



ZAHA HADID ARCHITECTS



# Zaha Hadid Architects

Zaha Hadid Architects  
is published on the occasion of the exhibition

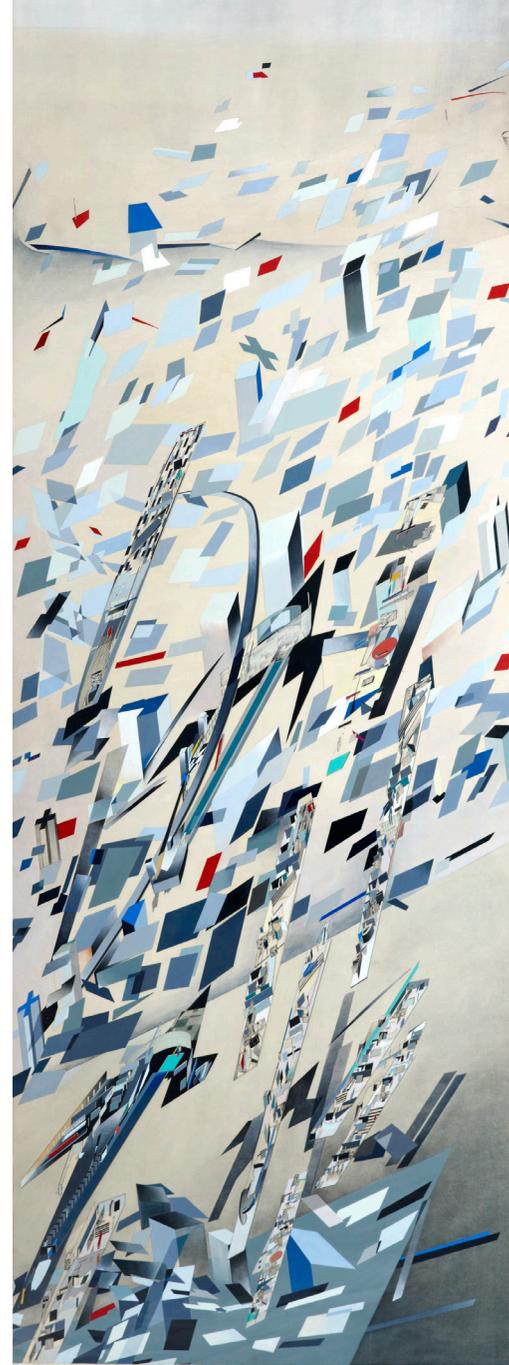
**ZAHA HADID**  
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San Marco 2847 / Campo Santo Stefano  
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Confetti, The Peak, Hong Kong 1982-1983

While I was writing this introduction to the exhibition, my thoughts were interrupted by the dramatic news of Dame Zaha Hadid's sudden death.

That news shocked me. I sat down to think.

I have always looked upon Ms Hadid with great admiration for her strength, determination and independence. And I took inspiration from this to decide how to proceed: Adriano Berengo with the Fondazione Berengo and Zaha Hadid Architects had the responsibility to realize her desire to hold an astounding exhibition in Venice.

This is my commitment to her, to what she achieved and created during her lifetime. Today, more than ever, I can say that this is not just a solo show, but a show evidencing her desire to share with us a vision of present and future architecture. Her way of accomplishing this was through a mission, with incredible results. This would not have been possible without the willingness and strength of Zaha Hadid Architects Studio that fully represents the determination of its founder and which will continue on this path.

The moment I received Zaha Hadid's proposal for the exhibition, I immediately felt a deeper connection with her.

When you search for perfection and you obtain it, when your audience is accustomed to surprising and successful results, when your name is Zaha Hadid, the research process, the attempts and trials, which for months are the only things you think of, sometimes go almost unnoticed and take second stage.

For over twenty years, I have been seeing this in my reality, in the glass artworks created in my furnace on Murano, Berengo Studio 1989: all the intermediate steps leading to

13 the creation of the final project are an inseparable component of the end result. This leads to the need for interviews, filming and video editing, documenting the difficult but amazing moment right before an artwork is made.

I think that this awareness was also part of Zaha Hadid's works and is more than alive in this exhibition.

With this show, Zaha Hadid aimed to create an intimate and profound journey. Honoured with awards, prizes and publication covers, the so-called "star-architect" has established a more intimate dialogue with her audience here in Venice in the Palazzo Franchetti.

Three key concepts strike the spectator: Synergy, Innovation, and Fluidity. The word synergy that the architect finds in design, engineering and manufacturing technologies inevitably evokes, in my mind, a strong parallel with my own activity in the art world. Creating works of art in glass is a process that needs synergy and harmony among design (artists, designers and architects that I host for the projects), the manufacture (referring to the furnace where expert glassmakers shape the design and the ideas of the artists) and the technology they employ. There is much talk today about the need for craftsmanship, but technology is especially essential, since the contemporary approach should not be a nostalgic remake of the past, but an advancement that renders tradition priceless. All this is found in Zaha's creations, from architecture to design.

Fondazione Berengo is an organization that I established to bring Murano glass as applied to contemporary art and design to the world. Fondazione Berengo implements its mission through the exhibition *Glasstress* and related educational processes.

Fondazione Berengo has also embraced this architectural

14 exhibition of Zaha Hadid for its educational aspect. The exhibition seeks to surpass the barrier between the magnificence of the completed project and its "backstage", also by investigating aspects – far from secondary – inherent to its implementation: logistics, organization, materials, skilled labour, techniques and technologies, with great dignity and attention.

Innovation is the second key concept intended as a process that questions what we know in favour of progress that benefits everyone. And this is one reason that Zaha's projects are extraordinary: they abound with magnificence, thanks to an incredible research and innovative approach, taking building know-how to the extreme. At the same time her works possess the humility to listen to the spirit of the place where they are built and acknowledge the functionality of those who experience them. I think this is the secret of her success, a delicate balance that requires dedication, commitment and full control of processes and mediums to create a project that can be enjoyed by people in the present while representing them in a changing world.

For me, the incredibly fluid work called *Helix* has a very strong and conceptual meaning in this exhibition, an intermingling of significance: a conjunction between the "artist" and her audience, between performers and patrons, between the present and the future of us all.

The word fluidity comes to mind: an exhibition on contemporary architecture that harmoniously unfolds across the rooms of a 16<sup>th</sup>-century palace on the Grand Canal in Venice. Her works and installations interact with the environment of the palazzo itself, in the same way that the restless flow of water of Grand Canal combines reflected images of a Venice - and a world - in which past and present merge more and more into one beautiful context. This is fluidity.

The Palazzo Franchetti is not only home to Fondazione Berengo but to the Istituto Veneto di Scienze, Lettere ed Arti, an institution committed to spreading and safeguarding science, literature and the arts by promoting research and far-reaching programs. Here, I am sure visitors will have a greater understanding of Zaha Hadid's pioneering vision that redefined architecture and design for the 21st century and captured imaginations across the globe. Expert or amateur, they will enjoy this exhibition and go away with precious memories and valuable lessons. I work in the art world. Dame Zaha Hadid was an excellence in architecture, but her work is also imbued with art, that patina that makes everything eternal, including the creator herself.

Adriano Berengo  
President Fondazione Berengo

The 2004 publication of *Digital Hadid* remains an important milestone in my attempt to reflect the genealogy of the digitally driven style I started to call 'Parametricism' at the 2008 Venice Architecture Biennale. In 2004 I was already formulating the need to name and define the new language or style of architecture that was forming due to a strong convergence of a whole generation of young architects since the early 1990s. In retrospect it seems curious that it took me another 4 years to find the courage and occasion to take a stab at attempting such a definition.

My 2004 thesis focused on the pre-digital desire for complexity and fluidity as a motivating force for the introduction of certain digital tools drawn into architecture from the realms of computer graphics, movie animation and scientific simulation. What was already clear at the time, namely that those digital tools started to have a profound impact on our design and design thinking beyond the mere fulfillment of our prior motivating desires, became much more pronounced since. In the last 10 years a whole new suite of tools was brought to bear on our design methodology and repertoires, tools that pushed our conception of architectural design into a whole new direction. These tools are the ever expanding set of algorithms that shape, discipline, and rationalize our designs in unexpected and sometimes even counter-intuitive ways. These tools have become truly generative and intelligent, augmenting our design capacity in profound ways. While new degrees of design freedom are conquered, our designs can be simultaneously constrained by structural, environmental and fabrication logics. This delivers engineering rationality together with an expanded range of new

17 morphologies that can serve architecture's expressiveness and communicative capacity. This coincidence of rationality and expressiveness determines the peculiar search space of our discipline, a solution space which has been hugely expanded under the auspices of parametricism. This new paradigm has been flourishing for quite some time but is only now ready to go mainstream on all scales and with respect to all program domains.

Patrik Schumacher, 2016  
Partner, Zaha Hadid Architects

*Digital Hadid Revisited* will explore the contribution of Zaha Hadid and of Zaha Hadid Architects to the development of the new architectural language and paradigm that is fast becoming hegemonic within avant-garde architecture today.

There is an unmistakable new style manifest within avant-garde architecture today. Its most striking characteristic is its complex and dynamic curvilinearity. Beyond this obvious surface feature one can identify a series of new concepts and methods that are so different from the repertoire of both traditional and modern architecture that one might speak of the emergence of a new paradigm for architecture. It seems difficult to give a unified name to this new paradigm that succinctly captures the essence of the current trend. One difficulty lies in the question whether such a defining term should refer to the formal features, the guiding concepts or the methods/techniques that characterize this new paradigm. Contenders are Blob-architecture, Folding, Deformation, Parametric Architecture, Digital Architecture.

This new language (or style) of architecture seems to be based upon the adoption of a new generation of 3D modeling tools. Indeed a lot of commentators tend to construe a direct causal link from this new paradigm back to the IT revolution that has transformed the discipline in last 10 years.

Indeed the choice of a representational/design medium has a huge impact on the character of the design results. The medium is never neutral and external to the work. It constitutes and limits the design issues treated and the universe of possibilities for effective design speculation. Design thinking is bound to the representational medium and its scope can be expanded by the expansion offered by the new digital design tools. The reflection upon "design worlds" (Mitchell 1990), and their embeddedness in the "discursive formations" (Foucault 1972) of the discipline, is a necessary component of taking a progressive stance towards the possibilities of design research.

However, I shall argue and demonstrate that such a simple reduction of the new type of work to the availability of computing in architecture would be a fallacy. While it is undeniably true that the arrival of the new tools (3ds max a.o.) had a huge impact and that these tools have been able to monopolize the production of contemporary work – without these tools nothing goes – I will argue that the adoption of animation tools was not at all inevitable,

but rather had to be prepared by certain conceptual and methodological advances that preceded the arrival of these tools. To uncover and explicate this pre-digital pedigree of the current digital architecture will be the task of the first part of the catalogue. In this prehistory one can locate Zaha Hadid's most original and path-breaking contributions to the development of contemporary architecture. In this era – the 1980s – Hadid was one of the key protagonists in a field of radical conceptual and formal architectural research, and her pre-eminent reputation was established on the basis of pictorial research without the completion of a single building during this first decade of her career. During this period the computer was absent from Hadid's design studio. However, the innovation of certain analog design media deployed was crucial in the formation of her work.

The second part of the catalogue will focus on the development of the work since the introduction of the computer in 1990. Here I will introduce a series of key projects and key concepts that have been important with respect to the development of the current flourishing of “digital architecture” both within and beyond Hadid's practice. The period is also the period in which Hadid's architecture has made the transition from concept to material realization without compromising its innovative thrust. The involvement of the 3D modeling tools in this process of realization will be explained. Finally, I will present and discuss the most recent work of Zaha Hadid Architects which is marked by the fact that a new level of structural complexity, tectonic fluidity and plastic articulation has been mastered with precision and confidence.

While the catalogue presents two parts representing two phases in the development of Hadid's oeuvre pre-digital and (post) digital – I think the work has a strong continuity overall. The computer was introduced in the late eighties, early nineties, when we started with simple forms of 3D-modelling with Model-shop and later FormZ. That was a process parallel to hand drafting and painting. They were quick three-dimensional sketches. The computer was used because it was helpful for what was already established as an architectural language. The computer programs that work with splines and smoothly deformable meshes were introduced much later, in the second half of the nineties. The 2D computer-drafting, for the plans and sections, started in the mid-nineties. That was a big shift, because it meant not just working in layers, which you can also do on transparent paper, but it meant that we could work on all plans simultaneously. The latest shift is the introduction of 3D modeling and complex curvilinearity. That made more

complex compositions possible. But the desire for complex form was always building upon the formal and conceptual innovations achieved previously. The tools came in as soon as they were available, keenly taken up to support the ambitious design manoeuvres already under way. It was a dialectic amplification, in which the new work spurned the search for new tools and the introduction of new tools facilitated the work further, pushing the most ambitious tendencies to new extremes. This process was an evolution of many smaller steps, not of a few singular breaks.

The quest for new design media

One of the most significant and momentous features of architectural avant-garde of the last 20 years is the proliferation of representational media and design processes.

In the early eighties Zaha Hadid burst onto the architectural scene with a series of spectacular designs embodied by even more spectacular drawings and paintings. The idiosyncrasies of these drawings made it difficult to read them as straightforward architectural descriptions.

This initial openness of interpretation might have led some commentators to suspect “mere graphics” here.

There is an obvious parallel here with the skepticism which confronted the early, abstract experiments in computer surface modeling in the mid-nineties.

However, these unusual modes of representation played a fundamental role in the development of a series of highly original and influential expansions of the formal and conceptual repertoire of architecture. Modes of representation in architecture are at the same time modes of generation. The creative process to a large extent resides in these modes and means. The creativity and information processing capacity of the “imagination” or “inner eye” is rather limited and itself dependent upon being trained and developed in conjunction with the development of the media. That is why “Digital Hadid Revisited” is part of a significant series of investigations.

Computer technology, i.e. the new digital design tools have had an important and increasing influence on the work of Zaha Hadid Architects over the last 10 years. This concerns primarily the handling of increasingly complex geometries within the designs. However, the desire for such tools to be imported from the animation industry originated in the fact that the tendency towards complexity and fluidity was already manifest in the work before those tools were available. Hadid’s early elaborate techniques of projective distortion – deployed as a cohering device to gather a multitude of elements into one geometric force-field – were already setting the precedence of the current computerbased techniques of deformation and the modeling of fields by means of pseudo-gravitational forces.

Hadid used axonometric and perspective projection in a new way to dynamize the implied space. Initially such projections were deployed according to their proper function as means of representation. However, it soon became apparent that there was a

“self-serving” fascination with the extreme distortion of spaces and objects that emerged from the ruthless application of perspective construction – not unlike the anamorphic projections one can find in certain 17<sup>th</sup> Century paintings. Hadid built up pictorial spaces within which multiple perspective constructions were fused into a seamless dynamic texture. One way to understand these images is as attempts to emulate the experience of moving through an architectural composition revealing a succession of rather different points of view. Another, more radical way of reading these canvasses is to abstract from the implied views and to read the swarms of distorted forms as a peculiar architectural world in its own right with its own characteristic forms, compositional laws and spatial effects. One of the striking features of these large canvasses is their strong sense of coherence despite the richness and diversity of forms contained within them. There is never the order of monotonous repetition, but the field continuously changes its grain of articulation. Gradient transitions mediate large quiet areas with very dense and intense zones. Usually these compositions are poly-central and multi-directional. All these features are the result of the use of multiple, interpenetrating perspective projections. Often the dynamic intensity of the overall field is increased by using curved instead of straight projection lines. The projective geometry allows to bring an arbitrarily large and divers set of elements under its cohering law of diminuation and distortion. The resultant graphic space very much anticipates the later (and still very much current) concepts of *field* and *swarm*. The effect achieved is very much like the effects currently pursued with curve-linear mesh-deformations and digitally simulated “gravitational fields” that grip, align, orient and thus cohere a set of elements or particles within the digital model.

A second prevalent feature of Hadid’s large paintings is the technique of layering and the concomitant technique of rendering elements as transparent to reveal the depth of the composition. This transparent superposition of the elements of a drawing anticipates the literal spatial interpenetration of geometric figures in order to create more complex organizations.

A third characteristic of Hadid’s early work that anticipates a pervasive preoccupation of the recent avant-garde is the idea of manipulating the ground plane by means of cutting and warping. (Tomigaya, Al Wahda, Duesseldorf) This elaboration of the ground as manipulated/moulded surface anticipates the current use of digital surface modelers and the attendant idea of architectural articulation by means of surface foldings implying the concept of the building as a single continuous surface.

Here is what Zaha Hadid had to say about the role of design media in general and digital media in particular in an interview with the Chairman of the Architectural Association School of Architecture Mohsen Mostafavi, Dec-Jan 2001 (El Croquis 103):

MM:

You touched on the question of mechanisms or means of representation. How do you think your approach has changed in the last 5 or 10 years? What is the tension between your own drawings/conceptualisations and the way in which in your own office computers are playing such a central role ?

ZH:

I still think that even in our later projects, where the computer was already involved, like for instance the IIT project, the 2-dimensional plan drawings are still seminal. I still think the plan is critical. The computer shows what you might see from various selected viewpoints. But I think this doesn't give you enough transparency; it's much too opaque.

Also, I think it is much nicer on the screen than when it is printed on to paper, because the screen gives you luminosity and the paper does not unless you do it through a painting.

Further I think if you compare computer renderings with rendering by hand I must say that you can improvise much more with



'Riverside Elevation' KMR Art and Media Centre, Dusseldorf 1989-1993

hand drawing and painting. As you go along, there is another layer of operation, while you're working on the drawing which is somehow missing in the computer rendering. Some people still have this raw talent. Some people can do drawings and plans (by hand or by computer). They can manipulate them so much. Somebody like Patrik can do plans like nobody else. Some people have an incredible way of dealing with 3-dimensional modelling in the computer; but they don't have the same value. You can achieve certain things through technology. But you can't abstract in the same way. When drawing a perspective by hand you can decide that you want to show and edit out some other things. It's not about wire-framing. Rather you can decide to focus on the thing you want study at the time as you're doing the drawing. It focuses you more on certain critical issues. However, because I'm sitting there with 15 or 20 computer screens in front of me and I can see them all at the same time, it gives me yet another repertoire. You can see at the same time the section, the plan and several moving 3-D views, and in your mind you can see them in yet a different way. So I'm not sure if it weakens or strengthens your view. I just think it's a different way. And we still do physical models all the time, and I still do the sketches.

MM:

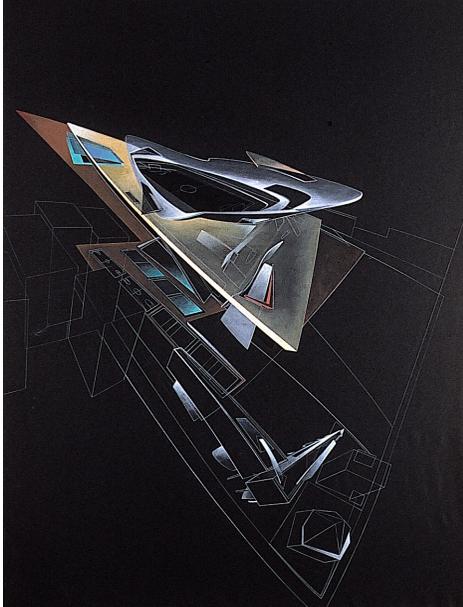
With your drawings you were often dealing with a certain notion of distortion, which allowed certain conventions to be looked at again.

ZH:

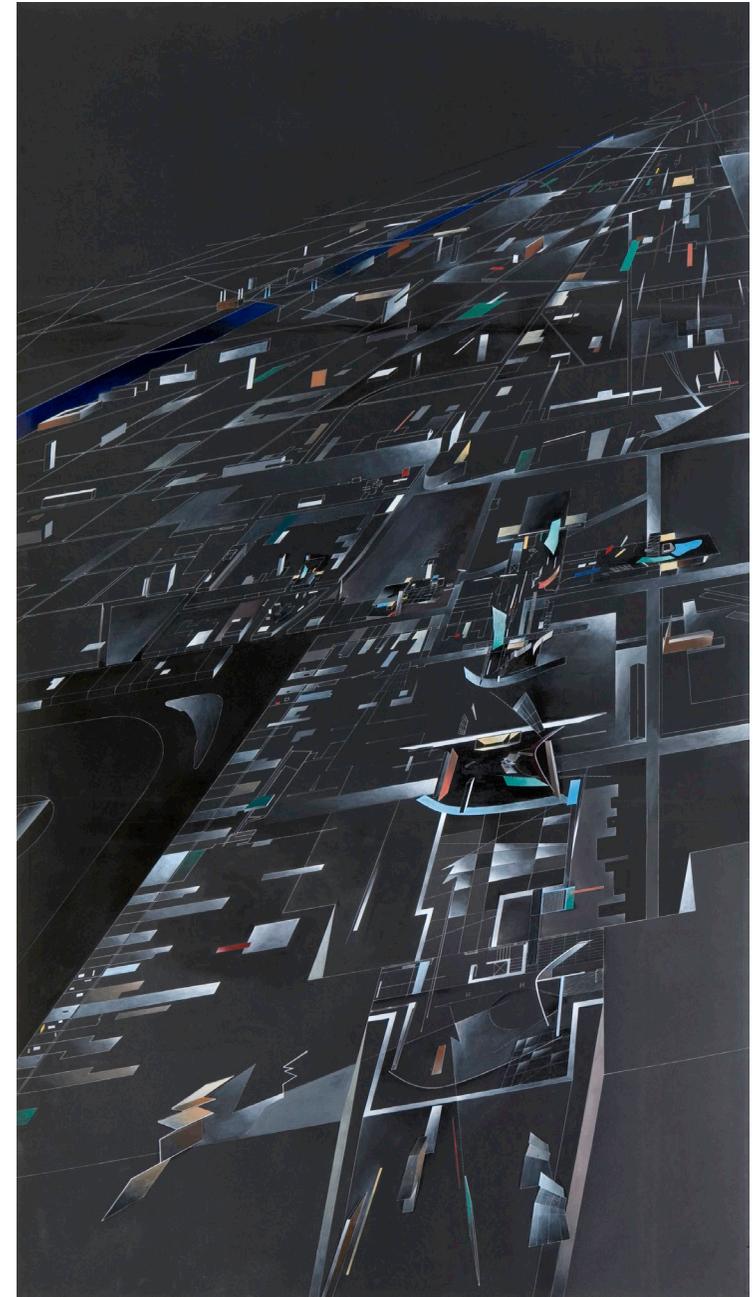
Yes, but what is interesting is that these ideas, at the time we did these drawings, allowed us to see a project from every possible and impossible perspective. Maybe you can do that now with the kind of animated fly-over. You can. But the nice thing about the elaborate drawing is that, because they take such a long time to construct, they give you the time to add many layers. With physical models it is the peculiar nature of the material which affords design opportunities. Because I am always doing the contouring of the site in plexi we began to see a similarity between liquid space and rock. Such "discoveries" can be productive. By the sheer use of the model, almost by total accident, you begin to look at things in different ways. So I'm saying that the presentation began to inform the work and it gives you ideas. In the case of the Tomigaya project in Tokyo we did these every difficult drawings where we saw everything simultaneously in 3-D. This coincided at the time with the appearance of the plexi model, about 15 years ago. What does it mean to see in a transparent way through a building? One of the implications for us was the realisation that we do not have to have the vertical circulation operate like an extrusion or vertical core but

rather allow the vertical path to shift from one level to the next. This was discovered because we had the different plans overlaid with each other, to construct a way to connect the levels in a new way.

I think that in a way one can say that these very elaborate, complicated drawings – without saying that they are definitely finished – did their job at the time. At the time I could not present the work in a normative way. The work could not be done just through a simple set of plans and sections only. There was an element of shock, really, which was to shock or challenge normal conventions. But it's not enough to just, say, do anything formally different. I think that 20 years ago, when my formal repertoire has developed over a number of years, in every project, the idea of the project was first challenged, and then it was worked on formally. We never set out explicitly with the intention of formal discovery, through a drawing with the prediction that we would discover something. All these drawings which were quite elaborate needed a scenario. These drawings were developed over a considerable length of time. Therefore I would say, the formal repertoire that emerged was not completely accidental, perhaps a bit of accident at the beginning maybe, prior to the development of the project. But then those accidental discoveries have been worked out through very precise drawings.



Al Wahda Sports Centre, Abu Dhabi, UAE 1989



Halkin Place, London, UK 1985



The predicament to start (and ultimately stay) with drawings, i.e. with objects lacking the third dimension, has been architecture's predicament ever since its inception as a discipline distinguished from construction. As Robin Evans pointed out so bluntly: architects do not build, they draw.

Therefore the translation from drawing to building is always problematic – at least under conditions of innovation.

Architecture as a design discipline that is distinguished from the physical act of building constitutes itself on the basis of drawing. The discipline of architecture emerges and separates from the craft of construction through the differentiation of the drawing as tool and domain of expertise outside (and in advance) of the material process of construction.

The first effect of drawing (in ancient Greek architecture) seems to be an increased capacity of standardization, precision and regularized reproduction on a fairly high level of complexity and across a rather wide territory. Roman architecture could benefit from this but also shows hints towards the exploitation of the capacity of invention that the medium of drawing affords. Without drawing the typological proliferation of Roman architecture is inconceivable. Since the Renaissance (via Mannerism and Baroque) this speculative moment of the drawing has been gathering momentum. But only 1920s modernism really discovers the full power and potential of the drawing as a highly economic trial–error mechanism and an effortless plane of invention – in fact inspired by the compositional liberation achieved by abstract art in the 1<sup>st</sup> decade of the 20<sup>th</sup> Century. Drawing accelerates the evolution of architecture. In this respect modern architecture depends upon the revolution within the visual arts that finally shook off the burden of representation. Modern architecture was able to build upon the legacy of modern abstract art as the conquest of a previously unimaginable realm of constructive freedom. Hitherto art was understood as mimesis and the reiteration of given subjects, i.e. re–presentation rather than creation. Architecture was the re–presentation of a fixed set of minutely determined typologies and complete tectonic systems. Against this backdrop abstraction meant the possibility and challenge of free creation. The canvas became the field of an original construction. A monumental break–through with enormous consequences for the whole of modern civilisation. Through figures such as Malevich and vanguard groups such

as the DeStijl movement this exhilarating historical moment was captured and exploited for the world of experimental architecture.

My thesis here is that the withdrawal into the two–dimensional surface, i.e. the refusal to interpret everything immediately as a spatial representation, is a condition for the full exploitation of the medium of drawing as a medium on invention. Only on this basis, as explicitly graphic manoeuvres, do the design manoeuvres gain enough fluidity and freedom to play. They have to be set loose, shake off the burden to always already mean something determinate. Obviously, this stage of play and proliferation has to be followed by a tenacious work of selection and interpretation. At some stage architectural work leads to building. But not in every “project”. Some architectural projects remain “paper projects” which are “translated” later, by other projects. The discipline of architecture has learned to allow for this. Major contributions to the history of architecture have been made on this basis. Today we see architectural experiments and manifestos proliferating within the virtual space afforded by the computer. Although the working interface (computer screen) as well as the various output media (printing, video–projection) remain strictly two–dimensional, the virtual three–dimensionality afforded by 3D modeling software offers a new way of working that combines the intuitive possibilities of physical model making with the precision and immateriality of drawing. Further, as will be discussed in more depth below, certain 3D modeling and animation tools introduce whole new series of “primitives” and manipulative operations which are highly suggestive with respect to new architectural morphologies and the conceptual build up of an architectural composition. However, these new compositional techniques still share some of the productive under–determination of the experimental drawing. 3D modeling can be equally abstract and ambiguous with respect to the final translation into physical constructs.

One of Hadid's most audacious moves was to translate the dynamism and fluidity of her calligraphic hand directly into equally fluid tectonic systems. Another incredible move was the move from isometric and perspective projection to literal distortions of space and from the exploded axonometry to the literal explosion of space into fragments, from the superimposition of various fisheye perspectives to the literal bending and melt down of space etc. All these moves initially appear rampantly illogical, akin to the operations of the surrealists.

The level of experimentation reached a point where the distinction between form and content within these drawings and



Aerial View, Irish Prime Minister's Residence, Dublin, Republic of Ireland 1977-1980

paintings, was no longer fixed. The question which features of the graphic manipulation pertain to the mode of representation rather than to the object of representation was left unanswered. Was the architecture itself twisting, bending, fragmenting and interpenetrating or were these features just aspects of the multi-viewpoint fish-eye perspectives? The answer is that over an extended process and a long chain of projects the graphic features slowly transfigured into realizable spatial features. The initial openness in this respect might have led some commentators to suspect “mere graphics” here. Within Zaha Hadid’s studio this uncertainty was productively engaged through a slow process of interpretation via further drawings, projects and finally buildings.

These strange moves which seemed so alien and “crazy” – once taken seriously within the context of developing an architectural project – turn out to be powerful compositional options when faced with the task of articulating complex programmes. The dynamic streams of movements within a complex structure can now be made legible as the most fluid regions within the structure; overall trapezoidal distortions offer one more way to respond to non-orthogonal sites; perspective distortions allow the orientation of elements to various functional focal points etc. What once was an outrageous violation of logic has become part of a strategically deployed repertoire of nuanced spatial organisation and articulation.

Painterly techniques like colour modulations, gradients of dark to light or pointillist techniques of dissolving objects into their background assume significance in terms of the articulation of new design concepts like morphing or new spatial concepts like smooth thresholds, “field-space” and the “space of becoming” (Eisenman). These concepts came to full fruition only with the latest digital 3D modeling and animation software. Jeff Kipnis deserves recognition here as someone who has theorised such possibilities of “graphic space”. But it was Zaha Hadid who went first and furthest in exploring this way of innovating architecture – without as well as with support of advanced software.

Zaha Hadid has been a persistent radical in the field of architectural experimentation for the last 35 years.

The importance of her contribution to the culture of architecture lies primarily in a series of momentous expansions – as influential as radical – in the repertoire of spatial articulation available to architects today. These conquests for the design resources of the discipline include representational devices, graphic manipulations, compositional manoeuvres, spatial concepts, typological inventions and (beyond the supposed remit of the discipline

proper) the suggestion of new modes or patterns of inhabitation. This list of contributions describes a causal chain that significantly moves from the superficial to the substantial and thus reverses the order of ends vs. means assumed in normative models of rationality. The project starts as a shot into the dark, spreading its trajectories, and assuming its target in midcourse. The point of departure is the assumption of a new representational media (x-ray layering, multi perspective projection) which allow for certain graphic operations (multiple, over-determining distortions) which then are made operative as compositional transformations (fragmentation and deformation). These techniques lead to a new concept of space (magnetic field space, particle space, continuously distorted space) which suggests a new orientation, navigation and inhabitation of space. The inhabitant of such spaces no longer orients by means of prominent figures, axis, edges and clearly bounded realms. Instead the distribution of densities, directional bias, scalar grains and gradient vectors of transformation constitute the new ontology defining what it means to be somewhere.

These innovations have been (and continue to be) produced within an international collective/competitive milieu of experimenters. The totality of discoveries emerging within this milieu is immediately appropriated – and rightly so – by each and every contributor.

This assessment of Hadid’s oeuvre in terms of the expansion of architectural methods and formal resources is independent of the success and merit the various built and unbuilt projects with respect to the particular tasks they are addressed to solve. Rather than fulfilling only their immediate purpose as a state of the art delivery of a particular use-value – e.g. a fire station or an exhibition venue – the significance and ambition of these projects is that they might be seen as manifestos of a new type of space. As such their defining context is the historical progression of such manifestos rather than their concrete spatial and institutional location. The defining ancestry of e.g. the Vitra Fire Station or the Millennium Mind Zone includes the legacy of modern architecture and abstract art as the conquest of a previously unimaginable realm of constructive freedom. A key example for such a manifesto building is Rietveld’s House Schroeder. The value and justification of this building does not only depend on the particular suitability to the Schroeder’s family interests. It operates as an inspiring manifesto about new compositional possibilities which much later are further extended in the Vitra Fire Station – Hadid’s first built manifesto to be understood within Zaha Hadid’s oeuvre at large. Both these manifesto buildings radically violate the typological and tectonic

norms of their time and dare to suggest compositional moves hitherto unknown to the discipline of architecture. Hadid's oeuvre in turn can be defined as an attempt to push ahead with "the incomplete project of modernism". This is the most general account Zaha Hadid has – on many occasions – given of her work. The "incomplete project of modernism" as Hadid understands it is more tilted towards Russian Constructivism rather than German Functionalism giving greater prominence to formal innovation than to scientific rationalisation. But this opposition is one of degree rather than principle. For all shades of the modern movement the historical intersection of abstract art, industrial technology and the social revolutions succeeding in the aftermath of the 1st world war have been the indispensable ingredients.

The introduction of categories such as "manifesto", "the discipline of architecture" and "oeuvre" suspends but does not cancel or deny concerns of utility. These categories are not set absolute, autonomous and forever aloof from the functional concerns of society. Rather the concrete uses and users are bracketed for the sake of experimenting with new, potentially generalisable principles of spatial organisation and articulation with respect to emerging social demands and use patterns. Functional optimality according to well corroborated criteria is thus renounced for the experimental advancement of social practises of potentially higher functionality. The very nature of the kind of iconoclastic research of "the avant garde" is that it thrusts itself into the unknown and offers its challenging proposals to the collective process of experimentation in a raw state rather than waiting until the full cycle of experimentation, variation, selection, optimisation and refinement is complete to present secure and polished results.

Despite the often precarious status of its partial and preliminary results I will argue that this radicalism constitutes a form of research; an unorthodox research in as much as its methods include intuitive groping, randomisation and automatic formal processes, i.e. the temporary relaxation and even suspension of rational criteria.

Hegel grasped that the New in artistic and intellectual history is always consuming its immediate precursor as its defining opposite, maintaining and carrying it along like a shadow. And this shadow carries a further shadow etc., so that a cultural innovation can only be identified and appreciated by those who are able to place it within the whole historical evolution. Such appreciation therefore becomes a relative, graded and ultimately infinite act. (And it is essential for the culture of architecture to insist that a new architectural position can not be reduced to an isolated form or gesture, but – like a scientific idea – involves a whole network of historically cumulative assumptions and ambitions.)

This process, which Hegel called sublation, is borne out by the fact that the definition of the New, e.g. of deconstructivism or folding in architecture, stretches across hundreds of magazine and book pages, broadly retracing architectural history, referencing classic as well as modernist tropes.

But – and this is beyond the grasp of hegelian dialectic – each time the sequence is traversed it is twisted and retro-actively realigned by current contingencies and emerging agendas. The history of (architectural) history reveals how distinctions and relative newness are redistributed, emerge and collapse under the force of current innovations and concerns, a force that thus works to a large extent against the arrow of time and this has bewitching consequences: A thought might no longer speak the language of its own beginning. As Derrida puts it "... all is not to be thought at one go ..." and "The necessity of passing through that erased determination, the necessity of that trick of writing is irreducible". (Derrida 1974)

However easy and natural the latest innovations (layerings, deformations) might seem to us now, they did constitute radical violations of the implicit rules of architectural order and for the mainstream audience this oppositional character still dominates their perceived meaning. The innovative architect has no choice but to reckon and work with this dialectic determination by opposition or contrast. It will take time for the differences internal to the new language to emerge from the shadow of the stark difference of new vs old.

One argument here is that while the current avant-garde language of architecture – with its incredible surge of creative energy and power, fuelled by the ongoing IT revolution, is conceptually still working out the ramifications of a series of dialectical reversals



Park Isometric, Parc de La Villette, Paris, France 1982-1983

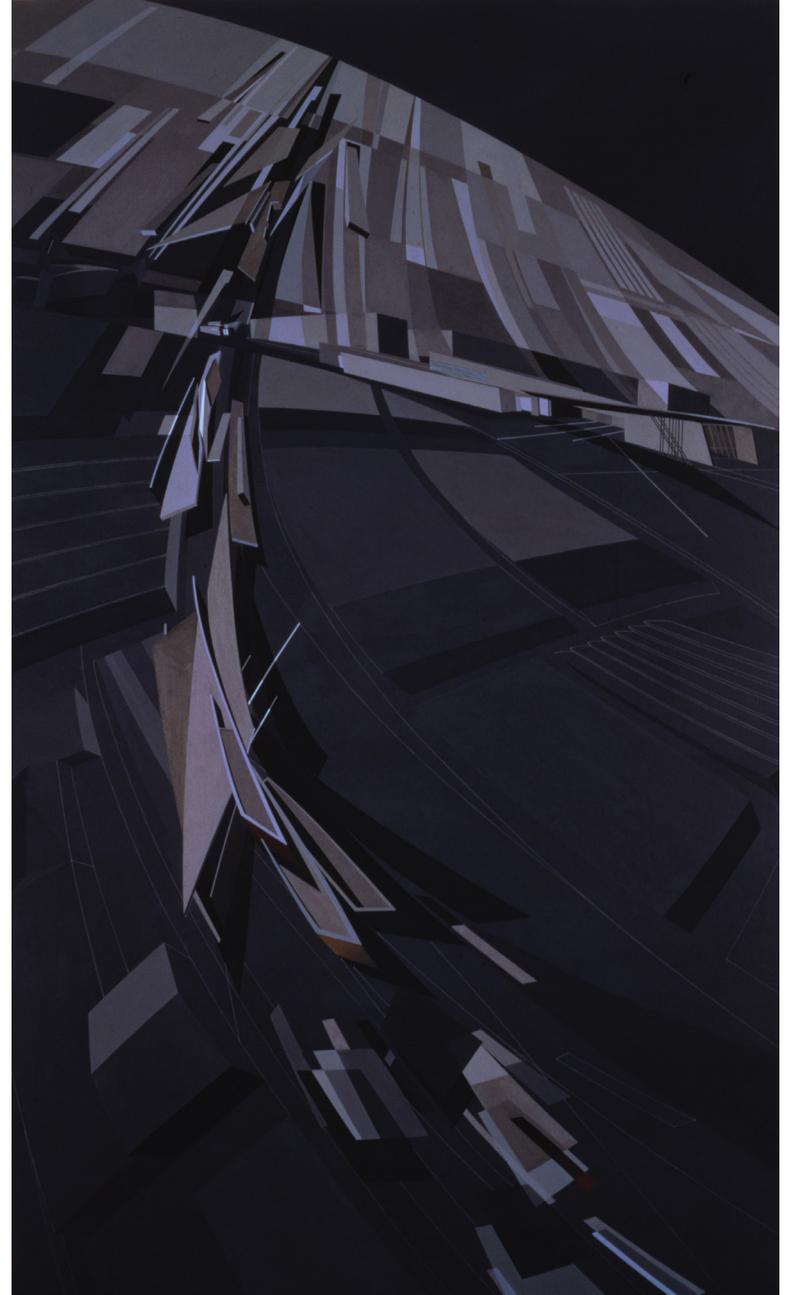
first launched by “deconstructivism”. Further we should not forget that the follow on movement of “folding” too was initially elaborated with pen and paper before it soaked up the new digital possibilities. Folding was counterposed to deconstructivism by a series of further reversals and oppositions – defined within the framework established by deconstructivism.

The rapid succession of these three movements within avant-garde architecture (1970s to 1990s) created the conceptual and formal resources from which the current digitally liberated work took off in the second half of the nineties. Venturi’s *Complexity and Contradiction*, and Colin Rowe’s *Literal and Phenomenal Transparency* offered seminal conceptual innovations that can still guide ambitious design agendas today.

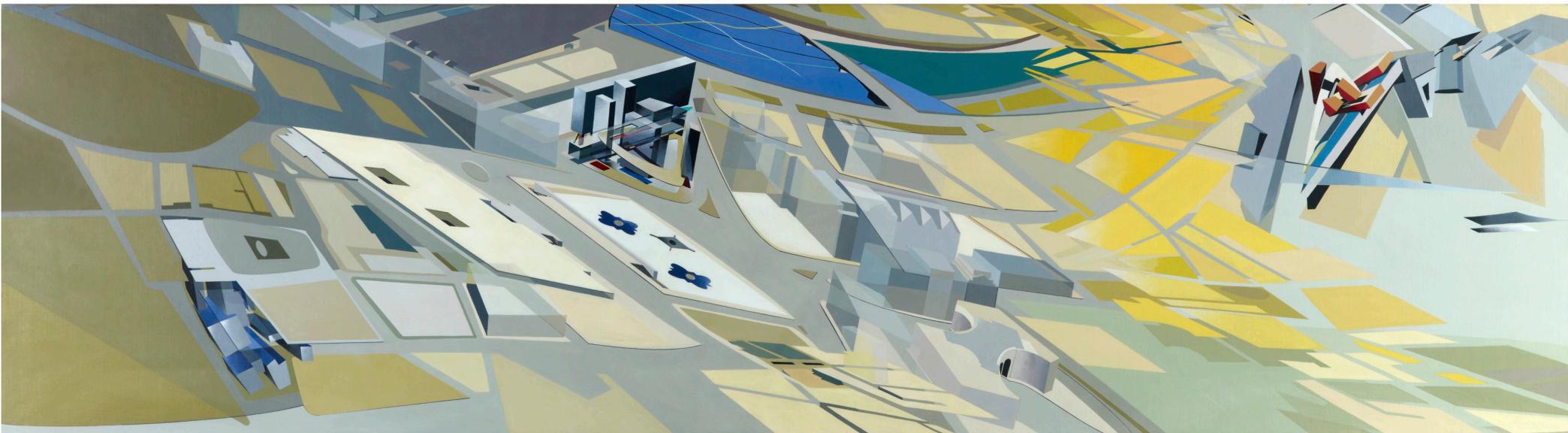
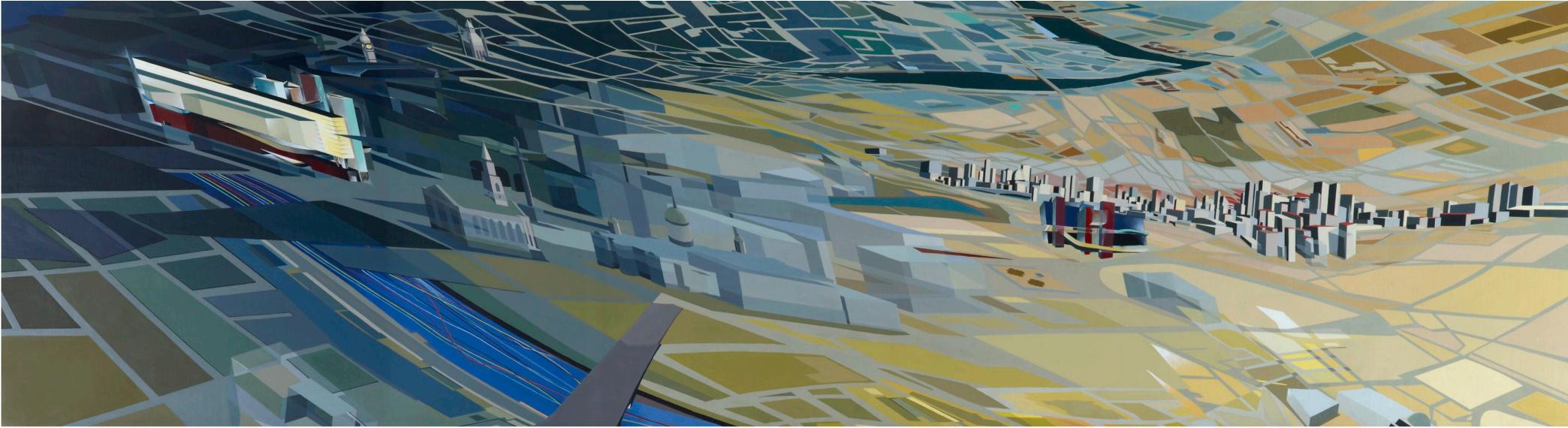
Peter Eisenman’s method of transformational series, whereby he was working with series of successive over-determinations of an initial platonic primitive, anticipates the method the CAD-systems use in modeling 3D solids via the Boolean operations of addition, subtraction and intersection. Eisenman’s process is explicating his complex compositions as the end result of an explicit and retrievable series of such operations. This is mirrored in the ability of the CAD-system to keep a retrievable record of the history of object construction. The designer is enabled to retrace his steps and intervene in the recorded history of design steps, and depending upon the combinatoric dependencies between operations, he can make alternative choices at any point in the sequence of over-determination. Eisenman was also the first – inspired by Colin Rowe’s insightful analysis of cubism – to employ the method of superposition of incongruent geometric organizations. The resulting accidental clashes and interferences were cherished as interesting new compositional effects. It was Tschumi’s contribution to foreground and radicalize this method most effectively in his seminal project for the Parc de La Villette in Paris. (The competition drawings were much more striking and influential than the built project which took many years to complete.) This project stated the principle of layering in crystal clear radicality. Multiple, diverse spatial reference systems were occupying the same site. However, at this stage in the development of a new language of spatial complexity the layered spatial reference systems – point-grid, meandering line, system of platonic figures – were indifferent to each other. The layers are breaking through each other without registration of each other. There is no mutual inflection, adaptation or any attempt at integration. This was first achieved by Zaha Hadid who realized a seamless coherence in her complex and deep pictorial textures.



Blue Slabs, The Peak, Hong Kong 1982-1983



Aerial View with Landscape, Vitra Fire Station, Weil am Rhein, Germany 1991-1993



Grand Buildings, Trafalgar Square, London, UK 1985

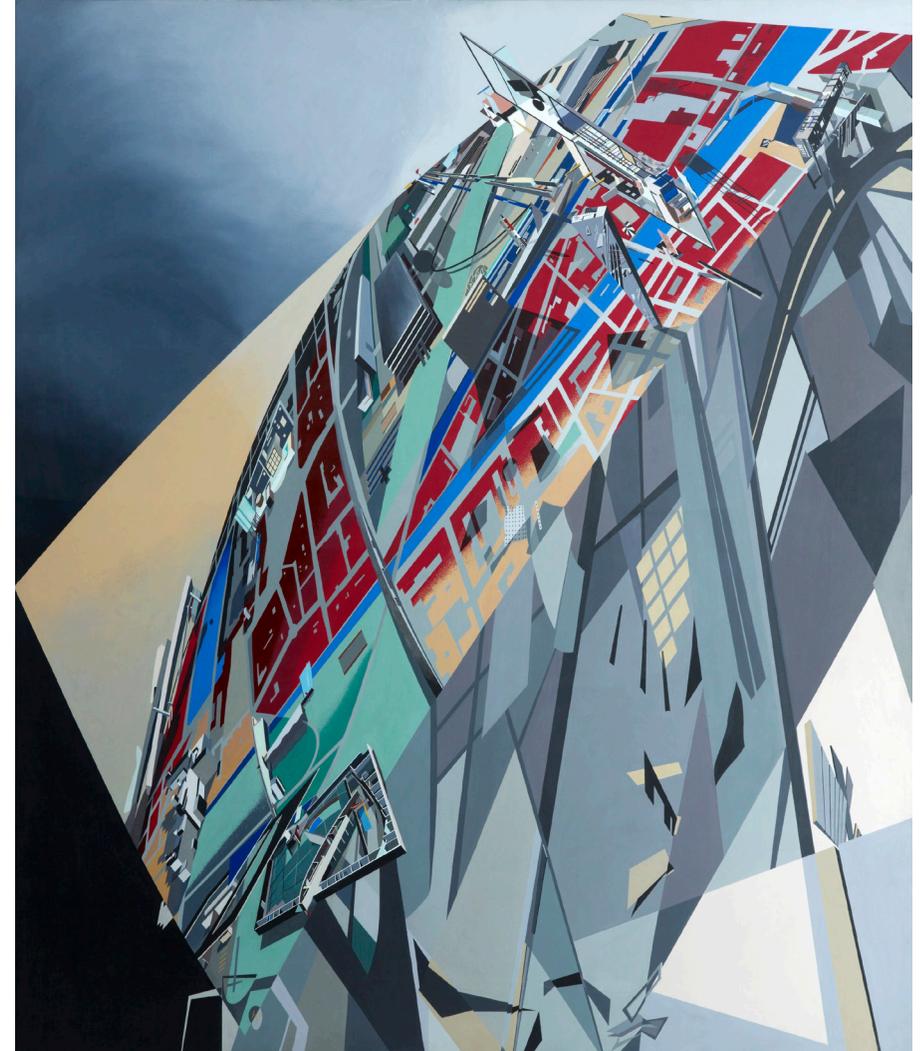
Even her contribution to the competition for La Villette already displays the seeds of these characteristics. The interarticulation of various spatial layers went hand in hand with the curvilinear distortion and dynamization of the complex spatial arrangements.

It was Jeff Kipnis' and Greg Lynn's contribution to elaborate the theoretical terms that allow us to focus our attention on these most advanced formal characteristics. Concepts like smooth vs striated space (taken from Deleuze & Guattari's *Thousand Plateaus*), deformation as registration of programmatic and contextual information, multiple affiliation, and intensive coherence were offered as poignant descriptions and worthy ambitions. Greg Lynn soon moved ahead with the strategic deployment of brand new animation software tools to explore effective design techniques that could help to deliver the spatial qualities described in those concepts: meta-balls (=blobs), nurb meshes, inverses, kinematic skeletons etc.

Zaha Hadid Architects was quick to upgrade their digital toolkit to continue and intensify their exploration of dynamic and organically integrated complexity. In fact, even before these new software systems were brought in Zaha Hadid Architects were already using the Xerox machine to partly mechanise some of the most pertinent design moves: smearing drawings across the xerox-machine following a curved or s-curved trajectory produced the desired dynamisation and smoothing effects.

While it is important to reveal the genealogy of the formal and conceptual apparatus of the current architectural avant-garde (which includes Hadid as one of its practitioners and precursors), such a genealogy is not written in a spirit that wants to reduce what is going on now to what has been, or foreclose the current and future potential for developing the repertoire in new directions. That can not be the purpose of "Digital Hadid Revisited".

We have nearly reached the point in our argument where we have to pose the question – given this genealogy – what is fundamentally new now and what points towards further radical mutations of architecture in terms of its methods, concepts and forms. The best way to approach this question might be via a review of the most recent series of projects coming from Zaha Hadid Architects. However, before we do this we should make yet another short excursion into the methods and mechanisms of invention that have been prevalent in Hadid's previous work.



Post-modernism, Deconstructivism, Folding

The World (89 degrees) 1983

#### Re-combination: Collage and Hybridisation

A key mechanism that has to be mentioned here is the dialectic of re-combination and hybridisation. The important reminder here is that the result of combination is rarely just a predictable compromise. Synergies might be harnessed: Unpredictable operational effects might emerge and, on the side of meaning, affects are engendered as the whole taxonomy of differences is forced into an unpredictable realignment. The new combination re-contextualises and reinterprets its ingredients as well as its surroundings. Currently it is the various morphing tools that afford the most sophisticated form of formal hybridization resulting in hybrids that appear as seamless wholes, leaving no trace of any conflicting figures in their origin. Kolatan & Macdonald focused attention on this form of hybridization, introducing the suggestive term *chimera* to denote the resultant effect.

#### Abstraction

Abstraction implies the avoidance of familiar, ready-made typologies. Instead of taking for granted things like houses, rooms, windows, roofs etc. Hadid reconstitutes the functions of territorialisation, enclosure and interfacing etc. by means of boundaries, fields, planes, volumes, cuts, ribbons etc. The creative freedom of this approach is due to the open-endedness of the compositional configurations as well as the open-endedness of the list of abstract entities that enter into the composition. To maintain the liberating spirit of abstraction in the final building a defamiliarising, “minimalist” detailing is preventing that volumes immediately denote rooms and cuts turn into windows again. This minimalism withdraws the familiar items that otherwise would allow the inhabitants to fall into habitual patterns of behavior. Instead they confronted with an abstract composition that needs to be discovered and made sense of in a new way. Instead of points, lines, and planes we now work with control points, splines, nurb surfaces, and force-fields etc.

#### Analogies

Analogies are fantastic engines of invention with respect to organisational diagrammes, formal languages and tectonic systems. They have nothing to do with allegory or semantics in general. Hadid’s preferred source of analogical transference is the inexhaustible realm of landscape formations: forests, canyons, river deltas, dunes,

glaciers/moraines, faulted geological strata, lava flows etc. Beyond such specific formations abstract formal characteristics of landscape in general are brought into the ambit of architectural articulation. The notion of an artificial landscape has been a pervasive working hypothesis within Hadid’s oeuvre from the Hong Kong Peak onwards. Artificial landscapes are coherent spatial systems. They reject platonic exactitude but they are not just any “freeform”. They have their peculiar lawfulness. They operate via gradients rather than hard edge delineation. They proliferate infinite variations rather than operating via the repetition of discrete types. They are indeterminate and leave room for active interpretation on the part of the inhabitants.

Ultimately anything could serve as analogical inspiration. Often such analogies become to be considered as the concept of the project: The Cardiff Opera House as an inverted necklace, the Copenhagen Concert Hall as a block of terrazzo, the Victoria and Albert Museum extension as 3D TV, i.e. a three-dimensional pixelation etc. Most recently Zaha Hadid Architects are exploring the possibility to exploit analogies with organic systems.

#### Surrealist mechanisms

Hadid’s audacious move to translate the dynamism and fluidity of her calligraphic hand directly into equally fluid tectonic systems, her incredible move from isometric and perspective projection to literal distortions of space, from the exploded axonometry to the literal explosion of space into fragments, from the superimposition of various fisheye perspectives to the literal bending and melt down of space etc. – all these moves resemble the illogical operations of the surrealists.

The initially “mindless” sketching of graphic textures (see Vitra sketches) in endless iterations operates like an “abstract machine” proliferating difference to select from. Once a strange texture or figure is selected and confronted with a programmatic agenda a peculiar form-content dialectic is engendered. An active figure-reading mind will find the desired conditions but equally new desires and functions are inspired by the encounter with the strange configuration. The radically irrational and arbitrary detour ends up hitting a target.

This “miracle” can be explained by recognising that all functionality is relative, that all well articulated organisms have once been monstrous aberrations and might later seem crude and deficient – relative to other “higher” and more “beautiful” organisations. Before we dismiss arbitrary formalisms we need to realise

that all our time-tested typologies themselves adhere dogmatically to the arbitrary formalism of orthogonality and platonic simplicity derived from the constraints of measuring, making and stabilising structures handed down to us from a rather primitive stage of our civilisation. To remain locked in within these figures at this time and age would be more than arbitrary. The only way out is radical proliferation and testing of other options. All points of departure are equally arbitrary until tested against presumed criteria. There is no absolute optimality. Every measure starts with a finite array of arbitrary options to compare, select from, adapt and thus working away from absolute arbitrariness. It is significant in this respect that the logic of evolutionary innovation starts with mutation: mutation, selection and reproduction. Hadid has been a vital engine of mutation with respect to the culture of architecture.

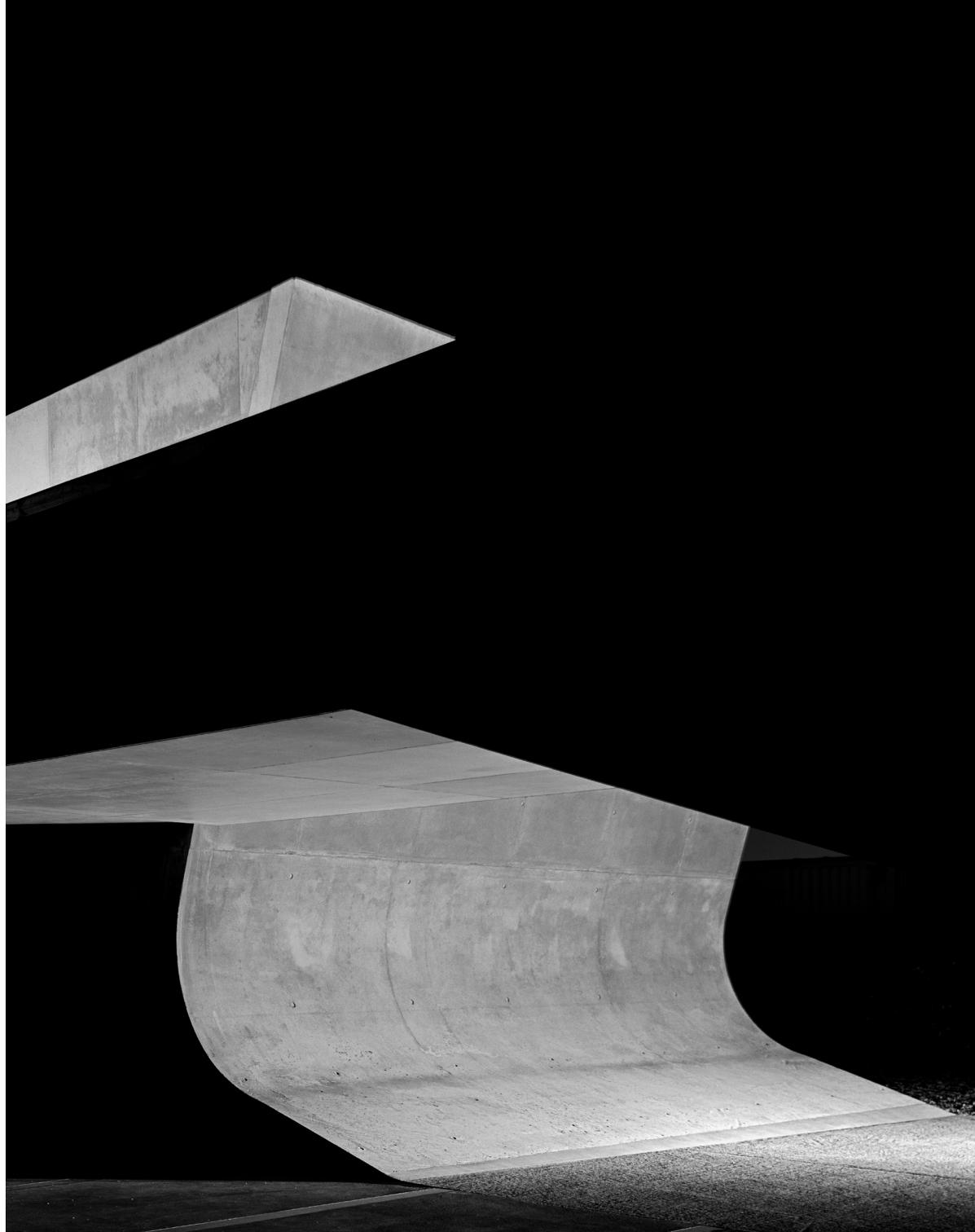


Skyline view, Grand Buildings, Trafalgar Square, London, UK 1994

Zaha Hadid Built Work  
photographed  
by H  l  ne Binet

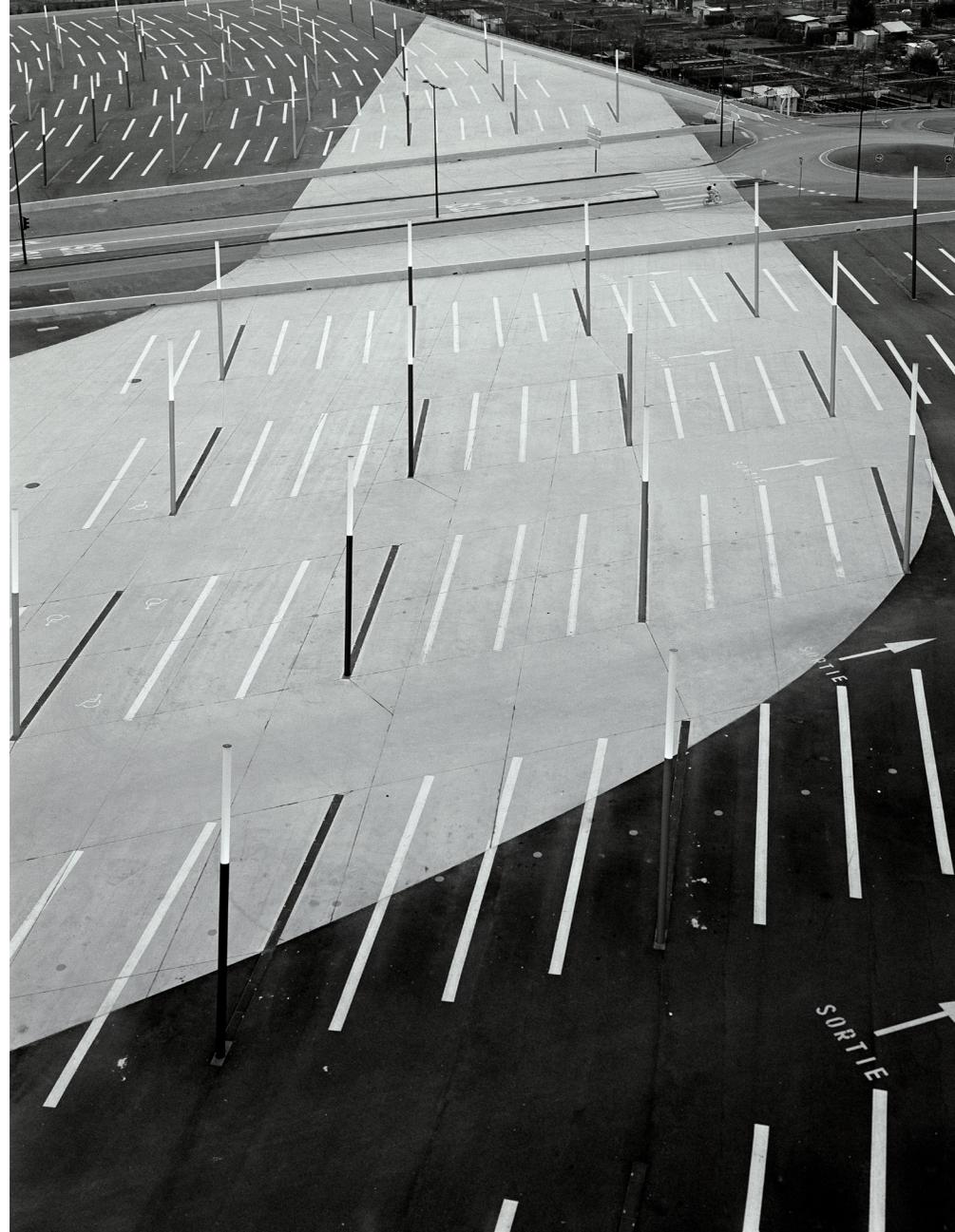










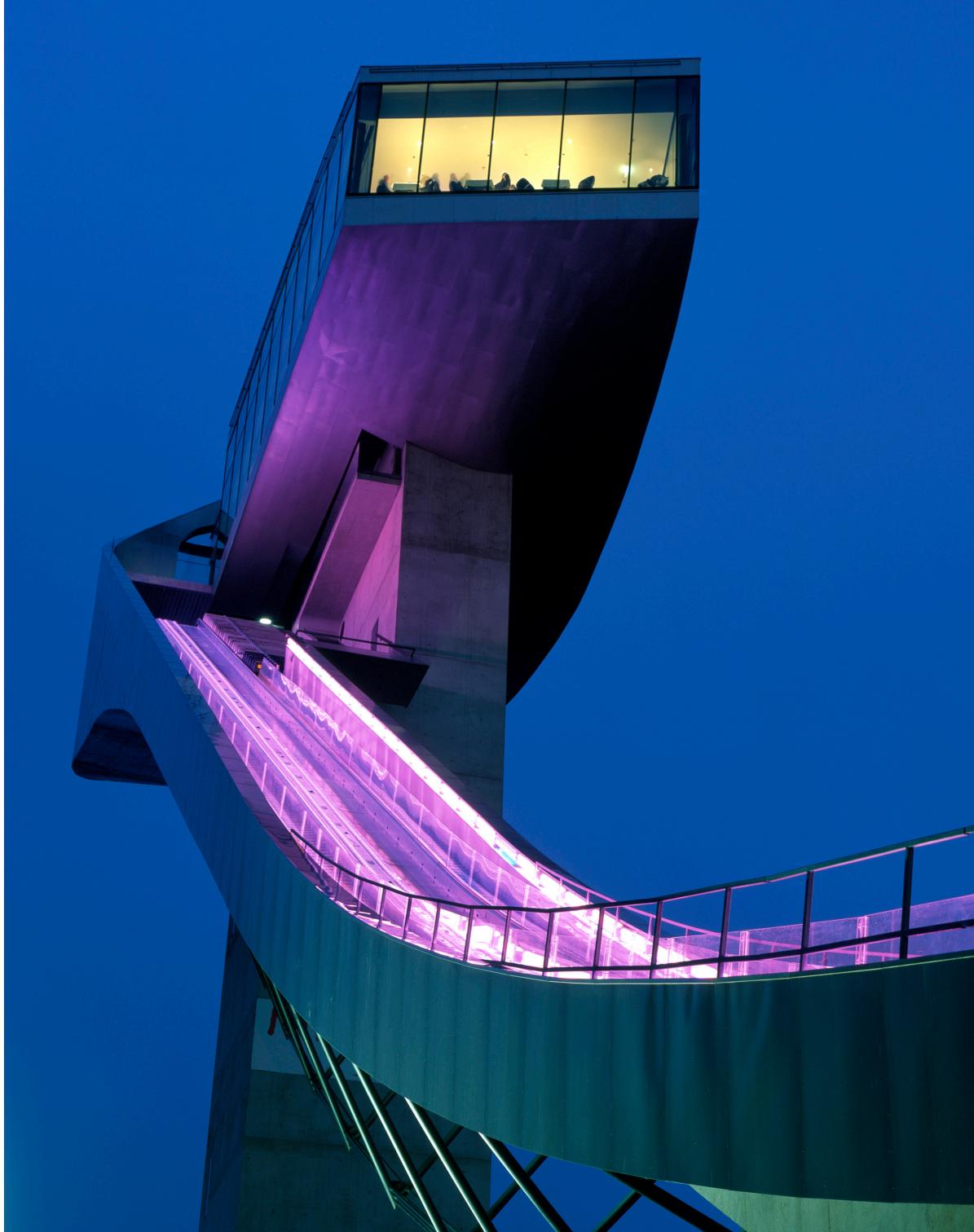














# Zaha Hadid Profile



Zaha Hadid, founder of Zaha Hadid Architects, was awarded the Pritzker Architecture Prize (considered the Nobel Prize of architecture) in 2004 and is internationally known for her built, theoretical and academic work. Each of her projects builds on over thirty years of exploration and research in the interrelated fields of urbanism, architecture and design.

Born in Baghdad, Iraq in 1950, Hadid studied mathematics at the American University of Beirut before moving to London in 1972 to attend the Architectural Association (AA) School where she was awarded the Diploma Prize in 1977. Hadid founded Zaha Hadid Architects in 1979 and completed her first building, the Vitra Fire Station, Germany in 1993.

Hadid taught at the AA School until 1987 and has since held numerous chairs and guest professorships at universities around the world including Columbia, Harvard, Yale and the University of Applied Arts in Vienna.

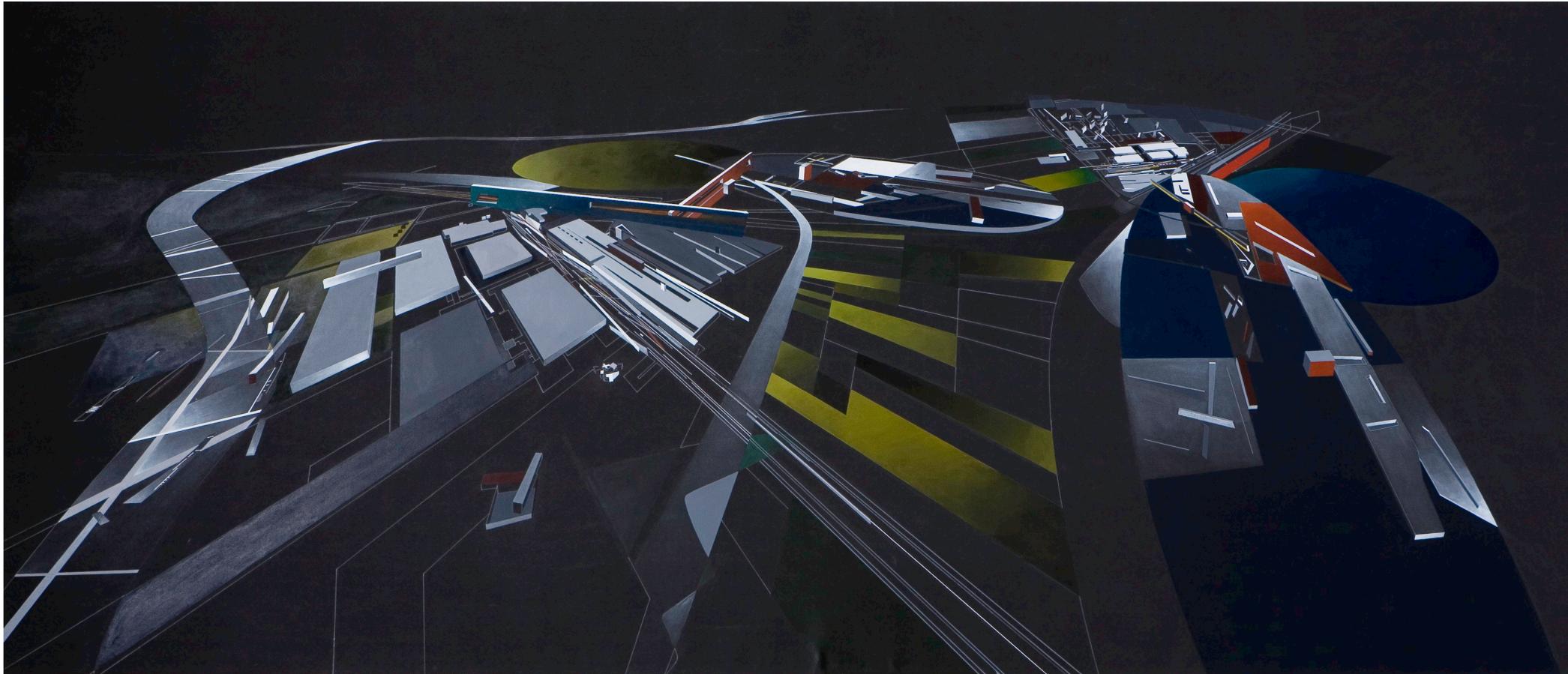
Working with senior office partner, Patrik Schumacher, Hadid's interest lies in the rigorous interface between architecture, urbanism, landscape and geology as her practice integrates natural topography and human-made systems, leading to innovation with new technologies. The MAXXI: Italian National Museum of 21st Century Arts in Rome, the London Aquatics Centre for the 2012 Olympic Games and the Heydar Aliyev Centre in Baku are built manifestos of Hadid's quest for complex, fluid space. Previous seminal buildings such as the Guangzhou Opera House and Contemporary Arts Centre in Cincinnati have also been hailed as architecture that transforms our ideas of the future with visionary spatial concepts defined by advanced design, material and construction processes.

The practice recently completed the Oxford University's Middle East Centre at St Antony's College and is currently working on a diversity of projects worldwide including the new Beijing Airport Terminal Building in Daxing, China, the Sleuk Rith Institute in Phnom Penh, Cambodia and 520 West 28th Street in New York. Zaha Hadid Architects' portfolio also includes cultural, corporate, academic, sporting and infrastructure projects

across Asia, the Middle East, Europe and the Americas, in addition to national institutions such as the Central Bank of Iraq and the Grand Theatre de Rabat.

Zaha Hadid's work of the past 30 years was the subject of critically-acclaimed exhibitions at New York's Solomon R. Guggenheim Museum in 2006, London's Design Museum in 2007, the Palazzo della Ragione, Padua, Italy in 2009, the Philadelphia Museum of Art in 2011, the DAC Copenhagen in 2013 and the State Hermitage Museum in Saint Petersburg in 2015. Hadid's outstanding contribution to the architectural profession continues to be acknowledged by the world's most respected institutions including the Forbes List of the 'World's Most Powerful Women' and the Japan Art Association presenting her with the 'Praemium Imperiale'. In 2010 and 2011, her designs were awarded the Stirling Prize, one of architecture's highest accolades, by the Royal Institute of British Architects. Other awards include UNESCO naming Hadid as an 'Artist for Peace', the Republic of France honouring Hadid with the 'Commandeur de l'Ordre des Arts et des Lettres' and TIME magazine included her in their list of the '100 Most Influential People in the World'. In 2012, Zaha Hadid was made a Dame Commander of the Order of the British Empire by Queen Elizabeth II, and in February 2016, she received the Royal Gold Medal. Zaha trusted everyone to achieve the potential she saw in them, to never stop questioning, to never stop imagining, to realise the fantastic. Her legacy is embedded within the DNA of the design studio she created. She continues to drive and inspire us every day, and we work on as she taught us – with curiosity, integrity, passion and determination.

Zaha Hadid died on Thursday,  
31st March 2016 in Miami, USA.



Aerial site plan, Vitra Fire Station, Weil am Rhein, Germany 1991

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