist architecture, and the installation of neomodernism, so-called organic shapes appear too playful and too fancy today for serious public buildings, at least in the city centres of Central Europe. This is true even though these shapes possess a captivating futurist appeal. But it does seem to be possible to transform them into appealing *and* serious ones. With regard to the extension of the Bernisches Historisches Museum (Historical Museum in Berne), they just needed to be *bevelled*. (fig. 8)

Fig. 8 Extension of the Bernisches Historisches Museum (Historical Museum in Berne), :mlzd architects, 2001–2009.

The concept of an enclosing shell that is cut open by a glass membrane.

The extension by :mlzd architects was completed in 2009 and houses the Berne Municipal Archives as well. The observer is presented with a continuous grey surface, which seems to be cut open by a thin vertical glass membrane. Once more, one notices that glass is used not as a transparent material but as a mirror in which the original building of the Historisches Museum is reflected. The membrane operates like a screen. The sectional drawing of the building confirms the impression that the grey surface can be regarded as a *shell* that is cut open by the glass membrane. This becomes even more clear in the floor plans. (fig. 9 and 10) This observation

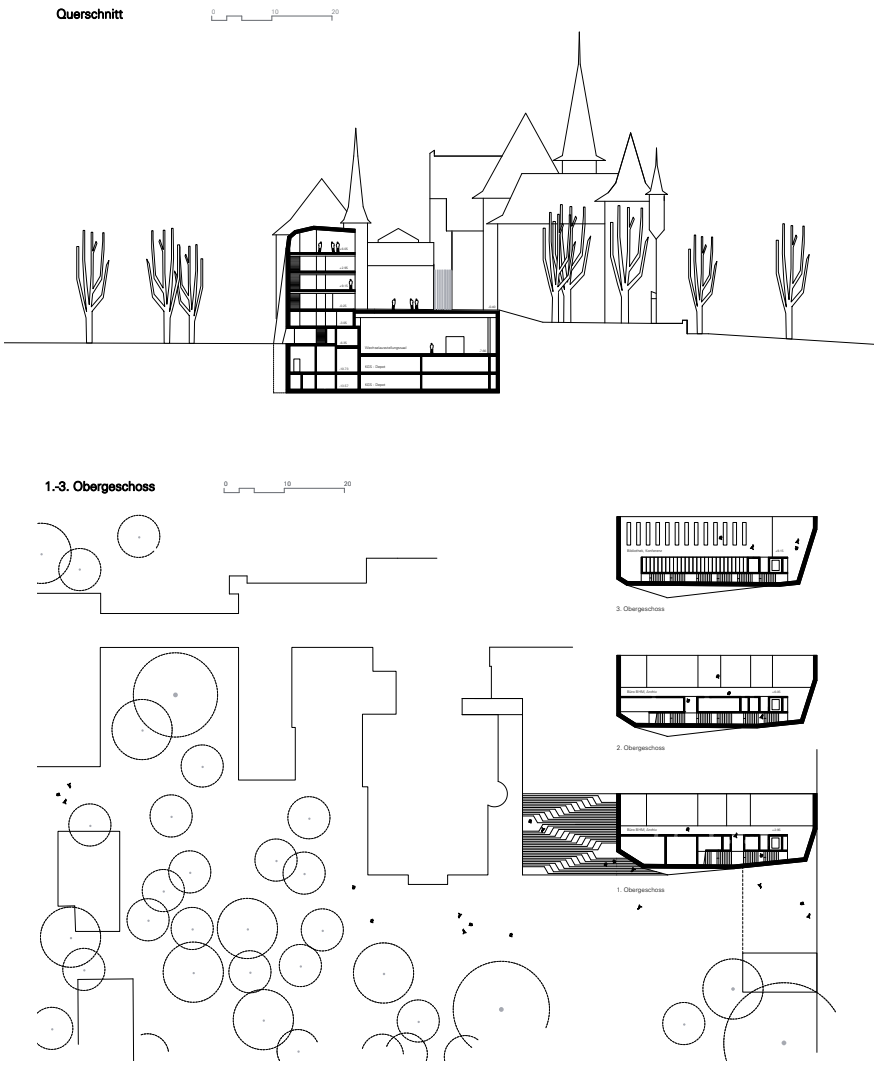

Fig. 9 and 10 Extension of the Bernisches Historisches Museum (Historical Museum in Berne), :mlzd architects, 2001–2009, section and floor plans.

The impression of a shell that is cut open by a glass membrane is approved by the section and floor plans.

allows me to return to the beginning of this article, when I described some characteristics of current digital devices. Now one can add the shell concept as another characteristic, at least for some devices. Their appearance is characterized by a seemingly thick shell or all-over metal shield, which is replaced only on the front side by a thin glass membrane. (fig. 11) There is, however, an even more direct model for the Berne building.

Fig. 11 Advertisement at Munich main station.

Smartphone advertisement presenting a digital device almost in the scale of architecture. The concept of an enclosing shell that is cut open by a glass membrane is clearly visible in the device's design.

9 Cf. B. E. [Benedikt Erenz], *Zeitläufte: Schrauben und wegklicken,* in: *Die Zeit,* May 16th, 2013, p. 18; transl. by T. St.

10 Cf. note 8.

11 Cf. Colin Rowe and Fred Koetter, *Collage City,* Cambridge, Massachusetts/London 1978, p. 58.

12 Cf. www.gehrytechnologies.com/digital-project/digital-project-designer (accessed April 1st, 2014).

Fig. 12 Apple II computer (1977) as exhibited at the Museum Enter, Solothurn.

Industrial design as a model for architectural design?

It is the Apple II of 1977, one of the first personal computers. (fig. 12) By taking the Apple II into account, the somewhat peculiar shape of the building easily becomes explicable. The upper floors serve as a casing in the shape of a monitor; though this ›monitor‹ – similar to the today's digital devices – does not permit a view into the cut open interior. Rather the reflections on the screen prevent the observer from gaining an *insight* into the construction.

The impression of the building as an Apple II personal computer translated into architecture is intensified by the bevelled edge on the back of the ›monitor‹. (fig. 8 and 12) Having the Apple II on mind, the scattered pixels

Fig. 13 Extension of the Bernisches Historisches Museum (Historical Museum in Berne), :mlzd architects, 2001–2009.

Though contemporary in style, the almost closed south façade of the building appears to some extent similar to the back shell of a former computer monitor. In this reading, the rare window openings and the accompanying ornamental shapes seem to refer to the low-resolution pixel graphics of early PCs.

on the surface of the building at once become readable as a reverence for the computer and its low-resolution early graphics. (fig. 8 and 13) Indeed, the Apple II could display not more than 280 by 192 pixels.[13] It seems as if one of the architects – consciously or unconsciously – recalled his first experiences in using computers when he designed the building. And obviously his first computer must have been an Apple II.

13 »The Apple II computer has two distinct graphics modes. Lo-Res graphics […] has a resolution of 40 dots horizontally by 48 dots vertically. Each dot is very coarse (7 × 8 pixels). […] Hi-Res graphics, on the other hand, is much more detailed or dense. The resolution is 280 horizontal dots by 192 vertical dots. […] However, only six different distinct colors are available in this graphics mode.« – Jeffrey Stanton, *Apple Graphics and Arcade Game Design,* Los Angeles 1982, p. 9.

In the case of the Bernisches Historisches Museum, the translation of an industrial into architectural design has resulted in a serious and appealing construction. Moreover, the architectural design is up-to-date, while the computer is not. The translation of the Apple II into architecture is an example of how objects may be *adopted*. The shape of a somehow unspecific object served as a model for a highly site-specific and recognizable structure.

Fig. 14 Nacionalinė dailės galerija (National Gallery of Art) in Vilnius, riverside view of the original building, Gediminas Baravykas and Vytautas Vielius, 1971–1980; reconstructed in 2003–2009.

Building design lead by the principles of classical modernism. Presence of space-defining architecture and human scale.

The building of the Nacionalinė dailės galerija (National Gallery of Art) in Vilnius is another and even more literal example. It consists of an original building completed in 1980 (fig. 14) and a contemporary extension. The architectural competition for the original construction took place in 1966, when architects were still quite familiar with the principles of classical modernism. The building by Gediminas Baravykas and Vytautas Vielius was originally opened as Lietuvos TSR revoliucijos muziejus (Revolutionary Museum of the Lithuanian Soviet Socialist Republic). After 1990 it was rededicated as an art museum. In 2003, another competition was held for the reconstruction and extension of the building (architects Audrius Bučas, Darius Čaplinskas and Gintaras Kuginys). It reopened as the Nacionalinė dailės galerija in 2009, when Vilnius served as a European Capital of Culture.

Placed at a gently sloping river bank, the original construction visually corresponds with the city centre across the river. In contrast, the north façade

Fig. 15 Nacionalinė dailės galerija (National Gallery of Art) in Vilnius, street view of the extension, Audrius Bučas, Darius Čaplinskas and Gintaras Kuginys, 2003–2009.

Building design as an adoption of industrial design. Presence of space-suppressing objects and shift of scale.

is directed toward an adjacent high street and was originally of minor importance. In the course of reconstruction, two structures were added on this side, prominently connecting the lower main building with the street level. (fig. 15) Although the extension buildings house office spaces on the four upper floors, they are designed like two flat screens, equitably directed northwards and southwards. In the architects' design, the appearance as two oversized screens was of higher importance than providing comfortable workplaces for the gallery's personnel. Taking history into account, it stands to reason that such a grand gesture was needed in order to redefine the building. In this case the aesthetic effect underpins the mental transformation of the building and its surroundings.

Curiously enough, the two ›screens‹ are literally for the birds. They are directed where nobody can make use of them. This is not just an accidental feature of the extension, given that there are two smaller digital displays placed in the centre of the screen-like buildings, projecting information and images toward the sky. The orientation of the screen-shaped buildings emphasizes the independence of the object from architectural thinking and from its surroundings. In this regard, the Vilnius example is an even stronger adoption of the object by architectural design.

›Smartphone Architecture‹

What about the phenomenon of ›smartphone architecture‹? I announced to provide some examples of buildings that exhibit stylistic characteristics common to current digital devices, such as smartphones and tablet PCs.

As far as I can see, such buildings are to be found rather by chance. One example is the Musée des civilisations de l'Europe et de la Méditerranée

(MuCEM) in Marseilles by Rudy Ricciotti and Roland Carta, which was inaugurated in 2013, when Marseilles was a European Capital of Culture. (fig. 1) Obviously, the building features most the characteristics of current digital devices listed above: One observes basic stereometric shapes, flatness and simplicity of form, accompanied by underdetailing and the integrity of surface. The gently rounded off corner is harmoniously contrasting with the sharp edges of the brise-soleil. Moreover, the combination of the dark glazed main structure, and the additional structure of the ornamental brise-soleil reminds one of the manifold additional cases which are offered for the protection and personalisation of smartphones. The building looks like some international style architecture – a kind of fancy but uniform container – that has become stationary by slipping under a specific shelter. This is another possibility of an adoption of the object.

One can easily recognize, furthermore, the discreetly reflecting surface of the building. Once more, opacity corresponds with the inscrutability of the way things operate. Similar to the design of digital devices, the building does not immediately communicate its purpose and handling. Rather it is presented as a precious black box. The purpose of the building needs to be written on the surface. But even if one has recognized that this is a public museum, one has to search for the entrance. Similar to digital devices, the radically reduced vocabulary of forms results in a lack of being self-explanatory.

Finally, one might find a reference to the way smartphones are presenting the so-called ›content‹: The sculpture at the rounded off corner is discreetly displayed underneath the glass membrane, so one is not quite sure if this is a flat image on the screen or a real sculpture. (fig. 16) This is the paradoxical phenomenon of the virtualization of in situ objects from the stock of the museum. The aesthetics of smartphones has switched over into the reality of architecture.

The case becomes even more paradoxical if one reads up on the sculpture, which is a funeral monument.[14] This object became an official sign for the Marseilles museum during its inauguration, even though it was only on loan and originated from the Musées d'art et d'histoire de Genève in Switzerland. At first glance, this observation seems to ruin one's confidence in the museum as a credible institution. At second glance, one realizes that the curators have only adopted a key feature of digital and social media, where the differentiation between the original and its copy inherently is of no great interest. Therefore it is actually quite consistent that the museum in Marseilles features some characteristics of ›smartphone architecture‹.

Another example of a recent construction that could be labelled ›smartphone architecture‹ is the multifunctional building at Vörösmarty tér in Budapest. (fig. 17) It was erected in a prominent situation, in which it de-

Fig. 16 Musée des civilisations de l'Europe et de la Méditerranée (MuCEM), Marseilles, Rudy Ricciotti and Roland Carta, 2004–2012 (opened in 2013; detail from fig. 1).

14 Monument funéraire à l'effigie d'une femme anonyme, 1ère moitié 2e siècle. Provenance: Palmyre. Technique: Calcaire dur jaunâtre sculpté, en haut-relief. Forme: plaque fragmentaire. Dimensions: Haut. 55.5 cm, larg. 44 cm. Musées d'art et d'histoire, Ville de Genève, inv. n° 13270. Cf. mahgeneve.ch/en-descendant-le-rhone-la-face-cachee-des-collections-du-mah-au-mucem (accessed April 1st, 2014).

Fig. 17 Multifunctional building at Vörösmarty tér, Budapest, György Fazakas and Jean-Paul Viguier, 2002–2007.

Futuristic ›smartphone architecture‹ in a traditionalist context.

fines one of the four façades of the square. The structure by György Fazakas and Jean-Paul Viguier was completed in 2007 and exhibits again some characteristics of current digital devices: a dark glass surface, stereometric simplicity, flatness, integrity of the surface, round corners etc. Unlike the examples in Berne, Vilnius, and Marseilles, this building is placed directly within the city centre, as part of the urban fabric. This leads to another observation: ›Smartphone architecture‹ conveys its message of being up-to-date especially well if it contrasts with its built environment. The new building is the only one at Vörösmarty tér completely wrapped with glass. The other buildings exhibit massive stone façades, as it is indicated in the photograph. Placed within an inner city ensemble, ›smartphone architecture‹ appears even more futuristic while the stone constructions appear exceedingly dated in comparison.

This impression is contrasted by the actual life span of the buildings. While the surrounding structures date from the 19th and the first half of the 20th century, the building lot of the multifunctional building has changed in quick succession. There were a historicist building in the same place destroyed in 1945, and a post-war modernist building existing there from 1971 to 2005. Presumably, the multifunctional building of 2007 will also be subject to alterations within the next decades, since it is just a functional building, not filled with meaning and history (as the Vigadó concert hall built back-to-back with it is). Furthermore, its appearance as a foreign body within the square's ensemble predestines it to be changed when a new architectural style is to be incorporated.

The example of Vörösmarty tér brings to mind a similar building dating from the time before the smartphone era. Jean Nouvel's Galeries Lafayette

building in Berlin Friedrichstraße, completed in 1996, exhibits some characteristics of ›smartphone architecture‹. Both the dark full glazing and the rounded off corner distinguishs the building from the traditionalist façades of its surroundings. (fig. 18) The traditionally developed expressive façade is replaced by a glass display alternately providing full sight into the interior, full-storey advertisement or random reflections of the surroundings – almost similar to a smartphone display. (fig. 19) However, in contrast to ›smartphone architecture‹, the curtain wall of the Galeries Lafayette does not obscure the division into floors; rather this division is architecturally emphasized by the structuring of the glazing. This prevents the building from undergoing a shift of scale and the appearance of objecthood connected with it. Furthermore, it's surface lacks perfect integrity but has a number of projecting and receding elements instead. Thus, the Galeries Lafayette building can be considered a precursor of ›smartphone architecture‹, but not ›smartphone architecture‹ itself.

Fig. 18 Galeries Lafayette, Berlin Friedrichstraße, Jean Nouvel, Emmanuel Cattani & Associés, 1991–1996.

Precursor of ›smartphone architecture‹ contrasting the traditionalist façades around it.

Fig. 19 Galeries Lafayette, Berlin Friedrichstraße, Jean Nouvel, Emmanuel Cattani & Associés, 1991–1996.

The traditionally developed expressive façade is replaced by a glass display alternately providing full sight into the interior, full-storey advertisement or random reflections of the surroundings.

Generic Objects and Adoption of Objects II

The new Museum der bildenden Künste in Leipzig (MdbK) was designed by Hufnagel Pütz Rafaelian architects and completed in 2004. It is likewise placed within a city centre ensemble, following a specific urbanistic concept. The museum itself was erected in the ›second row‹, which means in the middle of a newly outlined building block and set back from the street line. This concept anticipates the construction of a surrounding line of front buildings, which will give the usual impression of a block of buildings. Behind them the museum becomes visible through four openings placed almost in the middle of each side of the block. These openings allude to passages, which are characteristic of the Leipzig city centre. Although the museum occupies the courtyard space that usually belongs to the front buildings, this is a remarkable concept for the integration of a large structure within the scale of the existing city. Regarding the museum, the *loss of the façade* is one of the most significant consequences of this concept. Situated in the second row, the museum renounces a developed façade.

The MdbK, therefore, appears almost like a uniform container. The view of the beholder virtually slips off the abstract volume, similar to the design of current digital devices, which do not communicate their function and utilisation, or even their meaning. (fig. 20) The museum's surface lacks articulated architectural expression. In both cases – the smartphone as well as the MdbK – there are just large ›shop windows‹, screens for constantly changing contents. The characteristics that in the past made readable the meaning and use of a building by specific shapes, iconography, and differentiation of the volume are replaced by almost a black box.

The MdbK building is a sophisticated yet generic kind of container architecture, placed in a very central and specific situation. Given that its unspecific façade, which is rather a non-characteristic, ›non-dialogical‹ building envelope, completely rejects the observer's usual expectations towards a building in the city centre, the design demands a kind of simulated building block to be raised around the new construction.

Having the smartphone topic in mind, the MdbK may be regarded as another example of personalized generic design. The design approach of the MdbK building parallels the wish of smartphone owners to adopt their digital devices by means of adapting their appearance. This idea of encasing a generic design with a highly specific appearance, which contrasts with the original design, is a characteristic that is apt to explain the MdbK concept from a contemporary point of view. This concept makes its urbanistic approach even more compelling. In this respect, the building may be regarded as a piece of ›smartphone architecture‹ avant la lettre.

Fig. 20 Museum der bildenden Künste (MdbK), Leipzig, Hufnagel Pütz Rafaelian, 1997–2004.

A generic container that becomes adopted by the surrounding front buildings (yet to be built).

Considering the MdbK as a precursor of today's ›smartphone architecture‹, also explains why its corners are not rounded off, a common feature today. The building design was not yet influenced by the industrial design of contemporary digital devices. For that reason it also lacks the high degree of objecthood that characterizes ›smartphone architecture‹. Instead, its strangely abstract volume appears as a prototype of puristic *CAD architecture,* modelled by subtraction operations from an original solid. This is especially true for the inner spaces, which seem to be cut out from the larger volume.

There are still other constructions that are apt to elucidate the interdependence of architectural and industrial design and the ways buildings are adopted. I finish this essay commenting on a last example.

›Desktop Architecture‹

Up to now I have enquired mainly about the industrial design and outer appearance of digital devices, without considering the graphic user interfaces provided by the software. Yet it can be presumed that their omnipresence has an influence on architects' designs as well.

The EPFL Learning Center in Lausanne was designed and constructed by Kazuyo Sejima and Ryue Nishizawa between 2004 and 2010. It is another building that contrasts its surroundings in a way that implies ›up-to-date modernism‹ contra ›dated modernism‹. No doubt the Learning Center appears more contemporary than many of the adjacent university buildings. What are its characteristics? First, the building appears like a sandwich construction: There are two seemingly solid planes that envelop the indoor spaces between them. The complete surface part of the building is situated between these planes. (fig. 21) Moreover, the ›façade‹ gives the impression that the sandwich construction was cut out quite precisely from a larger plane. The building appears like a rectangular segment of a potentially infinite two-dimensional plane.

Fig. 21 EPFL Learning Center, Lausanne, Kazuyo Sejima and Ryue Nishizawa (SANAA), 2004–2010 (photo of 2009).

A computer display laid down on the ground? The dimensions of 166.5 m × 121.5 m correspond almost perfectly with the 4 : 3 display aspect ratio of laptop displays in use at the time of the architectural competition (2004). The openings and undulations are reminiscent of scattered ›widget‹ applications.

This plane is modulated by different aberrations in height and manifold apertures, which transform the incipiently accidental segment into something highly specific. The building is not really site-specific, but it becomes recognisable through its unique internal shape and appearance. One notices that the category of ›recognisability‹ does not apply to those surfaces that, traditionally, would provide the façade, but does manifest itself in the modulations of the two-dimensional plane. The ›façade‹ is in contrast a quite generic ›cutting edge‹ providing random views into the sandwich construction. The architects obviously switched over the traditional function of the façade to the roof.

It should be possible to show the genealogy of this unusual design through the preceding projects of Sejima and Nishizawa. Actually the phenomenon can be reduced to such simple things as parallel floors and ceilings, which are found prominently in Le Corbusier's Maison Dom-ino scheme. One is reminded of the partially ›paralysed section‹ which Colin Rowe attributed to Le Corbusier's Villa in Garches:

> In the frame building it is not, as in the solid wall structure, the enclosing walls that are a dominant, but the horizontal planes of floor and roof. The quality of partial paralysis, which Corbusier has noticed in the plan of the solid wall structure, in the frame building is transferred to the section. Perforation of floors giving a certain vertical movement of space is possible; but the sculptural quality of the building as carving has disappeared, and there can be none of Palladio's firm sectional transmutation and modelling of volume. Extension must be horizontal, following the established horizontal planes; free section is replaced by free plan, paralysed plan by paralysed section; and the limitations in both cases are equally severe; as though the solid wall structure had been turned on its side, the former complexities of section and subtleties of elevation are now transferred to plan.[15]

15 Colin Rowe, *The Mathematics of the Ideal Villa. Palladio and Le Corbusier compared,* in: *The Architectural Review,* issue 603 (March 1947), pp. 101–104, here: p. 103.

This comment on Le Corbusier's Villa in Garches helps provide a possible interpretation of the Learning Center. It draws our attention once more to the two-dimensional quality of the Lausanne building, which now may be read as a *display* laid down on the ground. The building seems to be largely independent from that ground, an object incidentally placed in the as-found situation and subsequently connected with it by lanes and paths; the ground plane of the sandwich gives the impression of merely touching the lawn.

Taking all this into account and paying attention to the proportions of the cutoff rectangle (almost perfectly 4 : 3) it becomes possible to consider the Learning Center as an equivalent of computer screens. The *virtual desktop* displayed on such screens is likewise only a segment of a larger, potentially infinite plane, on which the application windows, ›widgets‹ etc. can be moved around in two dimensions, i. e. in direction of the x- and y-axes. The infinite character of the plane of the graphic user interfaces becomes even clearer if one considers the option of defining different areas of that plane for simultaneous display on a computer screen and on a connected video projector.

But what about the modulations of the surface along the z-axis? Can they be explained by the display and virtual desktop comparison as well? I propose to read them as an allusion to a concrete phenomenon in computer graphics – a way of reading that is almost similar to the interpretation of

the extension to the Bernisches Historisches Museum. From a bird's eye view – that means observed as a display laid on the ground – the Learning Center looks like a computer screen simultaneously displaying numerous ›dashboard widgets‹, which characteristically are scattered all over the screen and have different shapes and sizes. The bulges in the surface then implement the motif of undulations playing every time a new ›widget‹ is opened. This effect is produced by the ›Aqua‹ graphic user interface of the Apple Operating System.

›Dashboard‹ and ›widgets‹ were introduced only in Mac OS X 10.4 (April 2005), but they were first presented by Steve Jobs in June 2004, already demonstrating the Aqua wave effect while opening a new widget,[16] in other words, at the same time that the EPFL Learning Center architectural competition was being arranged. It started in March 2004 with a pre-qualification; the twelve competition entries were presented to the public in December 2004. This coincidence underscores the probability that the graphics design of digital devices may have had an influence on the building design.

The similarities between digital devices and architecture apparently also extend to the graphic user interfaces. The EPFL Learning Center may be characterised as a variation of ›smartphone architecture‹, which I would like to call ›desktop architecture‹ due to its emulation of virtual desktop effects.

Final Remarks

We have seen that a particular kind of building emulates the design of the widely-used digital devices. This design is characterised mainly by flatness without any projecting or receding parts, simplicity of form, underdetailing, large, reflective glass displays, surface integrity, rounded off corners, opacity, and a kind of minimal design that expresses ›elegant simplicity‹. Such buildings are to be found only occasionally, but they differ from most other buildings in a characteristic way. They are perceived much more as an object, and are more abstract than other constructions. This causes one to look at them as a kind of oversized digital device. One should note that the design of today's digital devices has its models in other fields. It is no secret that the Apple design of the last decade has a strong link to the Braun industrial design some fifty years ago.

16 Cf. www.youtube.com/watch?v=dPCNUExWR6I (position 1:20:30–1:24:15; accessed April 1st, 2014).

Biographical Notes

Tom Steinert (Dr.-Ing.) holds a diploma (2003) and a doctor's degree (2012) in Architecture. From 2004 to 2012 he worked as an academic assistant at Bauhaus University Weimar. Since 2013 he is working at the Chair of Architectural Theory at Technical University Berlin. His doctoral thesis *Komplexe Wahrnehmung und moderner Städtebau (Complex Perception and Modern Urban Design)* was accorded the Wolfgang Metzger Award 2013, and the Theodor Fischer Award 2013. His research is situated at the intersection of architecture, urban design, art history, psychology of perception, contemporary artistic positions, and the history of science and ideas.

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Recommended Quotation

Steinert, Tom: Some Observations on the Interdependence of Architectural and Industrial Design. In: Cloud-Cuckoo-Land, International Journal of Architectural Theory. Vol. 19, Issue 32, 2014. cloud-cuckoo.net/fileadmin/hefte_de/heft_32/article_steinert.pdf [1.10.2014]. p. 155–180.