TOWARDS THE NEW BAROQUE WITHIN THE HISTORIC CONTEXT OF A CITY

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Introduction

In the twenty-first century, architecture changes its role, becoming part of an experimental exploration of topological and computational geometry, robotics orchestration, in the production of materials offering a new kind of experiences and sensations. A new approach to design is a global phenomenon. In many cities, curvilinear forms designed in synthetic digital spaces begin to emerge. It is a predominantly public architecture. It indicates the direction of a new turn in architecture, interest in its structural and environmental aspect.

Architectural historians and theoreticians rely mostly on visual and historiographical claims to argue that contemporary architecture is an advanced interpretation of the Baroque period. This view considers the visual effects created by the convoluted, folded and twisted morphology, to be formally associated with the Baroque since the 1990s. On the other hand, the two periods are perceived as different interpretations of similar ideas, not only because of the transformations in the cultural conditions that brought about the different architectures, but also because of the technological means that assist in the articulation of the respective ideas. With digitalization and computation, contemporary Baroque is considered to be an empirical praxis that evolves out of, and goes beyond, visual manipulation into the optimization of form, function and matter based in information streams. For more than two decades, these new forms have been introduced into the urban fabric to mitigate the arising conflicts. The role of the new forms in the context of historical development has been emphasized in particular.

Folding and non-linearity

Can contemporary architectural discourse, which focuses on the paradigms of digital and computational design-research and novel fabrication technologies, be described as neo-Baroque, as it may seem to promote a new global style of architecture: complex and dynamic, smooth and topological, technological and decorative at the same time?

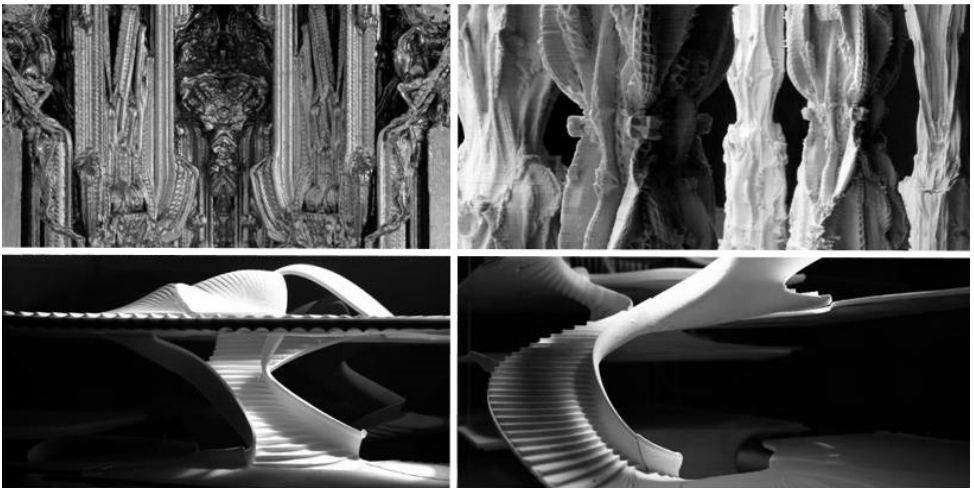

Fig. 1. 3-D printing top: Hansmeyer and Dillenburger, Digital Grotesque – 1:3 scale prototype of the room at the Materializing Exhibition, Tokyo, 2013, a new decorative column order based on subdivision processes. bottom: Emergent Design, the model of present interior spaces with their historical counterparts in terms of their richness, coherency and precision of formal organization
Source: Hansmeyer and Dillenburger, Studio Ali Rahim and Patrick Schuhmacher.

Two-dimensional computer-aided design, three-dimensional modelling techniques and rapid-prototyping technologies, four-dimensional animation and simulation protocols, as well as synchronized multimove robotic systems lie at the core of the theorization and manifestation of post digital architectural production – in academia as well as in practice. Although there is a strong emphasis on materiality, feasibility and sustainability, what emerges is an explicit agenda promoting material ornamentation, spatial spectacle and formal theatricality. Assuming that architecture is cultural production, it's talk discusses the intrinsic neo-baroqueness of the present-day architectural debate with a critical eye directed at the engagement of technology and emotion on various scales (from micro to macro).

Contemporary approaches to architectural design are also influenced and informed by the writings of theorists and philosophers, ranging from the German philosopher, mathematician and logician Gottfried Wilhelm Leibniz (1646-1716) to Gilles Deleuze (1925-1995), one of the most influential French thinkers of the twentieth century.

In the book published in 1988, titled *Le Pli. Leibniz et le baroque,* Gilles Deleuze predicted the inevitable shift towards curvilinearity in different kinds of art[1]. For Deleuze *le pli* (the fold) is the principle of construction of the world, leading directly to the concepts of continuity and continuation, so eagerly used by architects today. Continuity is included in the definition of *le pli* and is to be understood not as rectilinearity, but on the contrary, as a linear maze of continuation. It is assumed that there are no discontinuities, refractions or tears in the world of matter, which

[1] see: Deleuze Gilles. *Le Pli. Leibniz* et *le* baro*que,* Editians de Minuit, Paris 1988.

at the immaterial level means no conflict or contradiction. It is different in the tissue of old towns, where the substance has layered for centuries. The old techniques are in a constant conflict with the newer ones, and the evocative content of the forms and their associations contradict each other in the dialogue of history. However, the preserved buildings or their remains represent the state of consciousness of the eras in which particular styles were born. Historical continuity is perceived through the complexity and contradiction of various interventions performed constantly on the body of the city. In the maze of streets and squares, daily life is lived, which no longer corresponds to the spirit of the past and requires new technical and spatial solutions, new forms at the point of contact. According to Leibniz's idea, Deleuze's maze of matter continuity corresponds with a maze of continuity in the human soul. The two planes communicate because "the continuity of matter raises the soul" to the next level. And on the curtain stretched between the levels, the folds are formed, like the skin on the body. This is a great Baroque assembly, created by Leibniz between the lower level with windows and the higher level blind and closed, but intelligent as a music room, which translates the movement visible below with the sound. A few years later, Jeffrey Krausse takes this discourse explaining the fold as "something more than a surface" because the fold has potential energy and, like the skin on the body, it reacts to the organism's internal stimuli and external influence of the environment[2]. As in Leibniz's description cited by Deleuze, architecture can be understood as the "skin of matter" stretched over the immaterial organism of internal program, economic, or institutional events, and through the "windows to the outside", (defined as a contact with the outside), responsive to the environment. This meant the replacement of deconstructivist discontinuities with a new continuity, and for Krausse it was a shift from the concept of "architecture-the-costume" to the concept of "architecture-the-skin" with all the consequences of that procedure[3].

Referring to the growing interest in curvilinearity and folding in architecture, in 1993 Greg Lynn published an essay in AD *Architecture Curvilinearity: The Folded, the Pliant, and the Supple*[4]. He tied together Gilles Deleuze, Rene Thom (the French Mathematician 1923-2002), cooking theory, geology, as well as the aesthetics of the viscous substance and ductile material. He also pointed to the work of Jeffrey Kipnis and John Rajchman to refer them to the representative work of Peter Eisenman, Frank Gehry, and Philip Johnson. The essay argued that the interest in curvilinearity is not new, as proved by the architecture of the Baroque period. Greg Lynn's essay forms a basis to agree that curvilinearity newly cemented the architectural thought by identifying and stressing the importance of the new smoothness in architecture[5]. His background of philosophy and his attraction to computer-aided design made him an ideal person to publicize, in effect, define the fold in architecture as the intense interest during the remainder decade.

[2] see: Krausse Jeffrey. "Information, Folding in Architecture"*, ARCH* 4/1996, pp. 73-74.
[3] see: Januszkiewicz Krystyna. *O projektowaniu architektury w dobie narzędzi cyfrowych*. *Stan aktualny i perspektywy rozwoju*, Oficyna Wyd. PWr, Wrocław 2010, pp. 66-67.
[4] see: Lynn Greg. "Architecture Curvilinearity: The Folded, the Pliant, and the Supple"*, AD,* Vol. 63. No. 3-4, March-April 1993, pp. 9-15.
[5] ibidem, p. 14.

Fig. 2. Nicolas Grimshaw, Waterloo International Terminal, London, 1989-1993
Source: Nicolas Grimshaw Architects.

The publication of Lynn's essay in AD coincided with the extension of Waterloo International Terminal (1989-1993) by Grimshaw in central London site. The existing station determined the geometry of the new building, including the distinctive roof which is like a smooth snake, whose body squeezes between the existing development. The building is essentially a 400-meter-long glass-clad train shed, with a "tapering" span that gradually shrinks from 50 m to 35 m. The clad in glass provides passengers with an impressive view of Westminster and passers-by with a panorama of the city. It was then a completely new approach to design in the historical urban context. The complexity and variation in the size and shape of the structural elements involved in the train shed were possible thanks to the application of structural analysis of CAD techniques, the essential feature of which was the ability to represent parametric relationships. This design is a clear demonstration of conceptual and developmental benefits afforded by the parametric approach to design.

At the same time, Frank O. Gehry using CATIA software designed "Dancing House" (1992-1996) in Prague.

Fig. 3. Frank O. Gehry, Dancing House, Praque, 1992-1996
Source: photo by Roman Dvořák.

Fig. 4. Foster & Partners, Sage Gateshead, Gateshead, 1998-2004
Source: photo by Foster & Partners / Wojtek Gurak.

This corner building was set on a property of historical significance[6]. The very non-traditional design was controversial at the time because the house stood out among the Baroque, Gothic and Art Nouveau buildings which Prague was famous for, and in the opinion of some, it did not accord well with these architectural styles.

Over the last decade of the 20th century, contradictions in form and urban space were represented with the development of complex design. We observed two typically taken paths: conflict/contradiction and unity/reconstruction. "Dancing House" is different, in a dialogue with the existing pre-formed matter it picks the main points of its design to express its own complex opinion. The shift from the concept of "architecture-the-costume" to the concept of "architecture-the-skin" announced by Krausse, is represented by Sage Gateshead (1998-2004) by sir Norman Foster. The building is located in Gateshead on the south bank of the River Tyne, opposite the center of Newcastle. The architectural form of the building was designed in a virtual environment. The animation software was used not as a medium of representation, but of form generation. The digital tools are important for any parameter-based design to create both the unfolding of an internal system and the infolding of contextual information fields. Architectural form, is not only a manifestation of its internal, parameter-driven relational logic, but it also has to engage and respond to dynamic, often variable influences from its environmental and socio-economic context.

Architectural form, instead of being conceived as a stationary, inert construct, is conceptually a highly plastic, mutable entity that evolves dynamically through its transformative interactions with external, gradient forces[7]. The building was designed with environmental issues in mind and its aerodynamic form channels the predominant local winds to provide natural ventilation.

[6] Its site was the location of a house destroyed by the U.S. bombing of city in 1945. The plot and structure lay decrepit until 1960 when the area was cleared. The neighbouring plot was co-owned by family of Václav Havel who spent most of his life there.

[7] see: Kolarevic Branko, (ed.). *Architecture in the Digital Age: Design and Manufacturing*, Talyor&Francis, New York 2005, p. 19.

Fig. 5. Foster & Partners, Sage Gateshead: initial digital model, building under constructionin Gateshead view from the Newcastle site
Source: Foster & Partners.

The Sage Gateshead is a regional music centre of international standing, with approximately half a million visitors each year. The stainless steel roof encloses the entire complex, which is "shrink-wrapped" around the buildings beneath. The spectacular curved steel roof, which weighs 750 tonnes, is made from 3,000 stainless steel panels and 250 glass panels. The Sage Gateshead addresses the nature of public space and the concept of the democratic, accessible "urban living room".

The building at the waterfront is located at the contact point between the historic urban landscape of Gateshead with its traditional local development, and the world heritage – the arched bridges that are masterpieces of engineering. Last of them, the Gateshead Millennium swing footbridge completed in 2001, is the first bridge designed and fabricated completely digitally.

Does this historic context, being already in opposition, call for mediation and a dialogue mitigating a conflict, or rather a spectacular manifestation of the higher level of awareness and technical capabilities, emphasizing the beginning of another millennium of civilization development?

The presented examples of introducing new, non-linear forms into the existing urban tissue, prove the need for a new urban design strategy. At the turn of the twentieth and twenty-first centuries, new architecture called neo-Baroque or digital Baroque, driven by the development of technology is looking for contemporary theoretical basis for the new common practice in design and construction.

As a historical causality, the Baroque and digital Baroque are compared for their similar mode of operations. Like Baroque architecture, contemporary architectural manifestations are claimed to implement geometry and morphology that criticize previous practices: Baroque reacted against Renaissance spatial idealism, while contemporary twisted morphology refers to Modernist idealism as expressed most evidently in the early Corbusian Euclidian geometry and space. Nevertheless, digital Baroque, as it is argued, does not run counter to this Modernist perception of architecture, but tries to use the advanced, early twenty-century preoccupations with more sophisticated technological tools by referring to Baroque formalism. The digital Baroque is perceived trough Modernism in such a way that Baroque contributes the formal articulation, while Modernism suggested the technical discourse.

Fig. 6. Peter Cook and Colin Fournier, Kunsthaus, Graz, 2000-2003
Source: photo by Christian Plach Harry Schiffer.

New Baroque architecture within old development – the case study

In the 21st century, another path is coming to the forefront that involves a smoothness that steers away from these other methods. This smoothness is obtained by mixing different elements that work together to create the smooth or pliant form. Pliancy depends upon alliances with all other elements involved (whatever they may be), both internal and external. The third element of this method of design are folding and curvilinearity. Folding involves mixing unrelated elements together to create one continuous mixture. The elements within the mixture are still intact in and to themselves, yet integrated to form a cohesive element. One way to achieve pliancy is through viscosity. A good example of viscosity is hot lava flowing through the path of least resistance while picking things up that are in its path. Where the form is contradictory, it is further designed using continuous, flexible systems. Pliancy depends upon alliances with all other elements involved (whatever they may be), both internal and external. This kind of architecture is typically cited where other buildings are posing a contradictory, conflicting, and discontinuous identity.

A spectacular example is Kunsthaus in Graz (2000-2003), where Cook and Fournier synthesized the innovative design approach within the old town in Graz saturated with the Baroque architecture, designated as a UNESCO world heritage site. Graz Art Museum was built as part of the European Capital of Culture celebrations in 2003 and has since become an architectural landmark in the city.

The right bank of the river Mur, then a neglected part of the town, seemed a good location, and the old cast-iron Eisernes Haus (1848) was an ideal starting point[8].

These forms are a lively correlation with the distinctive architecture of the Kunsthaus smooth building. Biomorphic shape of the Kunsthaus has been achieved by Peter Cook and Colin Fournier as a result of adjustments after environmental analyses performed by engineers Bollinger + Grohmann from Frankfurt. This form can be contrasted with the last addition to the Museum der Kulturen in Basel (1999-2001) by Herzog and de Meuron. Their design is described as a "stunning crown for the historical walls: the rooftop of irregular folds fits into the rooftops surrounding the cathedral". The first question is, if this roof really is resonated with the medieval roofscape in which it is embedded? Their approach is typical - conflict/contradiction in the effort to maintain continuity. In contrast, Cook and Fournier attempted to synchronize the architecture of information and communication technologies in order to develop a strategy for unifying the "old" material reality and the "new" immaterial realities that surround and increase the present.

The Curvilnear BIX Façade of the museum represents a singular fusion from architecture and New Media. BIX, ("Big" and "pixels") is the acrylic glass skin of the eastern side of the building toward the Mur and the old town, and represents an oversize urban screen, which serves as an instrument for artistic productions. BIX projects accompany different exhibitions and are not transported into the public area, also the direct environment is defined and shaped. Beyond that, the skin offers also a possible drilling platform for art projects, which bring up for discussion the dialogue between media and area. 930 40 Watt fluorescent rings are embedded in the 900 m² outer skin, with the illumination level of each one being steplessly variable between 0 and 100%. Each light ring is as a pixel, which can be served by a central computer. In this way they can be developed as roughly screened indications, texts and film sequences, which radiate far into the urban area and thus, the blue blister of Graz with a screen of immense size makes an art gallery. Thus the original architectural concept of the skin was radically redefined transforming the facade into a low resolution computer display, a "communicative display skin", fusing architecture, technology and information. The Kunsthaus facade as a display constitutes an extraordinary medium for presenting art and related information transfers. It is an attempt to describe the way in which the representational sphere (the reception of an image) and the instrumentalized sphere (the reception of a form) become respectively deterritorized and deconstructed into a new image-form with a new intensity.

Multiplication and deformation of the image on curved surfaces often leads to a curved and unreal reality. Smooth curvilinear forms are capable of creating unpredictable references and associations with a cultural context. One such example is the department store Weltstadthaus in Cologne (2005) designed by Renzo Piano.

[8] The Eisernes Haus completed in 1848 was the first cast-iron structure in Austria and one of the earliest cast-iron buildings on the European mainland. Designed by architect Josef Benedict Witthalm (1771-1864), the building is innovative for the period not only in the novel structure but also in its large window apertures and flat roof.

Fig. 7. Renzo Piano, Weltstadthaus, Cologne, 2005
Source: photo by Paolo Rosselli, Michel Denancé, Maciej Holcer.

Fig. 8. Future System, Selfridges Department Storers, Birmingham, 1998-2003
Source: photo by Pawel Libera.

It is the object of a double-curved surface responsive to environmental changes. Its form is the result of a search for adaptability. A contact with the architecture of the past eras determines the relationship of the object with the existing urban fabric, destroyed during World War II. This fabric defines a path which extends to the direction of the form, where continuity and flexibility results from calculation relationships between the surface and the structure, the function and the form.

The curvilinear architecture of Weltstadthaus redefines not only the conceptual side, but also the perception of the building as a *per se structure.* There is no façade developed in the past, with the ”correct” articulation. It is the result of a sequence of parametric equations which define the span between the wooden ribs with individual curvature. Glass panels are mounted onto the ribs, each with a different curvature, and a shading system and sensors from the inside to enable the facade to react to the sun’s path. Also, the rain-water is collected[9]. Curvilinear form of Weltstadthaus creates continuities between site and structure, implementing conceptual design that entrain perception to follow patterns that connect the outside and the inside, both physically and psychologically. It works differently than the form of the Selfridges Department Store by Future System in Birmingham completed in 2003.

This building provides a distinctive new home for Selfridges and establishes a landmark for Birmingham in the West Midlands. The bulbous, metallic volume sits in the Bull Ring area of Birmingham, a historic market district in the centre of the city. The building itself becomes a genuine catalyst for urban regeneration. St Martin’s Church, rebuilt in the nineteenth century, has long acted as a landmark in this congested area. Selfridges Birmingham is located adjacent to the church and provides a twenty-first-century icon for the city. This department store building responds to the curves of the site, formed by a U-shaped confluence of streets.

In both cases, the curvilinear forms express the pursuit of the logic of an agreement, continuity, consistency and negotiations in terms of a given urban context and utility program. Where previously the complexity and contradiction resulted from spatial conflicts and historical layers, those forms are an attempt to alleviate or weaken them to bring out the historical identity of the place.

The development and distribution of parametric design tools based on NURBS (Non-Uniform Rational B-Spline) in the first decade of the 21st century has increased the interest in various kinds of spatial structures. Parametric thinking has introduced the shift in the mindset between the search for a specific static and defined formal solution, and the design of the specific stages and factors used to achieve it. Intensive experiments with three-dimensional modelling techniques, rapid-prototyping and CNC technologies were commenced both in academia as well as in practice. Especially on university campuses, various kinds of spatial structures were built, using most often plywood, cardboard, wood or plastic.

The Metropol Parasol (2005-2011) by Jurgen Mayer H. Architects is within historical context of Seville. This is the world’s largest wooden parametric structure. It has dimensions of 150 by 70 m and an approximate height of 26 m. The structure is

[9] Januszkiewicz Krystyna. „Architektura performatywna w Kolonii”, *Archivolta* 2/2012, pp. 32-45.

located at La Encarnación square, in the old quarter of the city. The stalls were knocked down in 1842, but it was not until 1973 when a decision was made to build a car park there. An underground car park was planned for the space, until an archaeological dig in the 1990s revealed the remains of a Roman colony, with figurative mosaics and architecture. In a bid to integrate the site with everyday commerce, the Seville Urban Planning Agency held an international competition in 2004.

The structure consists of six elements in the form of giant mushrooms, whose design is inspired by the vaults of the Cathedral of Seville and the ficus trees in the nearby Plaza de Cristo de Burgos. The free-standing parasols cover an area of 150 m x 70 m, which is one of the largest architectural timber structures ever built. The Metropol Parasol is organized in four levels. The underground level houses the Antiquarium, where Roman and Moorishremains discovered on site are displayed in a museum. On the first level there is the Central Market. The roof of the first level is the surface of the open-air public plaza, shaded by the wooden parasols above and designed for public events. Interior fountains and plants also help to provide a cool climate during the intense summer heat. Levels numbers 2 and 3 are the two stages of the panoramic terraces (including a restaurant), offering one of the best views of the city centre[10]. The polyurethane coating protects the wood and allows it to breathe - a sort of natural air conditioning - and the wood itself doesn't give off hazardous fumes when it burns. It is also sustainably planted, with a certificate PEFC (Programme for the Endorsement of Forest Certification schemes), granted by the Finnish Forest Council of Certification. The coat of the structure is self cleaning, and only needs repainting every 20 to 25 years.

The multi-curvature structural form of high complexity refers to the Baroque – its harmony and fusion of the arts and the sciences, the structural "truthful" efficiency of the Gothic, which nowadays is experiencing a revival under the premise of the parametric approach, of virtual scripts, and formal organicism (understood as evolutionary mimicry)[11]. In this sense, the Metropol Parasol is part of the existing historic context of the city, developed by the subsequent eras and their style. It re-defines the complete dependence on the square of the fabric of the city (effect, action, space), the separation of below (matter, function) and above (manner, vision), of tectonics and textures, of movement and stasis, of knotting and folding, of light and shadow, of thick and thin, of topologies (multiplicities of geometry and methods) and infinity (convolutions and illusion). The Metropol Parasol is a good example of viscosity using continuous, flexible systems.

The presented case studies show how curvilinear forms of digitally designed architecture coexist with the historic context and how they inscribe into the existing urban fabric with a complex historical substance. Following the spirit of the times (zeitgeist), the new architecture reconfigures the expression, reception

[10] see: Moore Rowan. "Metropol Parasol, Seville by Jurgen Mayer H – review, Art and Design", *The Observer*, London, 27.03. 2011 (Retrieved 05.03. 2015).

[11] see: Colletti Marjan. *CyberBaroque and other DigiTales, OS1: LSBU Lecture Series 2007/08*, London South Bank University UK, 2008. see also: http://marjan-colletti.blogspot.com/2009/10/cyberbaroque-and-other-digitales-marjan.html (accesed 24.02.2015).

Fig. -9. Jurgen Mayer H. Architects, Metropol Parasol, Seville, 2005-2011
Source: J. Mayer H. Architects.

and materiality, as well as uses the context to validate its existence. The features of this new architecture may be referred to the achievements of the Baroque and considered in a wider context of historical changes in the urban fabric. In fact, as Gilles Deleuze writes in *Le Pli*, the Baroque "represents the ultimate attempt to reconstitute a classical reason by dividing divergences into as many worlds as possible, and by making from incompossibilities as many possible borders between worlds"[12]. Within a digital architectural debate, we can consider the Baroque to be remarkably contemporary because it discovered and also shattered a plethora of binary conditions, boundaries and frames that provide an analogy to today's actuality-digitality feedback system[13].

One can agree with the view that beyond the generation of innovative engineering forms, digital design has the potential to affect the wider complex cultural landscape of today in profound ways.

[12] Deleuze Gilles. The Fold: Leibniz and the Baroque, (trans. Tom Conley), Minneapolis: University of Minnesota Press, 1993, p. 81.
[13] see: Colletti Marjan (ed.). Exuberance. New Virtuosity in Contemporary Architecture, John Wiley and Sons Ltd, 2010, p. 24.

Conclusions

As it was in the Baroque period, contemporary architectural manifestations are claimed to implement geometry and morphology that criticize previous practices. Baroque reacted against Renaissance spatial idealism, while contemporary twisted morphology refers to modernist idealism. Nevertheless, digital Baroque, as it is argued, does not run counter to this perception of historical architecture, but tries to use the advanced early twenty-century preoccupations with more sophisticated technological tools by referring to Baroque formalism. The curvilinear architecture with its submissiveness to the context, may be perceived as a new way to rehabilitate urban fabric, rich in various layers created in the past. Especially European medieval cities have zones requiring the introduction of new utility functions for their social reactivation[14].

New Baroque architecture involves and invokes a plethora of arguments on the performance (understood both as a task and as staging) of poetics in digital architecture. Under these circumstances, what is at hand is an alternative to the understanding and the production of truly contemporary, innovative and progressive digital architecture.

[14] see: Paszkowski Zbigniew. *Architectural Heritage – Today. Architecture As Culutral Heritage, Architectural Volumes,* Publisher Exemplum, No. 2-3. 2011-2012, p. 37.