Beyond Simulacrum: The Model as Three-dimensional *Post Factum* Documentation

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Certificate of Authorship / Originality

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

Marian Macken

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Abstract

Documentation within architecture refers to working drawings that are produced to envisage an imagined building. These drawings are a tangible representation of an object that has no tangible existence. Conventional documentation regards the act of drawing as that process upon which the object is wholly dependent for its coming into existence: they assist in 'getting to' the building. However, the definition of the word 'document' refers to a record of events, that is, *post factum* evidence. Within architecture, drawing as a record is not the dominant practice. Instead, representation that is a visualisation of the non-existent dominates. Hence, the realm of *post factum* documentation is under-examined. Due to the predominance of drawing within architecture, models are seen as an adjunct to drawings and so their role and potential has been examined in far less depth than that of architectural drawings. This thesis explores the notion of the model as three-dimensional *post factum* documentation of architecture. Through the theory of drawing, case studies of models of various scales are examined. These case studies are the Panorama model of New York City, the reconstruction of Mies van der Rohe's German Pavilion, and the exhibition of architecture as *post factum* model, in particular the work of Peter Eisenman, Herzog and de Meuron, El Lissitzky, Allan Wexler and Diller and Scofidio. This examination repositions models within an expanded notion of the design process, which displaces the built object as the endpoint of this process, and investigates the critical facility of models.

Documentation within architecture refers to working drawings that are produced to envisage an imagined building. They are a tangible representation of an object that has no tangible existence. Conventional documentation regards the act of drawing as that process upon which the object is wholly dependent for its coming into existence: they assist in 'getting to' the building. However, the definition of the word 'document' refers to a record of events, that is, *post factum* evidence. Within architecture, drawing as a record is not the dominant practice. Instead, representation that is a visualisation of the non-existent dominates. Robin Evans has written of this particularity of architectural representation, whereby the subject-matter exists after the drawing, not before it.[1] Due to this situation, the realm of *post factum* documentation is under-examined. This thesis investigates the field of *post factum* documentation, using Evans's writings as a basis.

During the design phase, the drawings are primary, setting out an intention. Drawing is defined as the pre-eminent methodology for the generation of the building; drawings are considered the necessary initial step towards the creation of the full-scale object. The act of drawing has such a crucial value for architects that 'being unable to think without drawing became the true mark of one fully socialized into the profession of architecture'.[2] Due to the predominance of drawing, discussions of architectural documentation are mainly within the realm of drawing. Hence, models are seen as an adjunct to drawings and so their role and potential has been examined in far less depth than that of architectural drawings. This thesis explores the notion of *post factum* documentation of architecture, through architectural scale models.

This examination of *post factum* models aims to reposition models within an expanded notion of the design process. The consequences of this repositioning are to displace the 1:1 built object as the finality of the design process; to acknowledge the recursive, reflective nature the design process; and to explore the critical facility of models.

Definition and scope of the model

As a definition and etymology of the word 'model', Albert C. Smith writes:

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[1] R Evans, 'Architectural projection' in E Blau & E Kaufman (eds), *Architecture and its image: four centuries of architectural representation: works from the collection of the Canadian Centre for Architecture* exhibition catalogue, Canadian Centre for Architecture, Montreal, MIT Press, Massachusetts, 1989, pp. 19–35 and 'Translations from drawing to building' in R Evans, *Translations from drawing to building and other essays*, MIT Press, Cambridge, Massachusetts, 1997, pp. 153–93.

[2] 'A black box', in R Banham, *A critic writes*, University of California Press, Berkeley, 1996, cited in P Eisenman, *Diagram diaries*, Thames and Hudson, London, 1999, p. 7.

> [T]he word 'model' is borrowed from Middle French *modele*, from Italian *modello*, a model or mold, from Latin *modellus*. *Modellus* is a diminutive of the Latin *modulus*, a diminutive of *modus*, which means to measure. A model is typically a small object, usually built to scale, that represents another, often larger object. It can be a preliminary pattern, serving as a plan, from which an item, not yet constructed, will be produced. A model can also offer a tentative description of a theory or system that accounts for all its known properties. Architectural scale models operate in all these areas.[3]

According to Smith, of the multiple definitions associated with the word 'model', the French word *maquette* is most closely related. A *maquette* is:

> [A] demonstration designed to gauge the general appearance or composition of the thing planned. The key to the significance of a *maquette* is the concept of demonstration. The word 'demonstrate' comes from the Latin *monstrum*, and means to divine, portend or warn. A demonstration offers a foreshadowing of coming events and allows a certain prophetic indication of meaning through marvel, prodigy, and wonder.[4]

Smith relates the idea of demonstration to that of the divine, that is, to the secondary definition of the word 'divine': 'to foretell through inspiration, intuition or reflection on the shape of future events'.[5] Hence, the model is closely associated with the quality of prediction: the *maquette* can 'warn the architect of future problems and can allow marvel, wonder, astonishment, and surprise into the design process'.[6] Such associations further separate the model from its potential role as *post factum* documentation.

There are various ways in which models can be classified. The usual way is to note their place within a design process and name them due to their role and function. Examples of this, that are used within architectural practices, are conceptual models, site models, design development models, block models, interior models, structural and conceptual structural models, lighting models, wind tunnel models, presentation models, exhibition models, city models, historical

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[3] Smith uses the definition offered for models in 'Model', Webster's *Third new international dictionary*, II, CG Merriam Company, Springfield, Massachusetts, 1967, p. 1451, in AC Smith, *Architectural model as machine: a new view of models from antiquity to the present day*, Architectural Press, Oxford, 2004, p. 61–2.

[4] Smith 2004, p. 2. Robert Harbison writes that the word 'model' has two main senses: 'the first is a trial version, at a smaller scale, of something which does not yet exist or perhaps can never fully exist. This also includes post-versions, copies on a different scale in different materials of objects existing or no longer existing. The second use, as in "model child" or "model dwelling," is a metaphorical extrapolation from the first, which has lost or dropped the idea of a change of scale but imagines a world full of patterns for imitation.' R Harbison, *Thirteen ways: theoretical investigations in architecture*, MIT Press, Cambridge, Massachusetts, 1997, p. 84.

[5] Smith 2004, p. 2.

[6] Smith 2004, p. 2.

models, and full-sized prototypes. Within each of these headings, there may be further specificity; for example, concept models may be analytical or abstract, they may be gestural, or built not to scale. Models may be classified by their ability to show something, such as a model of a view or a model of an action. Historical models record destroyed buildings for posterity or, historically, provided souvenirs of famous buildings.

Models may also be classified by techniques of construction, such as being made by an assemblage of materials or by using one material, built up, or by a method of subtraction, cutting and removing from the medium. Models may be named by how they look, such as a relief plan, or a block model. Models may also be classed by certain qualities they possess, such as being: an object in the round, complementary to drawings, tangible, tactile, wall mounted or placed on a table, designed to be taken apart, able to be handled, able to mimic, and able to offer a comprehensible view by existing as a contained object.[7]

Rather than these definitions and classifications of models, the parameters of the definition of a *post factum* model shall be determined, firstly, by the work having a three-dimensional quality, and secondly, by the model's intention and result; that is, what role it performs within an architectural framework. These works shall all have the intention or result of documenting architecture *post factum*, the associations of materials and techniques being secondary.

Models may be classified as *post factum* due to their *intention* as after-the-fact documentation, for example being made after the project was finished, or representing the built context of a project; their *reading* as after-the-fact documentation, for example, models interpreted as documentation of a drawing; or their *status* within the chronology of the design process changing due to time passing, for example, they may have been made as process models, but have become artefacts of a process due to the project having been completed.

There are works within architecture and other fields, such as visual arts, that have appropriated the architectural model. This study aims to examine work that lies both within the field of architecture, shifting attention to intention and role, rather than the model's definition by its 'look', and to examine work that lies outside the field of architecture, and explore what it may have to offer modelmaking.

Computers are now also used in the construction of the physical model. Advances in computer technology have altered the relationship of design development and modelmaking by offering new ways of working between computer models, computer drawings and built form. By using technology developed within other industries, such as the automotive and aerospace design

[7] Alex Selenitsch has written of 'the hand-space' of the physical model, in reference to 'Models inc.: an exhibition of architectural models', at Artists and Industry Gallery, Melbourne, May/June, 1996.

industries, models may be generated from three-dimensional drawings which provide information to computer numerical control (CNC) milling and laser cutting machines.

The office of Frank Gehry & Associates is an example of an office that integrates the use of computers and scale models within its practice. Once the physical modelling process is exhausted, one of these models can be scanned into the computer and digitised into an electronic version.[8] The reconstruction of these models, as points and lines, are then 'rationalised' against a set of predetermined rules related to material behaviour and construction techniques. The adoption of this methodology allows for accuracy in the fabrication of materials.

Photographic and optical aids, such as Endoscopes and Relatoscopes, which enlarge images from model scale to actual size, are now also used in working with models. However, the intention and outcome of the model is not altered due to these work practices, or those similar to Gehry's office. For the purposes of this study, the inclusion of computers in assisting the making of models is not seen as an element in itself, but rather as an issue of methodology. The inclusion of computer technology will not be explicitly referenced, as a type of drawing, as it remains in a two-dimensional realm, one that does however operate differently from the modalities of non-computer generated drawings and models.

Overview

This thesis begins by examining the notion of documentation within architecture in detail. Chapter 1 introduces the writings of Robin Evans, and outlines their relevance to the study. The relationship between drawings and models is then examined, as they are allied representations with points of intersection. This sets up the framework within which the specificity of the model as *post factum* documentation may be examined. This then leads to an examination of the role of *post factum* documentation within the design process, as acknowledging the importance of interpretation and reflection.

In later chapters, this thesis uses case studies of *post factum* models to explore the notion of *post factum* documentation and its possible aberrations. The examples are used to present, analyse and interpret models and their role within architectural documentation.

The first case study examines the *post factum* model at the scale of the city. Chapter 2 deals with the Panorama of the City of New York model, constructed for the 1964/65 World's Fair, now installed at the Queens Museum of Art, New York. Many large cities have modelled

[8] T Porter & J Neale, *Architectural supermodels*, Architectural Press, Oxford, 2000, p. 166. Porter & Neale also give examples of the use of computers within modelmaking, from the offices of Branson Coates Architecture and William E Massie. See also K Moon, *Modeling messages: the architect and the model*, Monacelli Press, New York, 2005, p. 185–213.

versions of themselves on display. These models offer a graspable, three-dimensional totality of the city. Depending on the frequency of updates, these models document the city unlike other representations. Although the city model is a static medium of envisioning space, it is this quality that offers a different reading of the city. The Panorama model's representation of time and temporality portrays the city as a planned, cohesive entity, which develops in short bursts, from one static moment to another. It is an ideal site for exploring the representation and *post factum* documentation of the city.

The second case study examines the idea of the full-scale *post factum* model. Chapter 3 investigates the reconstruction of Ludwig Mies van der Rohe's German Pavilion, designed for the 1928/29 International Exposition in Barcelona, as a full-scale *post factum* model. The tradition of full-scale models has been to assist the development of the proposed design. These have usually been sections of the proposed building or temporary mock-ups, constructed to assist in developing a building design. The reconstructed Barcelona Pavilion has multiple readings due to its quality of recreating an earlier building at full-scale. To read it as a full-scale *post factum* model allows it to be seen in a different way, altering the notion of the model, the original and the replica.

Post factum documentation of architecture is aligned with the exhibition of architecture. Chapter 4 examines the issue of the exhibition of architecture, which is defined as *post factum* models of architecture. Rather than the model being an element of display within an exhibition, the exhibition itself may be seen to be a model of architecture. This chapter investigates the notion of the exhibition of architecture as a type of *post factum* documentation, through the work of Peter Eisenman, Herzog and de Meuron, El Lissitzky, Diller and Scofidio, Allan Wexler, and Imre Mackovecz.

As *post factum* documentation is seen as occurring once a project is finished, it is excluded from the design process. However, by examining the place of *post factum* documentation in more depth, it is seen not as neutral representation, but rather as interpretive and, therefore, exploratory and generative. In this way, it is integral to the design process, as it acknowledges the reflective and recursive nature of this process.

By appropriating, clarifying and reshaping situations that are relevant to the investigation of three-dimensional *post factum* documentation, widely held conceptions and distinctions of the model may be examined. The possible outcomes of such a reappraisal of models are: to revise the definition and role of the model within the design process, separate from the constraints of 'getting to' a building or standing in for the design process; to understand better the limitations

and specificity of the model as representation; to offer the potential of the model as critique; to examine opportunities for the exhibition and curation of architecture; and to further examine the relationship between architectural representation and the image of architecture.

Chapter 1: Drawings and models as *post factum* documentation

The notion of documentation within architecture, as referring to the drawings produced to aid construction of a building, has specific connotations. The qualities of these types of drawings have been examined by Robin Evans. It is through his writing that the notion of *post factum* documentation is examined. This chapter outlines the relevance of Evans's writing to the examination of *post factum* documentation. The points of intersection between drawings and models are explored, allowing the clarification and reshaping of models as representation to occur. The specificity of the model as *post factum* documentation, and its role and potential within the design process as acknowledging the importance of interpretation and reflection is then examined.

Documentation

The word 'document' refers to a record or evidence of events. It implies a chronological sequence: the document comes after the event, that is, it is *post factum*. However, within architecture, the use of the word documentation predominantly refers to working drawings that are made to 'get to' a building; drawings being the dominant representation within architecture. These drawings build a picture of an imagined building. They are a tangible representation of an object that has no tangible existence. They act as a manual for constructing the building and represent that which is to be built. The building comes into being, therefore, via this set of drawings.

Although it may be said that these types of drawings document the idea, or document the envisaged reality of the building, their main emphasis, and reading, is in *getting to* something. In this case, the term documentation is used, not due to the documents' placement within a process, of coming after the subject-matter, but in referring to the drawings' role.

Other architectural drawings do exist that are a record of what is seen, but these are not the dominant drawing practice within architecture. It is the difference between drawings that record and drawings that are a visualisation of the nonexistent, that concerns Evans in his essays 'Architectural Projection' and 'Translations from Drawing to Building'.[9] By examining his arguments within architectural drawing practice, analogies may be made with other representations, such as architectural models, and their role as documentation.

[9] R Evans, 'Architectural projection' in E Blau & E Kaufman (eds), Architecture and its image: four centuries of architectural representation: works from the collection of the Canadian Centre for Architecture exhibition catalogue, Canadian Centre for Architecture, Montreal, MIT Press, Massachusetts, 1989, pp. 19–35 and R Evans, 'Translations from drawing to building' in Translations from drawing to building and other essays, MIT Press, Cambridge, Massachusetts, 1997, pp. 153–93.

According to Evans, the drawing is a projection; that is, organised rays of imaginary straight lines pass through the drawing to corresponding parts of the thing represented by the drawing.[10] Evans writes that we are surrounded by these flat versions of embodied events, such as photographs and images on television screens. He writes that with the profusion of reproduction techniques, the majority of projections makes things flatter, because two-dimensional information is easier to handle than three-dimensional.[11] Therefore, projection has become directional, due to the availability of certain instruments and machines for making pictures.[12]

Evans writes that architecture, however, provides an instance of the opposite tendency; that is, it is more usual to take information from flat representations to create embodied objects, or rather, two-dimensional projections create three-dimensional objects.[13] Predominantly, the subject-matter, that is the building or space, will exist after the drawing, not before it:

> Drawing in architecture is not done after nature, but prior to construction; it is not so much produced by reflection on the reality outside the drawing, as productive of a reality that will end up outside the drawing.[14]

Evans calls this notion, of architecture being brought into existence through drawing, the principle of *reversed directionality*.[15] The process of two-dimensional representation leading to three-dimensional objects is different from the usual directional tendency of projections making things flatter. He attributes drawing's hegemony over the architectural object, and gaining unacknowledged generative power, to this inversion of classical realism.[16]

Documentation within architecture displays Evans's concept of reversed directionality. Evans's writing is important in that it addresses this difference between the drawings made within architecture, compared to those of artists. Within art schools, painters and sculptors may spend some time on preliminary sketches, but the bulk of their time is spent working on the object of their thought, rather than labouring through some intervening medium as architects

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[10] Evans, in Blau & Kaufman 1989, p. 19.

[11] Evans, in Blau & Kaufman 1989, p. 19. Evans uses the story of the origin of drawing — Diboutades tracing the shadow of her departing lover — as painted by David Allan (The Origin of Painting, 1773) to explain drawing as a function of projection. Evans 1997, pp. 162–4.

[12] Evans, in Blau & Kaufman 1989, p. 19. Evans writes that the projections — the invisible lines that relate pictures to things — are always directional. However, as soon as an observer, with a capacity to imagine what is to be produced from the drawings, is introduced, these lines, between the design drawing and the finished article, seem to be composed of 'a series of eddies and circuits rather than a single vector.' It is the imagination that alters, and is altered by, what is seen. The examination of the power of drawings and photographs to 'alter, stabilize, obscure, reveal, configure, or disfigure, what they represent' reveals how reliant architecture is on its own images. Evans, in Blau & Kaufman 1989, pp. 20–1.

[13] Evans, in Blau & Kaufman 1989, p. 19.

[14] Evans 1997, p. 165.

[15] Evans 1997, p. 165.

[16] Evans 1997, p. 165.

do.[17] In highlighting this situation, Evans's essays expose the predominance within architecture of one form of drawing, producing and, therefore, thinking. His essays open the possibility of concentrating on another, less examined form of making, that is, producing within the realm of *post factum* documentation. It is the scope of *post factum* architectural documentation that this thesis examines.

A consequence of attributing the name documentation to drawings of the as yet nonexistent confuses the definition, which is conventionally understood as a record of what has been. Documentation, as it exists in the form of construction drawings, does not fit this description but rather is seen as a projective term. To refer to construction drawings as documentation lessens attention on *post factum*, or what could be called non-reverse, documentation. Hence, less importance is given to documentation coming after the event. Drawings that interpret the 'existing', that is, whose subject-matter precedes the drawing, are absent from discourses on documentation in architecture. So too, are other forms of representation, such as models.

Before explaining the specific examination of models within this thesis, there is a need to clarify a potentially ambiguous notion. Evans writes of architectural drawings displaying reverse directionality because the subject-matter exists after the drawing. However, these drawings may be alternatively described as drawing the idea of the building, and hence displaying non-reverse directionality. This assumes that ideas exist in their own right and precede and guide the development of images — the conceptual matter becomes clear to others when drawings make it visible.[18] However, prioritising the undrawn idea is misleading, as there would be no building or any shared understanding of an idea, without representation. Drawings do not represent the reality of an idea, but rather 'they inaugurate its possibility'.[19]

Evans refers to this ambiguity in offering the presentation drawing as an aberration within the reverse directionality of architectural drawings. According to Evans, the presentation drawing records something, but what it records is not real. The presentation drawing is a projection of that which is not accomplished. Presentation drawings are neither:

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[17] Evans 1997, p. 156.

[18] D Leatherbarrow, 'Showing what otherwise hides itself: on architectural representation', *Harvard Design Magazine*, Fall, 1998, p. 53. Leatherbarrow writes, 'Alberti's sense of design as the "mental composition of lines and angle" that has contributed as much to acceptance of this assumption as has Descartes' description of "clear and distinct ideas."'

[19] Leatherbarrow 1998, p. 53. In citing the case of vernacular building, Leatherbarrow claims that drawings are not necessary for buildings, but for architects: 'architects have come to think architecture by drawing it'. Frank Gehry's drawings have been described as embodying a process of thought: 'It's almost like I'm grinding into the paper, trying to find the building. I never think of the drawing as a finished product — they're a process to get to an idea.' C Tomkins, 'The maverick', *The New Yorker*, July, 1997, p. 43.

> [I]mpressions received from a real object … nor are they directly instrumental in the making of what they represent. They are neither received from nor transmitted to a building, but are pulled into a sort of *cul-de-sac* somewhere between the beginning and the end of the process.[20]

Evans acknowledges the potential of drawings to document an idea. However, for the purposes of this study, the notion of the documentation of the internal mind of the designer displaying non-reverse directionality will not be explicitly referred to as an example of *post factum* documentation.

The model as representation

There has been a long history of physically miniaturising planned architectural projects, as a way of previewing their impact at full-scale. Architectural drawings, especially the orthographic, often need an amount of knowledge and experience to be understood. Models offer a more immediate representation for conveying the future project, due to their objecthood.

However, the use of models within architecture has predominantly been as an adjunct to drawings. Although they are used educationally and as part of practitioners' design processes, they have not had the same consideration by theoreticians as drawings. The role of drawings has been questioned, examined, and codified in far more depth than that of architectural scale models, as Mark Morris writes, in *Models: Architecture and the Miniature*:

> Models may dominate academic activity, competitions and aspects of practice, but they do not dominate the discourse, they footnote it.[21]

Bradley Starkey agrees that architects theorise their work through the practices of writing and drawing, ignoring theorisation of, or through, the architectural model.[22] Models, according to Starkey, are more likely to be discussed in relation to matter.[23]

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[20] Evans, in Blau & Kaufman 1989, p. 19.

[21] M Morris, *Models: architecture and the miniature*, Wiley-Academy, Great Britain, 2006, p. 7. This is reflected in the disempowerment of the model that has occurred over the centuries. In the Middle Ages, due to the multi-generational time frame for building, the model was used as a legal reference. Goldthwaite writes that the model became a guarantee for the finished product, both assuring the patron of his understanding of the architect's intentions, and binding the architect in his capacity as foreman responsible for the execution. Construction often continued beyond the lifetime of those originally involved in the planning of the project, so a model could serve as authority against pressures for modifications. The model, or representation, therefore, becomes important as a record once there is a clear idea of the building, from the moment of its conception. RA Goldthwaite, *The building of Renaissance Florence: an economic and social history*, Johns Hopkins University Press, Baltimore, 1980, p. 373.

[22] B Starkey, 'Models, Architecture, Levitation: Design-based Research into Post-secular Architecture', *The Journal of Architecture*, vol. 11, no. 3, 2006, p. 323.

[23] Starkey writes that the 'division between intellectual and material aspects of architecture can be traced back to the Italian Renaissance when architectural labour became associated with intellectual rather than manual labour.

Evans writes about drawings, and the extent of their role in the development of architectural forms, rarely mentioning other forms of representation, such as three-dimensional models. However, the drawing has intrinsic limitations of reference, and 'not all things architectural … can be arrived at through drawing'.[24] Yet drawings exist in relation to models. They both act as intervening media, able to be translated into each other. Therefore, the terminology, scope and discussion of one has many points of intersection and overlap with the other. Hence, an examination of drawings' role within documentation must occur and, by analogy, models may be examined as an allied representation. Models are not examined as a 'footnote' to drawing, but rather this comparison allows the integrity, limitations and possibilities of models to be seen. These parallels assist in addressing omissions from the discussion of models and their parameters, and contribute to the examination of the relationship between the drawing, the model and the building.

Drawings and models

What then, are the points of intersection between drawings and models, and what are the particularities of models that set them apart? Both drawings and models may be considered in terms of Evans's discussion of directionality of projection; they both operate as representations, yet have both achieved a certain autonomy and presence as objects in their own right; they both have the quality of scale or the miniature; and there is a noun and verb element to both drawings and models, that is, drawing or modelling as an action and as a product. Examining these in more detail sets up the framework within which the specificity of the model as *post factum* documentation may be discussed.

Directionality of projection

As already shown, two general divisions may be made in reference to drawings, or projections: the drawing that is a record of what is seen, and the drawing that is a visualisation of what is nonexistent.[25] This categorisation relates to the directionality of the projection. Drawings within art and architecture fall into both these categories, although drawing within architecture is predominantly the latter.

Architectural models have tended to escape theoretical consideration because they have been associated with matter, manual labour and craft and therefore dissociated from the intellectual'. Starkey 2006, p. 323.

[24] Evans 1997, p. 159.

[25] These divisions are taken from DM Mendelowitz, *Drawing*, Holt, Rinehart and Winston Inc., New York, 1967, p. 8. He mentions a third, the drawing that is a graphic symbol which can be read because the meaning is commonly understood.

Since the early Renaissance, a drawn sketch was central to the process of artistic creation, as thoughts and images were first rendered into graphic form.[26] These sketches could have been from real-life studies or could be images of the imagined. In this reading of the drawing, it has the quality of both non-reverse directionality, as drawing from the existing, and of Evans's reverse directionality, as a study for a work to be made later. The drawing as a record is alluded to by Ted Hughes in the poem 'Drawing': 'You drew doggedly on, arresting details / Till you had the whole scene imprisoned'.[27] This refers to the power of such a drawing to encapsulate a moment, in order to understand it.

The drawing as a visualisation of that which is nonexistent is referred to by Joseph Beuys:

> Drawing is … the first visible thing of the form of the thought, the changing point from the invisible powers to the visible thing … It's really a special kind of thought, brought down onto a surface.[28]

It is this type of drawing, that which conjures up and creates through the medium of drawing, which is strongest within architecture.

Drawings within architecture are generally classed as four main types: orthographic, perspectival, axonometric and sketch drawings. They may be described as either recording what is seen, or drawing a visualisation of what is nonexistent. Evans writes that, generally, 'orthographic projections are more commonly encountered *on the way to* buildings, while perspectives are more commonly encountered *coming from* buildings'.[29] However, perspectives are just as commonly found in a set of drawings describing a proposed project.

Evans's writing of the principle of reversed directionality centres on drawings only; however, architectural models predominantly adhere to this principle also. They, like orthographic projections, are usually 'encountered on the way to buildings': their main role is generative, assisting the design process towards the development of the project. Jean-Louis Cohen writes that rather than the model being merely a small-scale representation of the finished building, the model has become a 'veritable design tool whereby the spatial and constructive problems are

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[26] J Turner (ed.), *Grove dictionary of art*, Macmillan, London, 1996, p. 224.
[27] 'Drawing', in T Hughes, *Birthday letters*, Farrar, Straus and Giroux, New York, 1998, p. 44.
[28] A Temkin & B Rose, *Thinking is form: the drawings of Joseph Beuys*, Thames and Hudson, London, 1993, p. 73.
[29] Evans, in Blau & Kaufman 1989, p. 21. Within these categories, the line has a different meaning from the line within the drawing in art. For example, in orthographic drawing, every line has a meaning, and is able to be accounted for. See P Maynard, *Drawing distinctions: the varieties of graphic expression*, Cornell University Press, Ithica, 2005, p. 148 for more discussion on Rawson's description of the line, and P Rawson, *Drawing*, University of Pennsylvania Press, USA, 1987, pp. 85–99.

posited and resolved'.[30] Hence, the model's main purpose has become an aid to developing the design proposal.

The model as displaying non-reverse directionality has not fully been explored in architectural writing, as these types of models are predominantly seen as historical models. But, as in the example of the sketch, which acts as both record and preparatory study for a painting or sculpture, a model can operate within two roles, that of both recording and proposing, documenting and interpreting.

Autonomous representations

Both drawings and models operate within the system of representation and so are elements within the complex relationship of the architectural image and the perception of architecture.[31] Alberto Pérez Gómez and Louise Pelletier describe this notion of representation as 'necessary surrogate or automatic transcriptions of the built work'.[32] Drawings and models may become versions of the other; that is, they are members of the process of oscillation between modes of representation: a drawing leads to a model and a model to a drawing.

According to David Leatherbarrow, the word representation is meaningless when applied to architectural drawing, if the word is taken to signify "'looks like" or "resembles" something that exists concretely, that is, if understood as a form of mirror'.[33] This is because drawings do not depict the buildings around us, as they show aspects of settings impossible to see and they concern buildings that do not yet exist.

In the late twentieth century, models achieved an amount of autonomy, gaining a presence that allowed them to be seen as an object, rather than solely operating as a representation. Karen Moon writes that during the 1970s, the model suddenly began to attract attention as an object in

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[30] J-L Cohen, 'Models and the exhibition of architecture', in K Feireiss (ed.), *The art of architecture exhibitions*, Netherlands Architecture Institute, Rotterdam, 2001, p. 30. Also: 'Throughout the history of humanity's attempts to envisage an absent architecture, the alternation of the roles of the model and the drawing predominates. The model presents itself to the gaze and purports to be a representation of the absent and thus proposes to offer knowledge pertaining to its otherwise invisible referent. It is the willingness of the gaze to attribute such qualities to the model rather than any quality of the object itself, which accounts for the object's status as a model.' M Frascari, abstract of paper for 'Models and drawings: the invisible nature of architecture,' AHRA conference at the University of Nottingham, 18–19 November, 2005.

[31] See R Evans, *The projective cast: architecture and its geometries*, MIT Press, Cambridge, Massachusetts, c.1995. The terminology adopted by Adrian Snodgrass and Richard Coyne relate to the notion of drawings and models sharing properties of representation, in their phrase, 'What is being explained, the *explanandum*, the modeled; and the explanation, the *explanans*, the model'. A Snodgrass & R Coyne, 'Models, metaphors and the hermeneutics of design,' *Design Issues* vol. 9, no. 1, 1992, p. 59.

[32] A Pérez Gómez & L Pelletier, *Architectural representation and the perspective hinge*, MIT Press, Cambridge, Massachusetts, 1997, p. 3.

[33] Leatherbarrow 1998, p. 53.

itself.[34] Models became the subject of exhibitions, articles and specific collections.[35] This coincided with growing academic attention to the architectural process and practice, and to the representation of architecture.[36] Moon suggests that the new attention lavished on the objects of architectural representation was also linked to theories of conceptual art, and its importance of the documentation of the process.[37]

Models, merely by existing in a three-dimensional state, may be seen as objects in their own right. It is this objecthood which sets them apart from drawings. Christian Hubert refers to the extent of this objecthood:

> The space of the model lies on the border between representation and actuality … neither pure representation nor transcendent object. It claims a certain autonomous objecthood, yet this condition is always incomplete. The model is always a model *of*.[38]

According to Hubert, although the model achieves some objecthood, its desire is to act as a simulacrum, and therefore, the model as representation, is always present.

However, due to the objecthood of models, it is less common and less easy for architects to adopt a modelmaking 'style' and thus to 'assert some kind of intertextuality at the level of the model' in the way post-1960s architectural drawings allowed for the inclusion of stylistic references and conventions.[39]

The limitations of this objecthood then lead to the possibility of interpreting models as natural and evidential; hence, they are seen as neutral and transparent due to this quality.[40] By seeing the model as merely miniature, its artifice is not addressed: the model, as an object able to be handled, sets it apart from its lineage of representation. This objecthood also gives the model a sense of closure and completion, different from drawing's possible look of the unfinished.[41]

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[34] K Moon, *Modeling messages: the architect and the model*, Monacelli Press, New York, 2005, p. 18. The 1976 exhibition 'Idea as Model', curated by Peter Eisenman, was seminal in this regard.

[35] Such as 'Houses for sale', Leo Castelli Gallery in 1980. In 1999, an Alsop Architects model of a pavilion for the Hannover Expo was short-listed for the Charles Wollaston Award for the most distinguished work in the Royal Academy Summer Exhibition, one of the largest art prizes in the U.K. In the show 'Architectural imagination', at the Max Protetch Gallery, New York, 1999, Zaha Hadid reoriented one of her models vertically, distancing it from the proposal and presenting it instead as a freestanding work of sculpture. Moon 2005, pp. 22–4.

[36] Moon 2005, p. 24.

[37] Moon 2005, p. 21.

[38] C Hubert in K Frampton & S Kolbowski, *Idea as model,* Rizzoli, New York, 1981, p. 17.

[39] S Kaji-O'Grady, 'Speculating on architectural models,' in GT Moore & L Trevillion (eds), *Architecture and education*, proceedings of the Association of Architecture Schools of Australasia International Conference, University of Sydney, 2000, pp. 45–51.

[40] Kaji-O'Grady, in Moore & Trevillion 2000, pp. 45–51.

[41] However, Morris has written of the sketch model's qualities as 'seeming unfinished, fragmentary, serial and materially slipshod.' Morris 2006, p. 40.

The power and operation of this realm of representation is apparent in Evans's discussion of translation, and its intention to convey. The original meaning of translate, and what happens in translatory motion, is to move without alteration. Yet this is not the case with translation within representation or language. There is not an evenness and continuity of information, but rather, things get 'bent, broken or lost on the way'[42]; there is both a loss and gain due to the movement across these modes. The model as an intermediate, blurred state of the building allows scope for the imagination.[43] It is this quality of being able to be interpreted in numerous ways that representations possess.

Evans writes that between the drawing and the building in architecture, an understanding of translation, and an understanding of the space through which meaning moves, must be addressed, in order for architects to perform their task. Due to this not being explored:

> [T]he drawing is overrated, but the properties of the drawing — its power in relation to the building — are hardly recognized at all. Recognition of the drawing's power as a medium turns out to be recognition of the drawing's distinctness from and unlikeness to the thing that is represented, rather than its likeness to it, which is neither as paradoxical nor as dissociative as it may seem.[44]

Evans writes that by his observations, architects labour under the disadvantage of always working through some intervening medium, never working with the object of their thought. Yet the recent rise in status of architectural drawings alters their representational role: they are less concerned with what they represent than with their own 'constitution'.[45] Evans writes that this allows the transmutation that occurs between drawing and building to remain an enigma. Parallel processes of translation operate between the drawing and the model, the drawing and the building, and the model and the building. The examination of the drawing as both a representation and an autonomous object allows the discussion to include the model and, hence, address Evans's enigmatic transmutation.

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[42] Evans 1997, p. 156. Harbison, in his book *Eccentric spaces*, wrote 'Like maps metaphors often seem propelled by a change of scale … and change of scale seems to qualify as a kind of thought by performing a transformation in which everything is altered but remains the same.' Harbison 1977, p. 133.

[43] J Yanagisawa, 'A Utopia called model', in U Schneider & M Fenstel (eds), *Toyo Ito: blurring architecture*, Edizioni Charta, Milan, 1999, p. 155.

[44] Evans 1997, p. 156.

[45] Evans 1997, p. 156.

Scale and the miniature

There is a connection between the scale of the drawing, and within the drawing, with the notion of the miniature of the model. The scale of the drawing is governed not just by the intention behind it, but also by the medium and the gesture that is used; the page as a parameter of an action is an inherent quality of the drawing. However, the objecthood of the model results in a difference between the miniature and the scaled.

The act of modelmaking, of making miniature a proposed building, creates fascination.[46] Qualities associated with this change of scale include intimacy and interiority. They make the viewer feel authoritative, as the object may be easily manoeuvred and manipulated, even carried around, due to its diminutive form.[47] The concentration inherent within such smallness, commands the gaze of the viewer; reducing the scale has the effect of concentrating and intensifying the model's significance.[48] Susan Stewart links the miniature with nostalgia and childhood.[49] The act of holding the miniature within the hands creates qualities of the giant in the viewer. The miniature is able to be held within the hands, but these hands are then out of proportion to what they are holding and become a form of undifferentiated landscape. The miniature world is self-enclosed: 'we can only stand outside, looking in, experiencing a type of tragic distance'.[50] This sense of exclusion from the object distances the viewer, and hence, there is a lack of ability to explain fully the experience of viewing a building.[51]

In the Soane Museum, in London, hangs a Joseph Gandy painting called 'Public and Private Buildings Executed by Sir John Soane between 1780–1815' (1818). This depicts over one hundred projects designed by Soane, as models of different sizes and materials packed into a single huge room. Harbison writes that this 'brings out the miracle of models, which can put the whole world in a small space'.[52] Displaying models in this way exacerbates a potential dormant in

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[46] Jeremy Levensohn in a 1988 issue of *American Craft* magazine, cited in A Busch, *The art of the architectural model*, Design Press, New York, 1991, p. 27.

[47] Morris cites Rudolph Arnheim: 'Being smaller, the object as a whole seems less formidable. By being quantitatively diminished, it seems to us qualitatively simplified.' R Arnheim, *The dynamics of architectural form*, University of California Press, Berkeley, 1977, p. 124 in Morris 2006, p. 10.

[48] K Downes, *Sir Christopher Wren and the making of St. Paul's*, Royal Academy of Art, London, 1991, cited in Moon 2005, p. 73. Also: 'By the same count, it also increases its value … the Great Model of St. Paul's, for instance, cost as much as a three-storey house.' Moon 2005, p. 73.

[49] S Stewart, *On longing: narratives of the miniature, the gigantic, the souvenir, the collection*, Duke University Press, Durham, 1993, p. 69.

[50] Stewart 1993, p. 70.

[51] Kaji-O'Grady, in Moore & Trevillion 2000, pp. 45–51. However, it has been written that Eisenman does not draw any distinction, except in terms of scale, between the model and the built object. He sees the model as an object deprived of the need to be lived in. L Galofaro, *Digital Eisenman: an office of the electronic era*, Basel, Birkauser, 1999, p. 30, cited in Moon 2005, p. 16.

[52] R Harbison, *Thirteen ways: theoretical investigations in architecture*, MIT Press, Cambridge, Massachusetts, 1997, p. x, 84–5.

all models: 'to make distance unreal and thus free us from our own spatial identity'.[53] Due to their scale, models offer the ability to place seemingly dissimilar architectures next to each other. Consequently, connections and similarities are able to be speculated on, ones that would not exist at a built scale, or across pages of drawings.

The miniature as model begins with imitation; hence, a 'second-handedness and distance' exists within the model.[54] Therefore, there is no original miniature. Architects have attempted addressing this remoteness, claiming that the models created are the architecture themselves, not the representation of it.[55] No longer are models relegated to being a version of the building, but rather can be seen as the object themselves, that is, models of ideas. Models have taken on the role of presenting architecture, not *re*presenting it[56]; that is, the model as referent, with its own identity and presence, and, therefore, perhaps self-consciousness.

This shift has led to an ambiguous relationship between the building and the model. The model is forced to undertake two different roles: both to portray the object and to go beyond the object, and represent the ideas about the object, beyond its physicality. In the catalogue to the 'Idea as Model' exhibition, Jaquelin Robertson explains that the model has to be both 'tiny twin and symbolic surrogate … an idea scaffold for the real thing … A loaded toy'.[57] It is this quality that allows models to operate as interpretive documentation: not to model the existing neutrally, but to offer meaning and alternative readings of the existing. The distance that inhabits the miniature allows it to be seen as a vignette of reflection, an objective version of the subjective interpretations it represents. An interesting aberration to this is in the form of the full-scale model. However, the full-scale model maintains distance and autonomy from the original in other ways, such as the temporal, as later chapters discuss.

Drawing and modelling as noun and verb

The interchangeability of the noun and verb forms of the word 'drawing' allows different interpretations of the intended form of the word. By using the word drawing, the action and the result of that action are inseparable, due to the interchangeability of the word itself. This brings immediacy to the act of drawing, allowing the act to reside within its resultant noun. The action

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[53] Harbison 1997, p. 86.

[54] Stewart 1993, pp. 171–2.

[55] Hani Rahid, now of the architectural firm Asymptote, studied under Libeskind at Cranbrook in the 1980s. He writes: 'What was really interesting about [Libeskind's] approach, which became my approach, was that the model for us became a piece of architecture. There was no separation, really, in our minds at the time between making a model of a building and it being the building … and that's really the kind of exuberance and attitude we had to modelmaking … the feeling that the thing itself had all the … implication of a building.' Moon 2005, p. 16.

[56] Hubert, in Frampton & Kolbowski 1981, p. 17; A Benjamin, 'On display: the exhibition of architecture', in H Abe, *Flicker*, Toto Shuppan, Tokyo, 2005, p. 108.

[57] Frampton & Kolbowski 1981, p. 60.

is implied, when referring to the manifestation of that act. Therefore, the space of the action and the space of the page can be linked, metaphorically. It is the space of the paper that is occupied, as well as the location within the studio; the hand's trail of lines leaving evidence of this.[58]

This notion of movement in drawing is discussed by Philip Rawson, in *Drawing*. He writes of the drawing being a mark that records a two-dimensional movement in space, the tool acting as a surrogate for the hand. Every drawing inherently has a pattern of these movements within it, yet there is a difficulty of transferring this quality to painting.[59] Rawson writes that an appreciation of the drawing requires a retracing of these movements, from the evidence, or marks, that have been left behind.[60] Such a description shows the importance of the movement of the mark onto the page. It is drawing-as-verb which is predominant.[61]

The action of drawing is less inherent within architecture, and so the word exists more strongly as a noun within this realm. The sketch, where the action is strong, is often dismissed as a gestational, embryonic and fleeting stage of the design process. Other architectural drawings, such as construction drawings, are able to be legal documents, emphasising the drawing-as-noun. Models also lack this inhabitation of the act of modelling, or modelmaking. It is the noun, the depiction, that is dominant. This leads to the association of the noun form as substantive, and, therefore, pointing to a static moment of being. This is in opposition to the verb form which has a dynamism and 'modes of becoming' associated with it. [62] An analogy of being able to enter the space of the action of drawing, via its resultant markings on a page, is absent within the field of models; there is no metaphor for the page within modelmaking, although it, too, is a handmade act.[63]

Drawings offer the potential for the act of drawing, within a drawing, being a metaphor for the act of being within a space. The model also offers this, in the form of the full-scale model and in the exhibition of architecture that models a space.

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[58] Angela Kingston, describing the method of Claude Heath, in A Kingston (ed.), *What is drawing?*, Black Dog Publishing, London, 2003, p. 15. Philip Rawson writes: 'A stroke, even a dot, takes time to make and so shows to the spectator its beginning and its end. Herein lies the vital, unique quality of drawing, which distinguishes it from the other visual arts — its expression of time, movement and change.' P Rawson, *Seeing through drawing*, British Broadcasting Corporation, London, 1979, p. 24, cited in Maynard 2005, p. 190.

[59] Rawson 1987, p. 15, cited in Maynard 2005, p. 190. Also: 'If we do not follow through in time the traces left by the artist's moving hand we are bound to miss the point.' Rawson, 1979, p. 24

[60] Elderfield 1988, in Maynard 2005, p. 190.

[61] In 2006, the Guggenheim Museum in New York, held a show of Pollock's work titled 'No limits, just edges: Jackson Pollock paintings on paper'. Peter Schjeldahl refers to the use of the term painting as opposed to drawing, saying 'because even when the format is small and the medium is ink Pollock's practice obviates the distinction.' P Schjeldahl, 'American abstract: real Jackson Pollock', *The New Yorker*, July 31, 2006, pp. 80–1.

[62] RE Somol, 'Dummy text, or the diagrammatic basis of contemporary architecture', in P Eisenman, *Diagram diaries*, Thames and Hudson, London, 1999, p. 9.

[63] Drawings and models seen as artefacts of a process do go some way to redress this.

In examining the qualities that drawings and models share — the directionality of projection; they operate as representations and as autonomous objects; they are to scale or are miniature; they have both noun and verb elements to their description — allows writing on the topic of drawing to have resonance with models, and forms the basis of an examination of models. By marking the meaningful differences and similarities between the two modes of representation, clarification and reshaping of models may occur.

In summary, the drawing within architecture predominantly displays Evans's reverse directionality. The model assumes a similar position; hence, the model as displaying non-reverse directionality has not been explored in depth. Just as a sketch may operate as both a record of what has been and as preparatory to a sculpture, in the same way, a model may operate within two roles, that of recording and proposing.

The representational quality of the model places it within the framework of relationships with drawing and with the full-scale object. It may be translated into each of these, and provides a representational technique for these transmutations. Models are able to document the process of translation between drawing and building, drawing and model, and model and building. It is the model's objecthood, while also operating as a representation, that brings a distance of objectivity to the design process.

Drawings, by existing strongly in a verb form, offer the drawing-as-noun as a document to the act of drawing. Full-scale models offer a similar inhabitation of the space of the model.

Drawings, in getting to a building, *draw out* something: the act of drawing searches for and uncovers the latent design, drawing it into existence. They are seen as getting to the core of the design. Drawings display a technique of making and are influenced by their medium. Models, in getting to a building, may be described in the same way. The act of modelling, of making manifest two-dimensional sketches into a three-dimensional object, operate similarly in possessing a certain power in assisting the design process to unfurl.

Drawing, as recording, alters the object. This occurs because the act of drawing is used to resolve, and to edit, by excluding and omitting, as much as by including, within its page. Models similarly made after-the-fact are interpretive and consciously aware of their intentions. In encapsulating the subject–object, the model as documentation is equally drawing out meaning.

An outcome of this examination between the characteristics of drawings and models is to allow the analogy of drawing within architecture to infiltrate the discussion of models in the form of Evans's essays and other writings that centre on drawing. The difference between documentation that adheres to Evans's notion of reverse directionality and *post factum* documentation has been established. To explain further the need for a redressing of attention on

post factum models, it is necessary to examine the role of the model and its definition, in a broad historical overview.

Historical overview

The use of models has varied over the centuries, depending on their intention and audience. Throughout this time, it is their role as either exploratory or explanatory, that is, either generative or representational, that has influenced their use and status. In general terms, the exploratory model is associated with 'getting to' a building, and an explanatory model with 'coming from' a building.[64] By the late twentieth century, the exploratory model, seen as generating the evolving design, had become the dominant type. Due to this, explanatory models, that are seen to be disassociated with design generation, have had less examination. *Post factum* models have been seen to fall into this category. However, this differentiation within models is simplistic and divisive; as shown, the explanatory model involves interpretation and reflection, qualities strongly aligned with the design process.

Historically, models were used not only for designing buildings, but served as a means of defining a culture's universe.[65] The scale model offered a framework upon which a culture could project and develop their measure of invisible things. Albert C. Smith writes that models also serve as a marker of the role of the architect within the design process, and within society. What the observer sees reflected in their measurements is affected by the current concept, or reference standard, of what is invisible.[66] Smith defines the architectural model, therefore, as a small scale machine that allows definition through representation.[67] A reading such as this begins to blur the polarity of the exploratory–explanatory divide.

The shift towards the present dominant role of the exploratory model began as a reaction to the architectural education of the nineteenth century. However, to Smith, architects in the Renaissance set the stage for our current relationship with the model, by altering and greatly expanding upon the medieval traditions of the architectural scale model. During the Middle Ages, the scale model was a mechanism for implementing design, whose interpretation was stringently controlled:

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[64] This uses Evans's terminology, referring to architectural drawings. Evans 1989, p. 21.

[65] AC Smith, *Architectural model as machine: a new view of models from antiquity to the present day*, Architectural Press, Oxford, 2004, p. 1.

[66] Smith 2004, p. 63.

[67] 'A machine is generally considered to be something with a practical purpose, a device that substitutes for or extends humankind's own forces. The word itself has the same etymological root as 'might'. The word machine comes from the Latin *machina* and the Greek words *mechane*, meaning devices or contrivances for doing a thing, and *mechos*, meaning 'the means' or 'the way by which something is expedited.' 'Machine', *Webster's third new international dictionary*, II, CG Merriam Company, Springfield, Massachusetts, 1967, p. 1451, cited in Smith 2004, p. 63.

> To the medieval mind, there was no doubt who created nature. The chief architect who created nature was considered a Christian God whose work was interpreted and defined by the hierarchy of the church.[68]

Therefore, the model was developed with the expectation that it would agree with the prevailing reference standards of the divine.

However, during the Renaissance, these carefully conserved reference standards appeared to require recalibrating in light of changing manners. It was during this period that a general loosening of the rigid control of the church allowed this recalibration to occur.[69] According to Smith, this change was the most significant development in representation to occur during the Renaissance.[70] Hence, the architects of the Renaissance were allowed a renewed opportunity to engage the scale model as a form of *maquette*, that is, a preliminary study or demonstration of that which is planned.[71]

Architects of the Renaissance appear to have used models more consistently than any of their predecessors.[72] In the Renaissance, a model was customary in the consideration of a design by both architect and client.[73] A Florentine architect, having most likely been trained in the sculptural arts, may have felt a particular need to work out ideas in plastic form.[74] Models were used in communicating the architect's ideas to his workers; these models were preparatory to the design, rather than documenting a predetermined design.[75]

Another major development during the Renaissance was the change in pictorial representation of space, due to the use of the perspective. Visual perceptions could be translated into a comprehensible and manipulative series of spatial events, accurately depicting a design intention. With this rise in the role of drawing, the model became more an explanatory device, rather than exploratory.[76]

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[68] Smith 2004, p. 24. Pérez Gómez and Pelletier write, 'The master mason was responsible for constructing a model of the city of God on earth; but only the Architect of the Universe possessed a comprehensive foreknowledge of the project and was deemed capable of concluding the work at the end of time.' Pérez Gómez & Pelletier 1997, p. 8.

[69] Smith 2004, p. 71.

[70] Smith 2004, p. 71.

[71] Smith 2004, p. 30.

[72] See 'Models in Renaissance Architecture', in HA Millon & VL Magnago (eds), *The Renaissance from Brunelleschi to Michelangelo: the representation of architecture*, Rizzoli, New York, 1994, pp. 19–73, for documentation of references.

[73] Goldthwaite 1980, p 373–5.

[74] Goldthwaite 1980, p. 375.

[75] Goldthwaite cites examples such as models made for a doorway, window sills, and various metal ornaments at the Palazzo Strozzi which were used in the execution of these details. Goldthwaite 1980, p. 377.

[76] T Porter & J Neale, *Architectural supermodels*, Architectural Press, Oxford, 2000, p. 8.

During the nineteenth century, the refinement of the orthographic system, developed by the physicist and military engineer Gaspard Monge, had a profound impact on visualisation techniques.[77] This system, known as descriptive geometry, provided a means of coordinating the plan with the elevation and section, and came to emphasize drawing as the central means of architectural design. The desire for precise measurement and comprehensive representation of building projects became the dominant architectural theory at this time, undermining the more exploratory functions of the model.[78] The blueprinting process, introduced in the last quarter of the nineteenth century, reduced drafting costs, and so models came to be seen as an expensive luxury.[79] The cost of modelmaking had increased during the nineteenth century, and the level of skill required by craftsmen made it a specialized undertaking, so that modelling studios could only be run in larger urban areas.[80] However, major public building competitions required models to be exhibited for public debate.

The dominance of drawing on architectural representation was further influenced by the emphasis the École des Beaux-Arts school placed upon drawings. Exercises in rendering led students to produce exquisite drawings, often in watercolour wash, hence discouraging modelmaking.[81] According to Morris, although models were not excluded from Beaux-Arts inspired architecture programs, they were 'never required or prized in their own right'.[82] However, the Beaux-Arts tradition came under much criticism toward the end of the nineteenth and in the early years of the twentieth century. It was seen that the emphasis on drawings was having an adverse effect on the quality of design; this paralleled a revival in the use of scale models.[83]

The Bauhaus, founded in 1919, became an architecture program in opposition to the French Academy. Walter Gropius devised its revolutionary curriculum, to rebel against the remoteness of paper designs and in the hope of resurrecting the medieval 'lost chord' between designer and craftsman.[84] Although the program did include the study of plane geometry and drafting techniques, half the allocated time in the foundation course was spent fabricating and crafting

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[77] T Porter, *The architect's eye: visualization and depiction of space in architecture*, Chapman & Hall, London, 1997, p. 18. See also Evans, in Blau & Kaufman 1989, p. 28–9.
[78] Pérez Gómez & Pelletier 1997, p. 298.
[79] Moon 2005, p. 39.
[80] Moon 2005, p. 43.
[81] J Draper, 'The Ecole des Beaux-Arts and the United States', in S Kostof (ed.), *The architect: chapters in the history of the profession*, Oxford University Press, New York, 1977, p. 228; Millon 1994, p. 72.
[82] Morris 2006, p. 19.
[83] Moon 2005, p. 41; Porter 1997, p. 21.
[84] Porter & Neale 2000, p. 13.

things like models.[85] For example, László Moholy-Nagy encouraged his students to use, as a design tool, the simple, partly transparent model which he called a 'space modulator'.[86]

Changes in architectural style also influenced the need and use of models. Moon quotes Kenneth Reid, in his 1939 article in *Pencil Points*:

> Particularly since the development of the newer and less familiar contemporary architectural forms has there come about a need for three-dimensional visualization through models … now with the freer plan solutions and the resulting combinations of asymmetrically arranged masses that go to make up our modern architecture, the model has become almost a necessity for both architect and client.[87]

Rather than employing specialized craftsmen to make models, alternative, cheaper materials were explored, such as cardboard, so that models were no longer seen as a luxury.

The closure of the Bauhaus meant that its influence reached a larger audience as its leading proponents joined other teaching institutions. By the late 1940s, the Bauhaus program had become the dominant force in American architectural design studios.[88] According to Moon, citing examples by Gerrit Rietveld, Eric Mendelsohn, Antoni Gaudí, Mies van der Rohe, Le Corbusier, Frank Lloyd Wright and Eero Saarinen, the twentieth century revival of models had begun.[89]

By the 1970s several larger, as well as smaller, offices in Europe and America, such as I.M. Pei and Partners and Foster and Partners, had well-equipped, in-house workshops where models became a vital force in resolving design.[90] It was during this time, according to Moon, that the model suddenly began to attract attention as an object in itself.[91] Before the 1970s, exhibitions

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[85] Morris 2006, p. 20.

[86] Porter 1997, p. 19. Evans writes that in painting, attempts were made by Cubists, Futurists, Suprematists and Constructivists to abandon the linear perspective. Evans, in Blau & Kaufman 1989, p. 33. This influenced architects such as Gropius and Le Corbusier to reject the perspective as limited, finite and closed and to search for other representational means. Porter 1997, p. 20. Moon cites various articles, published in the United States between 1918 and 1926, showing that models were supplanting perspectives and rendered sketches as a means of presenting architectural ideas. For example HW Corbett, 'Architectural models of cardboard', *Pencil Points* 3, April, 1922, pp. 10–14; and 'Some architectural scale models executed by Berthold V Gerow', *Architect and Engineer of California* 56–57, June 1919, p. 83, cited in Moon 2005, p. 43.

[87] K Reid, 'Architectural models', *Pencil Points* 20, July, 1939, p. 407, cited in Moon 2005, p. 45.

[88] A Carragone, *The Texas rangers, notes from the architectural underground*, MIT Press, Cambridge Massachusetts, 1995, p. 17, cited in Morris 2006, p. 22.

[89] Moon 2005, p. 44. Cohen writes of the 'now mythic' exhibition of modern architecture organized by Henry-Russell Hitchcock and Philip Johnson at the Museum of Modern Art in New York in 1932. This exhibition centred on four models by Mies van der Rohe (Tugendhat House), Le Corbusier (Villa Savoye), JJP Oud (the project for the Johnson House) and Walter Gropius (Dessau Bauhaus). Cohen 2001, p. 29.

[90] Moon 2005, p. 83.

[91] Moon 2005, p. 18.

focusing on models were rare; they had usually been included alongside other forms of architectural representation, solely to help illustrate current projects.[92]

In 1976 the exhibition 'Idea as Model' in New York was important in exploring the border between drawing and models. Peter Eisenman, the exhibition's curator, sought to present the artistic and conceptual existence of models, independent of the project they represented, similar to the potential already acknowledged with architectural drawings.[93] The exhibition showed the model as a conceptual, rather than narrative, tool: models as 'studies of a hypothesis, a problem, or an idea of architecture'.[94] Richard Pommer, in his essay written four years after the exhibition, writes that this exhibition was Eisenman's response to Arthur Drexler's exhibition of the École des Beaux-Arts at the New York Museum of Modern Art in 1975. Drexler implied in the catalogue essay that drawings were conceptual and that models were not.[95] Eisenman's exhibition was an attempt to prove the contrary, that models 'could represent ideas beyond the objective concerns of conventional modern architecture'.[96]

The new attention lavished on the objects of architectural representation was also linked to theories of conceptual art, and its importance of the documentation of the process.[97] 'Idea as Model' was followed by other shows, and models and drawings began to be taken up by galleries, with more vigorous collecting in the 1980s.[98] The setting up of new architectural museums in the 1980s coincided with growing academic attention on the architectural process, architectural practice, and to the representation of architecture.[99] Entire issues of journals were devoted to models in the 1980s, and many one-off articles.[100] Moon suggests that due to the economic downturn resulting from the oil crisis of the 1970s, which depressed the building industry and reduced many architects' opportunities to gain commissions, making models became a focus of creative activity for them.[101]

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[92] Moon 2005, p. 18–19. John Wilton-Ely organized 'The architect's vision' at the University of Nottingham in 1965; the Victoria and Albert Museum installed 'Marble halls: drawings and models for Victorian secular buildings' in 1973. 'The prime purpose of each of these exhibitions was to elucidate a particular period of architecture using models as the medium of study. The idea of viewing them as objects in their own right (apart from their role in a project) and understanding their significance for the architect was barely considered.' Moon 2005, p. 19. Cohen writes of the exhibition of sixteen wooden models of Palladio's villas, presented in 1973 in the Basilica in Venice, designed by the architect, as an example of the model becoming the very basis of the narrative. Cohen 2001, p. 29.

[93] Frampton & Kolbowski, 1981, p. 1.

[94] Frampton & Kolbowski 1981, p. 3.

[95] Frampton & Kolbowski 1981, p. 10.

[96] Frampton & Kolbowski 1981, p. 10.

[97] Moon 2005, p. 21.

[98] Moon 2005, p. 22–3.

[99] Moon 2005, p. 24.

[100] Moon 2005, p. 24.

[101] Moon 2005, p. 24. Graves has used product design as an alternative format for modelling architectural ideas, such as 'Tea and coffee piazzi' for Alessi. Moon 2005, p. 29.

Therefore, towards the end of the twentieth century, emphasis was taken away from the importance of the presentation or realistic model, raising in prominence the role of the working model. However, recent symposia and exhibitions have posited the theory that it is still the presentation model that is lauded as the main type of model, and that the working or process model has been ignored.[102] This contributes to the division between exploratory and explanatory models, and how they are regarded within the design process. It is similar to the division in architectural drawings: the working model as a model version of the sketch and the presentation model as a version of the construction document.

The model is now seen as being predominantly exploratory and preparatory to a building, the emphasis being on its generative qualities, its revelatory capacities in getting to the design.[103] These types of models display reverse directionality. This relentless attention on the process model and its importance within the design process means the *post factum* model fades to fulfilling the role of historical documentation only. The case studies in later chapters redress this situation. For example, as shown in Chapter 1, the Panorama model of New York City offers a site for reflection on the city. This is not neutral documentation, but a representation that offers an alternate view of the city, and one that influences the reading of the city. To expand upon *post factum* documentation within the design process, the potential and importance of *post factum* documentation needs to be examined.

The place of post factum documentation

The realm of *post factum* documentation has been seen to exist separately from the design process. To examine the role and importance of *post factum* documentation, a return to drawing is needed. Due to the classification of architectural drawings, there exists a hierarchy of importance of drawings that are produced, and therefore, examined. This defines the design process as being made up of certain activities, while excluding others. However, this limits the potential of the design process and creates a simplicity not present within design.

This classification occurs because writers on the topic of architectural drawings distinguish between types of drawings on the grounds of their placement within the design process. In Evans's discussion of the directionality of projection, the similarities of the sketch and the

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[102] For example: 'Homo faber' symposium and exhibition, Melbourne Museum, 1 June–2 July, 2006; 'Durbach, Popov, Stutchbury, process: the role of sketches and models in the development of architectural concepts', Sydney, 17 January–4 February, 2006; and 'Supermodels: an exhibition of space and form in architectural models,' Sydney, 2–24 September, 2006.

[103] 'The "beautiful" drawing, the "beautiful" model have long been things of the past. They have made room for ephemeral sketches and paper structures that are like rough tools.' F Werner, *Covering and exposing—the architecture of Coop H*, Birkhäuser, Basel, 2000, cited in G Zugmann, *Gerald Zugmann: blue universe: transforming models into pictures: architectural projects by Coop Himmelb(l)au*, MAK, Hatje Cantz, Ostfildern, 2002, p. 61.

construction drawing are highlighted as they both operate within the realm of reverse directionality. In this reading, they are both involved in getting to a building, and so are seen to be a part of the design process.

Usually, however, the differences between such drawings are highlighted: sketches are associated with the beginning of the design process, and construction drawings at the end of the process. It is the combination of these that are seen to make up the design process. Morris writes that '[f]rom the napkin sketch to the project deadline, process is bracketed'.[104] Due to the distinction between these drawings, there is a tendency to give them either an aesthetic or instrumental function, leading to a polarity within architectural drawing. On the one side is the '(designer) architect who draws pictures of projects, and on the other is the (technician) architect who translates ideas into dimensioned diagrams'.[105] This leads to a differentiation between architectural drawings.

A clear and distinct separation exists in the design process, due to this naming, which is defined by its associated drawings.[106] Platt and Leatherbarrow both question how these two types of drawings co-operate in the single task of creating and representing architecture. With this categorising of drawings, documentation is seen as being a part of the design process, but at the end of that process. Documentation, therefore, is regarded as having a prescriptive endpoint, rather than being part of an open-ended improvisation. This reading of the design process places the 1:1 scale building as the finality of the process. Drawings made after-the-fact, that is, *post factum* documentation, are therefore categorised as outside the design process. Hence, they are separate from it and excluded from discussions of this process and are dissociated from possessing certain qualities: they are not seen as projective or generative, but rather as neutral documentation.

A similar conclusion may be made with models. The sketch or conceptual model bears similarities with the sketch drawing and presentation models ally themselves with construction drawings, coming at the end of the design process. *Post factum* models, therefore, are seen as separate from the design process, similar to drawings made after-the-fact. An example of this exclusion of *post factum* models from discussions of representation, due to their perception as separate from the design process, is given by Moon. She writes that her principal concern is with models made as part of the process of designing an architectural project, while the project is 'live' — that is, while the building is still in some sense an idea rather than a reality. She then

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[104] Morris 2006, p. 38–9.

[105] Leatherbarrow 1998, p. 50.

[106] J Platt, 'Working drawings: the unsung hero of the design process', abstract of paper for 'Models and drawings: the invisible nature of architecture' AHRA conference, at the University of Nottingham, 18–19 November, 2005.

writes that, 'replicas of historic structures do not form part of my discussion'.[107] Moon implies that to model that which is built, or rather to model that which is more than an unbuilt notion, reduces the model to historical explanation. This is a cursory classification of all the models whose function lies outside 'getting to' a building. This one comment reflects a wider view of *post factum* models: that they are outside the design process and perform some role in historical documentation. Therefore, the dominance within the design conversation is with process models, rather than *post factum* models.

The most conspicuous examples of drawings made after-the-fact are historical recordings of buildings and measured drawings of built projects, drawings not commonly associated with the design process. However, *post factum* drawing encompasses forms other than these. Examples of drawings that incorporate a reading of the original, that is, of that which exists in some form, include analyses and *parti* diagrams of precedents; site drawings; interpretive context studies; program analyses; mappings of the design process; and conceptual drawings done after the project is completed. These drawings all have analogous models: analyses and *parti* diagram models of precedents; site models that interpret the existing context; three-dimensional analyses of the program and process; and conceptual models constructed once the project is completed. These examples are all produced within various design processes. By naming these examples as after-the-fact documentation widens the definition of *post factum* documentation and includes it in the design process. This then repositions models within an expanded notion of the design process, in order to displace the finality of the built object as the endpoint of that process.

The emphasis of architectural design education is predominantly concerned with 'getting to' the design of the building. This is made manifest by the attention given to process or working models, within the design studios of architecture schools.[108] However, in order to learn how to produce architecture, students must be able to document that which exists; not to document neutrally, but to interpret and explicitly document this interpretation through representational editing. This documentation, and interpretation of the existing, involves the student representing the context, the program, precedents and their own process itself. Therefore, it is important, pedagogically, to teach an understanding of architecture through reconstructed interpretation. This is not mimicry or a neutral replication. Rather, through interpretation, the act of reflection

[107] Moon 2005, p. 7.

[108] Morris refers to the sequence of sketch models a student presents as the 'biography of a design; and by extension, the autobiography of the designer'. The project's evolution, illustrated by these, stands in for the project as a whole. Morris 2006, p. 40.

of the student's own design process and that of others is achieved within the design studio.[109] The balance of the role of representation should be addressed in order to include documentation as a personal critique, at all points during the design process.[110] *Post factum* documentation questions the 1:1 scale as the endpoint of architectural representation which still has dominance, to some extent, in architectural education.

Ranulph Glanville writes of the inherently recursive and reflective nature of design.[111] Arguing that most programs of academic study do not acknowledge this aspect of design, concentration is given to design-the-noun, that is, design as an outcome, rather than to design-the-verb, that is, design as a process. According to Glanville, for the outcomes of architecture to be improved, this emphasis needs to be reversed. One way for this to occur is to emphasise an overlooked aspect of the design process, that is, the importance of documentation as interpretation, as this acknowledges the recursive and reflective elements within the process.

Therefore, naming models and drawings as *post factum* documentation brings the notion of reflection to reside within the design process. Reflection allows the recursive nature of design to be acknowledged, and the importance of interpretation to be made explicit. This then acknowledges the role of the model as a design response. The case study of the reconstruction of the Barcelona Pavilion in Chapter 3 is an example of a project, read as a *post factum* model, that demonstrates the interpretation inherent within these types of models. It shows the reflection that a space of time offers on the poetics and motives and drawings of the architect, beyond the completion of the original building. The endpoint of the design process is not seen to be the 1929 pavilion, but rather the process is seen to extend beyond this building. Since the notion of an endpoint has been omitted, the link between object, process and representation is acknowledged.

As this case study shows, naming models and drawings as *post factum* documentation allows variation in the location of the 'finish' of the design process. Traditionally, this endpoint is seen as the built project. However, a designer is engaged with an ongoing, individual design process, separate from that of the project. Documentation, for example in the form of conceptual models done after the project is finished, that pare back built complexity to *post factum* conceptual simplicity, acknowledges this ongoing design process. The design process, in this case, is not

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[109] As an example, the students at Cooper Union in New York undertake an analysis exercise in which historical buildings are constructed, then 'autopsyed' by cutting and dissecting. B Goldhoorn (ed.), *Schools of architecture*, NAI Publishers, Rotterdam 1996, p. 15.

[110] The model is closely associated with the quality of prediction of the *maquette*, which can 'warn the architect of future problems and can allow marvel, wonder, astonishment, and surprise into the design process'. Smith 2004, p. 2. These qualities of divining and uncovering sit with the definition of *post factum* documentation as engaging with the design process, that is, reflection leading to discovery.

[111] R Glanville, 'An irregular dodekahedron and a lemon yellow Citroen', in L van Schaik (ed.), *The practice of practice: research in the medium of design*, RMIT University Press, Melbourne, 2003, pp. 259–60.

confined to one project's process, but rather is part of a discourse that extends and accumulates across many projects by a designer. In this way, models completed after one project finishes, are still within the greater design process of an individual. The exhibition work of the firm Herzog and de Meuron shows this, as discussed in Chapter 4. Herzog and de Meuron curate, and recurate, their own work, so that when exhibited, connections are formed between objects from different projects. The design component of their work, therefore, extends beyond the life of individual projects.

Post factum documentation allows for reflection; associated with this is the issue of critique and comment, both by the designer and by others. Architectural critique is usually in the form of the experiences and reactions of visitors and inhabitants of the built work; photographs; written architectural reviews; and architectural exhibitions and their catalogues. *Post factum* models offer the potential for three-dimensional architectural critique and acknowledge the critical facility of models as a response.

Focussing on *post factum* documentation, specifically that of models, widens the scope of the design process.[112] This widening acknowledges the importance of interpretation and reflection within the design process and offers an alternative critique of architecture. Documentation, when defined as getting to a building, does not acknowledge this, or signify this interpretation. *Post factum* models are not miniature versions standing in the shadow of the, as yet, unbuilt version. They have a presence, separate from the original yet linked by the lineage of representation. *Post factum* documentation, residing within the design process, shifts the emphasis from the 1:1 scale object and design as an outcome as the endpoint of the design process and allows design-the-verb to have greater prominence.

This thesis examines the role of the model as documentation, not documentation in the way architectural working drawings operate, as displaying Evans's notion of reverse directionality, but rather, the notion of documentation analysing that which exists in some form; that is, the subject-matter preceding the making, in a non-reverse directional way. This moves away from simplistic definitions of models as adhering to either explanatory or exploratory roles, and in doing so, places them within an expanded notion of the design process. In investigating the naming, reading and intention of *post-factum* models of documentation, this thesis proposes that

[112] Evans's notion of reverse directionality was developed from the idea of drawings becoming buildings, that is, two-dimensions moving to three. Although models as representation retain a three-dimensionality, when made to 'get to' a building, they still may be said to display reverse directionality, in that they are projective, towards the design of an, as yet, unbuilt project. In the same way, models as *post factum* documentation are referred to as displaying non-reverse directionality, although they too retain three-dimensionality.

these models have a role within a design process and as a critique of architecture, complementary to the textual critique, that is, to elucidate, narrate and comment, in three-dimensions.

Chapter 2: The *post factum* model at a city scale

Many large cities offer their visitors and inhabitants two versions of the city to experience. There is the full-scale city, able to be walked around and become immersed within. Then there is the three-dimensional scale version, navigated differently, yet travelled over all the same. These city scale models document the urban situation, for viewers to understand the place within which the model resides. By modelling the city at a smaller scale, the city becomes graspable, its entirety able to be walked around, or in some cases, over. The breadth of the metropolis may be seen, replicating a plane trip over the city.

City scale models represent the city in three dimensions. However, many spatial experiences and qualities of the city cannot be recorded in these models, hence highlighting the limits and specificity of this type of representation. The city is portrayed as a cohesive, designed whole: an idealised, unweathered metropolis with definite parameters. The city is seen to develop in staccato-like bursts, jumping from one static instant to another. This representation of surface, time and temporality defines the specificity of these types of models. The city model is the ideal site for exploring the representation and *post factum* documentation of the city.

The Panorama of the City of New York model

The Panorama of the City of New York model, constructed for the 1964/65 World's Fair, held in Flushing Meadow Corona Park, New York and now installed at the Queens Museum of Art (QMA), is an example of a model documenting an existing city[1] (Fig. 1). Robert Moses, the 1964/65 New York World's Fair Corporation president, conceived the idea for the model and hired the firm of Raymond Lester Associates to construct it, at a scale of one inch to one hundred feet, that is, 1:1200 scale.[2]

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[1] Using aerial photographs, street maps and photographs of individual buildings, a team of one hundred people constructed it in 273 sections. At the time of its creation, it was called the 'World's largest scale model', and to this day, it is still the largest architectural model of an urban environment. B Momchedjikova in H Ballon & KT Jackson, *Robert Moses and the modern city: the transformation of New York*, WW Norton & Co., New York, 2007, p. 310. It occupies 9,335 square feet. The base is made of urethane foam mounted on Formica flakeboard framed by pine boards. The buildings are made of wood and plastic, the 35 major bridges are brass, shaped by a unique chemical milling process. Windows are not accurately portrayed on the model, relying instead on standardized stencils. The model took over three years to build, and finally cost $672,662.69, in 1964 U.S. Dollars. The Panorama was expected to accurately duplicate the topography of the New York City area landscape, as well as the exact placement and appearance of all human-made structures. The contract allowed for only a 1 per cent margin of error. Due to size restrictions, the section showing Far Rockaway was never installed. MH Miller, *The panorama of New York City: a history of the world's largest scale model*, Queens Museum, New York, 1990, p. 29, 46.

[2] The New York Panorama model sits within a context of other models, historically, chronologically and physically, of New York City. The 1939 World's Fair Corporation used models both to plan and promote the fair, and included large model exhibits, such as the General Motors' Futurama. Similarly, Lester made other models for the 1964/65 Fair: a large model including the finalized design of each pavilion and seven smaller 'travel' models, used to promote ticket sales. Miller 1990, p. 12.

Figure 1: The Panorama model of New York City, showing the Bronx, looking south toward Manhattan and Queens.

Moses, working in various city and state positions from the 1930s to the 1950s, was the man most responsible for shaping the physical structure of New York[3]; it is perhaps appropriate then, that he orchestrated the model to be built of the city, as it records his influence on the city in representing so many of his projects.[4] Moses altered the shoreline of the city, built freeways, parks, bridges, public housing and civic buildings. Lewis Mumford writes that the influence of Moses on the cities of America was greater than that of any other person.[5] Moses highlighted the modernity, progress and development of the city by locating its skyscrapers and freeways on a scale model.[6]

Moses saw the role of the Panorama model as not just a tribute to the city, recording it as it stood at the time of building, but as a precise, permanent, and utilitarian planning tool, designed as a living model that would change and grow in response to the changes within the city it represents.[7] Lester designed the model so that individual buildings could be easily removed, and roads and highways reworked without excessive cost.[8] According to Marc H. Miller, Moses

[3] RA Caro, *The power broker: Robert Moses and the fall of New York*, Vintage Books, New York, 1975, pp. 5–21.

[4] In his construction of public works, Moses used architectural models as aids in both the planning and promotion of projects. By the 1950s, these models that he commissioned became bigger and more elaborate and it was during this time that he first employed the modelmaking firm of Lester Associates. Lester Associates made the model of the New York Coliseum in 1954, on long-term loan to the QMA, and the Verrazano Narrows Bridge, 1956, two projects orchestrated by Moses. In some ways, the Panorama model is a documentation of Robert Moses' projects, as these are emphasised in the making of it: the bridges, seven of which he had constructed, are the only elements in metal. Parks, another of Moses' interests, are emphasised by the unique device of painting them in an ultra-violet green so they glow through the night cycle. Miller 1990, p. 8, 10, 39.

[5] L Mumford, cited in Caro 1975, p. 12. Moses hoped that the World's Fair would be glamorous and spectacular, resulting in international recognition for himself; according to Caro, he saw parallels between his own career and that of Baron Georges-Eugène Haussmann, and knew that it was the Universal Exposition in Paris in 1867 that gave Haussmann his greatest contemporary glory. Caro 1975, p. 12.

[6] The 1939 New York World's Fair presented the future as an animated model of an American utopia, as it might appear in the year 1960. The next New York World's Fair presented the city as built, as its version of modernity.

[7] Miller 1990, p. 3.

[8] Miller 1990, p. 37.

considered the model to be an ongoing resource for architectural firms, community groups, city agencies and others involved in the growth and management of New York City. The Panorama was to serve as an educational tool for school children as well.[9] The museum continues to strive to fulfil the goal of the Panorama being a 'living model', changing and growing in response to the city itself.[10] However, this intention being achieved is reliant upon the frequency of updates of the model.

The model of the city of London, at New London Architecture, a permanent exhibition space dedicated to the future of the city's architecture, has a similar intention[11] (Fig. 2). This model is constantly updated, incorporating planned proposals within the representation of the existing fabric of the city. This model of London, at a scale of 1:1500, highlights forthcoming major developments that have received planning permission. Both the existing city is documented and its not yet existent intention. The model, therefore, becomes a strange pastiche of the city, being both how the city is, and how it may become. The model, in attempting to acknowledge the changing grain of the city, acknowledges the temporality of the city. The instability of the city is established, as within this context, the existing is read as that which may not always be there.[12]

Figure 2: The model of the city of London, at New London Architecture, looking west, showing east London, docks and City Airport.

Another city's models are more explicit in their function of portraying the existing and proposals. The city of Sydney has two models depicting Sydney. One, at Customs House, Circular Quay, assists visitors to acquaint themselves with the physical layout of the city (Fig. 3). It is able to be walked over and across, displayed below floor level, under glass. Most buildings on

[9] During the 1988/89 school year, 26,000 elementary and high school students visited it. Miller 1990, p. 41.
[10] Miller 1990, p. 3.
[11] A permanent public exhibition at the Building Centre in Bloomsbury, London.
[12] According to Deyan Sudjic, this model reduces a metropolis to a tabletop train set, turning the development process into a spectacle in an attempt to send a political message about the dynamism, far-sightedness and competency of the planners involved. However, according to Sudjic, it is difficult for the viewer to react with anything but 'quiet, fascinated awe.' He writes that it therefore sits between Stalinist instruments of propaganda and doll's houses, mixing the sinister and the winsome. D Sudjic, 'Metropolitan lines', *The Observer*, July 17, 2005.

this model are white, except for those that are well-known or have heritage value. The other model, at Town Hall House, is a planning tool model for proposed developments, showing how change and new developments might be implemented within the existing fabric of the city. The City of Sydney Council requires that models be submitted for this city model, with the proposal's Development Application, at a 1:500 scale.[13] The buildings on this model are colour-coded depending on their planning progress.[14]

Figure 3: Model of the city of Sydney.

By separating the documentation of the existing from that of the planned, an interesting relationship is formed between these models of the same city: one is the precursor to the other. One incorporates the potential for change, and one follows behind those changes, rendering the city finished and *post factum*, emphasised by its under-glass, sealed display.

The London city model and the Sydney city planning tool model display both Evans's definition of reverse directionality and non-reverse directionality. These models attempt to be both a record of the existing and a presentation of its future, achieved due to the frequency of their updates. When the updates are less frequent, the city is depicted differently.

Other city models render the existing in various ways. In presentation models, used for highlighting a new proposal, the context of the existing city is often shown as neutral backdrop, to heighten the proposal's impact. Often this is achieved by representing the city by white

[13] Although some models are made by the City of Sydney Council's model makers. City of Sydney Development 2007, City of Sydney, viewed 31 January 2007, <http://cityofsydney.nsw.gov.au/Development/documents/PhysicalModelSpecificationsV205.pdf>, and in conversation with the City of Sydney modelmaker, August 2006.

[14] The buildings on this model are colour-coded: existing buildings are beige; buildings under construction, red; buildings approved, but not yet under construction, grey; and buildings not yet approved, white. These city scale models came about due to the need for a proposed project's recognition of site, landscape, adjacent buildings and streets, historic context, circulation systems and compatibility with the existing environment.

models, the intention being to show new work within an existing fabric's form.[15] In these types of models, the existing city is made of one material, one colour and monolithic, in contrast to the colour and materiality of the proposal.

This method of modelling can reduce architecture to volume and geometry, and suggest knowledge through an omission of information.[16] Jeremy Levensohn writes:

> As a sales and promotional tool for developers, architects, and urban planners, models represent projects in their idealized state, often in a manipulated context or out of context altogether. The model offers us a Gulliver's view of a Lilliputian world, its seduction of scale reinforcing the sense of our powers to control the environment, whether it be unbroken countryside, a city block or the interior of a room.[17]

These presentation models take on an 'ambassadorial role'.[18] The city is seen in terms of aiding the perception of the proposed development.

Robin Evans, in his discussion of the directionality of architectural drawings, puts forward presentation drawings as an example of a type of drawing that is difficult to classify.[19] The job of presentation drawings is to propagate a completely defined idea, not to test or modify it. In this way they can be classed as records. Yet what they record is not real. Presentation models may be defined the same way.

The models prepared as part of competition submissions (2005) for design ideas for Sydney's East Darling Harbour site are an example of presentation models that show the context of each proposal. The models, due to their sharing of site and brief and scale, invite initial comparisons of content and scheme. But these models, when exhibited separate from the symbiosis of their drawings, invite examination based on other criteria.[20] They may be seen within the realm of modelmaking itself, and it is the representation of the city, the portrayal of the existing, that invites observation.

Some models represented the city as a homogeneous bulk, differentiated by colour and massing, such as the models of Lacoste and Stevenson Architects (Fig. 4) and Karres en Brands,

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[15] Moon writes of the lineage of white models, particularly from plaster models in the nineteenth century; in the twentieth century, many modernists found this to be sympathetic to their aims. K Moon, *Modeling messages: the architect and the model*, Monacelli Press, New York, 2005, p. 129.

[16] G Mack, *Herzog and de Meuron 1978–88*, Birkhäuser Verlag, Basel, 1997, p. 208.

[17] J Levensohn, cited in A Busch, *The art of the architectural model*, Design Press, New York, 1991, p. 27.

[18] Moon 2005, p. 129.

[19] R Evans, 'Architectural projection', in E Blau & E Kaufman (eds) 1989, *Architecture and its image: four centuries of architectural representation: works from the collection of the Canadian Centre for Architecture* exhibition catalogue, Canadian Centre for Architecture, Montreal, MIT Press, Cambridge, Massachusetts Blau & Kaufman 1989, p. 19.

[20] These were exhibited recently, separate from their drawings, in 'Supermodels: an exhibition of space and form in architectural models', Sydney, 2–24 September, 2006.

which represented the city as frosted perspex and black foamcore cardboard, respectively. Other models represented the city as topography, such as the model by Tim Williams, an aerial photograph providing density to the contours (Fig. 5). Others modelled the contours with some significant tall buildings, such as that by TRUC (with Burke, Brito, Hancock and Hewitt). The model of Mackenzie Pronk Architects modelled these tall buildings as having a solid western elevation, open to the north (Fig. 6, 7). Others modelled the buildings' bulk by other modelmaking techniques, such as Woodhead International (with Woodhead Interplan) using horizontal boxboard for the city buildings (Fig. 8).

Figure 4: Lacoste and Stevenson Architects, East Darling Harbour competition model, translucent perspex and vinyl graphics, base dimensions 841 x 594mm.

Figure 5: Tim Williams, East Darling Harbour competition model, cardboard and paper, 840 x 600mm.

Figure 6: Mackenzie Pronk Architects, East Darling Harbour competition model, balsa, part bronzed, 850 x 600mm.

Figure 7: Mackenzie Pronk Architects, East Darling Harbour competition model, detail, balsa, part bronzed, 850 x 600mm.

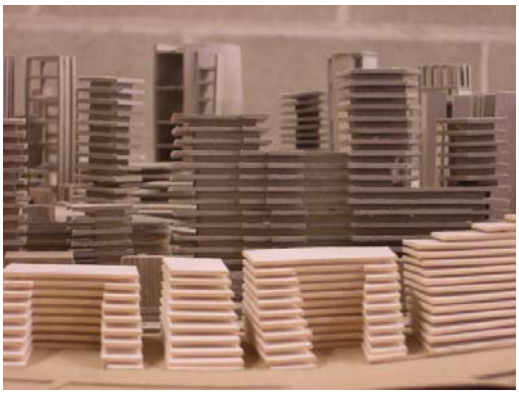

Figure 8: Woodhead International (with Woodhead Interplan), East Darling Harbour competition model, detail, cardboard, foamcore, acetate, 1849 x 595mm.

The city in these models is backdrop, providing separation from the focus of the proposal. The site's boundaries are emphasised, with new relationships extending from those boundaries not shown. These models are not within a context of time passing, they are a moment's imagining of a proposal. The Panorama model has length of time associated with it, existing through decades of the city. But its presence is influenced by the frequency of its updates.

The updates of the Panorama model

The updates of the Panorama model of New York City have been sporadic, and so proposed developments are often excluded from it, and only completed projects are modelled. The Panorama model had complete updates in 1967, 1968, 1969, 1974 and then, after an eighteen year hiatus, in 1992, when 65,000 buildings were replaced.[21] In 2007, the model had a lighting upgrade, including spotlights, a virtual sunrise every hour and the addition of an audio component.[22] Ideally, as buildings were constructed, the QMA hoped that architects and developers would donate models to be included on the Panorama model. However, the rising price of construction of the full-scale version of the building often prevented these contributions.[23]

As it stands in 2007, the Panorama model includes every building constructed before 1992 in all five boroughs[24]; it is a snapshot of a city fifteen years ago. When an update is completed, the model undergoes a dramatic change, then in the space of time until the next update, the model

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[21] In 1989, Abby Bussel wrote, towards the end of that hiatus, that the model was 20,000 buildings behind the times. A Bussel, 'The city that Moses built', *Progressive Architecture*, July, 1989, p. 21. Miller has written that a side effect of the piecemeal fashion in which the Panorama is being updated, is a breakdown in the uniformity of the model's look. Miller 1990, p. 43.

[22] Kilgannon, C 2002, 'On the Town, Sized Down, Jazzed Up', *The New York Times*, viewed 15 August 2007, <http://www.nytimes.com/2002/02/02/arts/design/02pano.html>.

[23] Skidmore, Owings & Merrill, Emery Roth Architects, and Fox & Fowle are among those firms, in 1989, to have promised contributions of models. Bussel 1989, p. 21.

[24] That is, 895,000 buildings. According to Miller, in 1964, the number of buildings was 830,000. The Empire State Building was the largest building in New York City at the time the Panorama was constructed. Miller 1990, p. 46.

Figure 9: Tribute in Light on the Panorama model (2002).

enters a hiatus; it becomes outdated the day after the upgrade is completed. A recent event in New York's history highlights this situation: the Panorama model has not yet incorporated the post-9/11 landscape of the city.

After the World Trade Centre was destroyed on 11 September 2001, twin rays from eighty-eight search-lights in downtown Manhattan, echoing the columns of the Twin Towers, illuminated the night sky for a month after the attacks.[25] This temporary artistic gesture, serving as a monument to those who died in the incident, has become an annual event in New York, mounted each anniversary since, from dusk until dawn.

For the first anniversary of the event, in 2002, the World Trade Centre towers were removed from the Panorama model, and replaced with a version of the Tribute in Light, using lasers to simulate the search lights (Fig. 9). This poignant event in the history of the model, almost mirroring, or re-enacting the original event was created by the artists responsible for the original Tribute in Light, Julian LaVerdiere and Paul Myoda.[26] However, in researching a permanent solution, it was discovered that the lasers needed either a thin mist of moisture or some sort of particulate, such as dust, off which the light could reflect.[27] Either of these options would be detrimental to the model, and hence the Tribute in Light was installed on the Panorama model for only one day. The next day, the Twin Towers were reinstalled and have remained on the model since. Once the new development for the site is built, the museum intends to replace the towers with its miniature version. The towers will then be put in a special display with artists' responses to 9/11.[28]

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[25] Tribute in Light was conceived by architects John Bennett and Gustavo Bonevardi of PROUN Space Studio, architect Richard Nash Gould, and lighting designer Paul Marantz. Productions support was from the Municipal Art Society and CreativeTime, with the assistance of Battery Park City Authority. These lights, on clear nights, can be seen for over 60 miles. Tribute in Light, 2003, CreativeTime Inc., viewed 1 November 2006, <www.tributeinlight.com>.

[26] Queens Museum of Art, New York, no date, viewed 1 November 2006 <http://www.queensmuseum.org/panorama/about.htm>, and David Strauss, Director of Public Relations and Marketing, QMA, email, 23 October 2006.

[27] D Strauss, email, 23 October 2006.

[28] When the Museum removes buildings from the model, most are kept in the Museum's archive or used for educational purposes, such as helping blind museum goers understand the scale of the Panorama. D Strauss, email, 24 October 2006. The potency of the actual buildings of the World Trade Centre has been acknowledged in model form in a project by Douglas Coupland. He included the Twin Towers, with no context, as part of his Super City installation at the Canadian Centre for Architecture. They are shown without their city, painted white, echoing his recollection as a child that everything in the Lego universe was perfect and crisp and antideath. Press release, 'Super City – an installation by Douglas Coupland', 2005, Canadian Centre for Architecture, Montréal, viewed 25 October 2006 <http://www.cca.qc.ca/pages/communique.asp?com=111&lang=eng>.

Figure 10: Commemorative ribbon and spotlight on the World Trade Centre, Panorama model.

In addition to this, the museum temporarily placed a commemorative ribbon and spotlight on the towers, and provided two tall explanatory panels[29] (Fig. 10). The small metal plane landing and taking off from LaGuardia Airport on the model, which had been removed before 9/11 to be repaired, was not replaced for some time.[30] Blagovesta Momchedjikova writes that therefore 'the Panorama was transformed from a model into a memorial, from history into heritage'.[31]

According to David Strauss, the Director of Public Relations and Marketing at the QMA, the museum has been debating the issue of the presence of the Twin Towers on the model since they were destroyed.[32] The model, as it exists, is an historically accurate depiction of New York City in 1992. In removing the towers for one day, then reinstating them, returns the city to its before the event phase. Although their presence on the model now represents a falsehood, they allude to the factual historical literalness of the model. In becoming an historical record of a New York City some fifteen years ago, the model becomes a 'before' version to the full-scale's scarred 'after'.

The limits of these city models in representing certain spatial experiences and qualities of the city allow another version of the city to be shown. The event of 9/11 highlights this. The presence of Ground Zero, as the site of the former World Trade Centre is now known, in the psyche of the residents of New York is strong. The absence of two important buildings on the fabric of Manhattan is a definite phase of the city's history, yet this absence is excluded from the model of the city. But the qualities of the site of Ground Zero allude to more than the absence of the Twin Towers: they refer to how the buildings fell. Adjoining properties were affected by debris and deterioration, and the site below ground was exposed, creating a hole that has connotations of the void. It was not a clean, City-initiated demolition, with the buildings falling vertically. Rather, the site suggests the magnitude and nature of the violence of the buildings' removal. The Panorama model, in contrast, was actually designed to allow for an easy removal of

[29] These were added a week after the first anniversary of 9/11, and were removed in the summer of 2005. Momchedjikova, M, 'The Miniature Metropolis as Memory Palace', PhD thesis, New York University, 2006, n.p.
[30] K Saunders, QMA publicist, email, 29 September 2007.
[31] Momchedjikova cites Barbara Kirshenblatt-Gimblett's *Destination culture: tourism, museums and heritage* in this notion. Momchedjikova 2006, n.p.
[32] D Strauss, email, 26 October 2006.

buildings. There is no distinction made, therefore, between differences in the disappearances of buildings.

A slurry wall at Ground Zero, constructed on bedrock foundations and designed to hold back the Hudson River, survived the events of 9/11. Studio Daniel Libeskind's masterplan proposes that portions of this wall be left exposed, as visitors journey ten metres below ground to a memorial called Reflecting Absence[33] (Fig. 11). Libeskind sees the presence of the wall as demonstrating the monumentality of New York after a terrorist attack. The power of the act of the removal of the Twin Towers to reveal such an element of the site cannot be replicated as a modelmaking act: the existing bedrock that has been exposed will have to be replicated in model form and 'added on'. The notion of the ground plane exposing through scarring is lost with this method.

Figure 11: The proposed inclusion of the slurry wall in Libeskind's Ground Zero Memorial site.

To see the ruins that exist at Ground Zero allows the viewer to reconstruct the buildings by imaginative effort. When the proposed development for the site is finalised and built, and, hence, replicated at scale on the Panorama model, there will be no evidence of that which it replaces. The hiatus of the emptiness of Ground Zero will never have been represented, nor will the palimpsest of collective memory of the city of such an event.

Due to these limitations of representation specific to the model, the event is able to be represented in another way. Combined with the intended strategy of the QMA not to model Ground Zero or the as yet unbuilt proposal[34], the events of 9/11 will therefore be represented by a sequence of states of the Panorama model: as the city is in 1992; the one-day Tribute in Light version; and the post-development form.[35] Therefore, the event is represented by the modelling of each of these phases, that is, the city's development is represented by a succession of models.

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[33] This memorial, the result of an international competition, is to create a quiet, mediative, spiritual space. It is due to be completed in 2013; collaborating architects are Michael Arad and Peter Walker. Studio Daniel Libeskind, 2007, Studio Daniel Libeskind, viewed 9 September 2007, <http://www.daniel-libeskind.com/projects/show-all/memory-foundations>.

[34] D Strauss, email, 26 October 2006.

[35] The intended year of completion is 2013. Studio Daniel Libeskind, 2007, Studio Daniel Libeskind, viewed 9 September 2007, <http://www.daniel-libeskind.com/projects/show-all/memory-foundations>.

The model city, therefore, is in stasis, between each update. However, by modelling the city as a static form allows it to become part of a series, like a set of animation stills. This series of stills then begins to depict movement, similar to the film editing device of the jump cut.[36] The discontinuity displayed in this type of representation serves to accelerate the movement of the city, and highlights the unreality of the model experience, rather than its narrative ability. The jump cut, within film editing, confronts traditional continuity conventions. By emphasising the cuts within a sequence it alludes to the notion of film being cut up bits of imagery, rather than trying to present the film's content by way of 'invisible' editing.[37] In the same way, the Panorama model, does not represent time passing in an 'invisible' seamless way, but rather unconcealed in a fragmented structure.

This device may be used photographically, by taking an image of the city from the same place over a number of years, and then adding them together in a flip book to create a continuous animation. However, unlike a sequence of photographs or a series of film frames, the model does not get remade each time, to sit next to its earlier version. Rather, the next phase of the model is latent within the model itself. The city does not identify where likely alterations will be, it does not record the city as a site for change. In this way, the model and the city operate similarly. The 1992 model version of the city cannot hint at the instability inherent within the miniature skyscrapers at the tip of downtown Manhattan.

Visitors to the 1964/65 World's Fair, before viewing the Panorama model, first saw a model showing New Amsterdam in 1660.[38] With this as context, the Panorama model was seen as another snapshot of the city, 300 years later: the documentation of progress of three centuries, from the city as a trading post on the tip of Manhattan, to a sprawling metropolis.[39] The model continues this premise, with the original model providing the successive versions of the city.

This method of representation operates differently from models that are made in order to be reproduced by another medium. For example, the artist Thomas Demand recreates spaces out of paperboard and then photographs them. The work exists as large-format images, rather than models. This methodology maintains the intention of producing an imitation of the original setting and generating another and different representation.[40]

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[36] This technique was used most notably by Jean-Luc Godard, as part of the French New Wave cinema, where the middle section of a continuous shot is removed and the beginning and the end are joined together. This break in the continuity of time produces an effect in which moving objects appear to jump to a new position.

[37] D Fairservice, *Film editing: history, theory and practice*, Manchester University Press, Manchester, 2001, p. 313.

[38] This model was made in 1931 by Charles S. Capehart, at a scale of 1:300, and is now on display at the Museum of the City of New York.

[39] Miller 1990, p. 16.

[40] 'Thomas Demand: Zeichensaal, Büro', *Lotus*, no 104, 1999, pp. 18–19.

Another model to exist more strongly in photographs is the City of Tomorrow model, created by Norman Bel Geddes, the designer of the 1939 New York World's Fair Futurama model (Fig. 12). Bel Geddes designed the Futurama model, of an American utopia, to be viewed from an exalted viewpoint, simulating the experience of flight. The testing ground for this was in the City of Tomorrow scale model (1936-37) for Shell Oil. This model was conceived as though it were viewed through the camera lens. It was the city's photogenic qualities, as seen from the air, that became the project's overriding consideration.[41] The images, used for a Shell advertisement, depicted the pivotal role of interstate highway systems in the City of Tomorrow.[42] It is the camera's composition that dictates the gaze in this case. The ability for these images to be reproduced removes the emphasis of the power of the original. The Panorama model, by remaining present throughout each upgrade, maintains its objecthood.

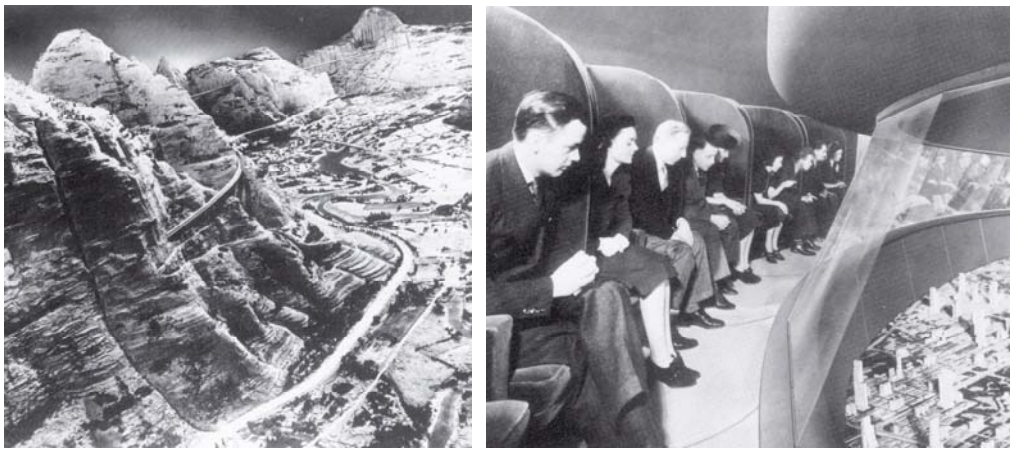

Figure 12: The Futurama model, at the 1939 World's Fair, showing, at left, highways and bridges of tomorrow, and at right, visitors viewing the Futurama from moving seats, at the General Motors' Pavilion (c. 1939).

Other city models are made in order to extract information. The Environmental Simulation Laboratory (ESL) at the University of California at Berkeley, has made a model of the city of San Francisco to attempt to record climate, both by re-creating patterns of sunlight and shadow and by measuring the erratic wind patterns.[43] A computer controlled miniature camera moves along the streets of the model to make films that accurately simulate street level views. Lighting systems duplicate the movement of the sun at all times of the year, showing clearly the shadows new buildings will cast. ESL also built a wind tunnel for models to test how new buildings will

[41] Smoke bombs created the illusion of urban haze as well as clouds. A Morshed, 'The aesthetics of ascension in Norman Bel Geddes's Futurama', *Journal of Society of Architectural Historians*, vol. 63, no. 1, March, 2004, p. 88. Momchedjikova writes that the 'Panorama was the Futurama come true'. Momchedjikova 2006, n.p.

[42] Morshed 2004, p. 87.

[43] Busch 1991, p. 27.

affect wind currents.[44] This model of an existing city tries to record the intangible movements within the city. The data retrieved from the model is the model's representation and, hence, its presence.

Due to its objecthood, the Panorama model operates on two time scales. The first time scale compresses time, similar to photographs taken over many years and collated to form a series. These create movement within the city by compressing time. In displaying a day-night cycle, that allows night to fall every three minutes, the model also compresses time. This is similar to the models of Australian artist Callum Morton. His work explores the event space of models, including the ephemeral life within known architecture. In his work 'Habitat' (2003), he models the housing complex in Montreal by Moshe Safdie. Accompanying the model is a 28-minute sequence of changing lights and sounds, a compressed version of the day, yet giving a sense of duration and time passing.

The Panorama model, however, also represents the city at a real time scale: the changes can only be made when the 1:1 scale version of the city has sufficiently changed. Then it must be static until the city is sufficiently altered to warrant another upgrade. It is an editing jump cut in real time. In this way, the Panorama model maintains its object status, and the original city is implicit within each subsequent version.

The temporality of city models

In order to highlight the specificity of these types of city models, their limits need to be addressed. That which cannot be represented or documented on a model highlights the representation of time and temporality that are shown, specific to these types of models. The representation of time, in rendering the city as staccato-like in its development, is particular to the city model. In representing the temporality of the city, the model also offers the potential to view the city differently from its full-scale version.

The half-built, the untended and unintentional, the falling down and decaying buildings becoming undone are not represented in a model such as the Panorama. The exclusion from the model of other events in New York's history assists in indicating this. In the mid-1960s to the mid-1970s a wave of arson attacks destroyed nearly half the buildings in South Bronx.[45] Yet such a transformation of decay to a neighbourhood is not represented on the model.

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[44] Miller 1990, p. 40.

[45] The power of these events and their presence in the memory of the city is shown by the collective understanding of the phrase 'the Bronx is burning'. This was used in 1974 by Howard Cosell, the sports commentator, as the cameras picked up the smoke of burning buildings close to Yankee Stadium, in South Bronx, and has entered the language of the city. According to Kenneth T Jackson, the neighbourhood just east of Crotona Park, once enlivened by thousands of Jewish and Italian residents, Charlotte Street became an international symbol of abandonment and ruin. Ballon & Jackson, p. 68. Robert Moses' urban renewal projects such as the Cross-Bronx

On the Panorama model, an empty building looks the same as that which is occupied. These types of models cannot show time and palimpsest, the age and decay and weathering that the city and its buildings experience, or how their landscape changes. Akiko Busch, in her book *The Art of the Architectural Model*, has written of this general quality of models, that the buildings are 'stilled, pristine. They bear no vestiges of time and weather. They are untouched by the gritty substances of urban life.'[46] Busch concludes that it is the nature of models to remove architecture from its context. However, in excluding the act of palimpsest and aging from city models, they are able to depict other qualities of the city, and, hence, other contexts. By referring to another exclusion from the city model, this may be explored in more depth.

Terrain vague and the city model

Ignasi de Solà-Morales writes of the empty, abandoned space within a city, in which a series of occurrences have taken place.[47] He denotes these spaces by the French expression *terrain vague*. He defines the term *terrain* as connoting a more urban quality than the English word 'land'; *terrain* refers to 'the physical idea of a portion of land in its potentially exploitable state but already possessing some definition to which we are external'.[48] The French *vague* has come to mean empty and unoccupied yet also free, available and unengaged. According to Solà-Morales, it is the relationship between the absence of use and activity with a sense of freedom and expectancy, a void coupled with latent possibility, that is fundamental to understanding the evocative potential of the city's *terrains vagues*.[49] Ground Zero has become an area of *terrain vague* within the city of New York. It adheres to Solà-Morales's definition of a tract of land that is unoccupied yet has latent possibilities.

The inherent indefiniteness, instability and fluctuation of these types of spaces are not conducive to precise architectural representations. According to Solà-Morales, *terrains vagues* seem to subjugate the eye of the modern photographer, who has captured the condition of these spaces as internal to the city yet external to its use.[50] In other representations, however, these spaces are absent.

Expressway and the demolition of existing low density neighbourhoods is attributed to partly contributing to these arson attacks, an influence of Moses upon the city that is excluded from the model.

[46] Busch 1991, p. 27.

[47] I de Solà-Morales Rubió, '*Terrain vague*', in CC Davidson (ed.), *Anyplace*, MIT Press, Cambridge, Massachusetts, 1995, pp. 118–123.

[48] Solà-Morales Rubió, in Davidson 1995, p. 119.

[49] Solà-Morales Rubió, in Davidson 1995, p. 119–120.

[50] Solà-Morales gives the examples of the photographers John Davies, David Plowden, Thomas Struth, Jannes Linders, Manolo Laguillo and Olivio Barbieri. Solà-Morales Rubió, in Davidson 1995, p. 120.

Solà-Morales's essay is concerned with how architecture can act in the *terrain vague* without becoming an 'aggressive instrument of power and abstract reason'.[51] The individual, he reasons, looks for forces rather than forms, yet architecture's destiny is concerned with colonisation, and the imposing of limits, order and form, that is, an instrument of organization, rationalism and productive efficiency. This then results in the desire to transform the fallow into the productive, the void into the built, that is, the violent transformation of estrangement into citizenship in the name of efficacy.[52] The same could be said of the aim of architecture's representation: with this concept of architecture, 'blank' spaces do not model well.

The white space within a drawing may be interpreted as sparseness, or as the manifestation of the drawing's abstraction. The Panorama model, however, does not have an analogy for such white space. Melbourne landscape architect Kirsten Bauer has investigated spaces of *terrain vague*, and their representation.[53] According to Bauer, 'absence' as a design strategy needs the deliberate use of an already abstracting representation, an in-built void mechanism, that allows a strategic editing of information, of 'things'.[54] Bauer refers to these graphics, that eradicate processes from their representation, as 'smoothing over' graphics. Maps within street directories are just such a graphic, she argues, with the white areas the undetermined areas. She reasons that these media allow the 'absence' within *terrain vague* sites to stay within the design process, rather than 'loading' the site with an additive accumulation.

City models however, ask for seamless, designed areas. The undesigned is hard to document, with the exception of 'nature'. *Terrains vagues* are often represented as examples of a 'before/after': identified as areas that should be 'filled in' with a 'better' version.[55] This is the treatment Ground Zero will have on the Panorama model: the 1992 'before' version and then

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[51] Solà-Morales Rubió, in Davidson 1995, p. 123.

[52] 'When architecture and urban design project their desire onto a vacant space, a *terrain vague*, they seem incapable of doing anything other than introducing violent transformations, changing estrangement into citizenship, and striving at all costs to dissolve the uncontaminated magic of the obsolete in the realism of the efficacy. To employ a terminology current in the aesthetics underlying Gilles Deleuze's thinking, architecture is forever on the side of forms, of the distant, of the optical and the figurative, while the divided individual of the contemporary city looks for forces instead of forms, for the incorporated instead of the distant, for the haptic instead of the optic, the rhizomatic instead of the figurative.' Solà-Morales Rubió, 1995, p. 122–123. Elizabeth Meyer outlines the notion that landscape is defined by what architecture is not, landscape having no order other than the complement to architecture. The goal, she writes, 'is to allow landscape architecture to speak, to articulate a language which eschews binaries and operates in the spaces between the boundaries of culture and nature, man and woman, architecture and landscape.' EK Meyers, 'Landscape architecture as modern other and postmodern ground', in H Edquist & V Bird (eds), *The culture of landscape architecture*, Edge Publishing Committee, Melbourne, 1994, pp. 13–34.

[53] This was part of Bauer's Master of Landscape Architecture (by design project) at RMIT.

[54] K Bauer, '*Terrain vague*: a Melbourne conversation', *Kerb Journal of Landscape Architecture*, no. 3, 1996, p. 28.

[55] This idea is reiterated in a comment by Leon van Schaik, cited by Peter Connolly in his response to Solà-Morales's essay. Van Schaik was referring to a number of recent landscape architectural competition entries: 'Landscape architects tend to want to fill up their designs and sites with all manner of "things" … as if the competition sites were lacking something, or that no-thing is there until some-thing is put there.' P Connolly, 'T.V. guide: some footnotes to Morales's notion of *Terrain vague*', *Kerb Journal of Landscape Architecture*, no. 3, 1996, p. 23.

the post-development 'after' version. In omitting a site's fallow time, the city maintains cohesion. By the World Trade Centre remaining on the model, the legacy of a unified urbanscape is maintained. The city's present relationships with Ground Zero are overlooked, with the emphasis on the city as developed, not the city as having in-between development states.

The limits of representation inherent within the Panorama model insist that it exclude the temporary, the changing and the indeterminate, in addition to the *terrain vague*. The Panorama model does not represent demolition, dereliction, ruin or incompleteness. Hence, the city is represented in a particular way and the viewers' perception of the city is one of a planned, designed destiny. Each city block has a definite parameter, every square metre seems to be accounted for and determined. All the buildings are 'completed', so the city has a 'finished' look. Due to its objecthood, the model of a city has a sense of closure to it. The Panorama model demands design and intention, as this is what it models.

In representing the city at an instant, and then, after another update, jumping to another instant, renders the city both finished and suspended in time. It is this particular quality of models, that is, representing time as a series of moments, that contributes to the specificity of models. This offers an alternative to the predominance of photography as the dominant visual experience of the city. The city model is different from the manipulative composition and framing of architecture that the privilege of photography offers. The gaze is not constructed. At a city scale, there is a quiescence to the model. Rather than attempting to capture the flurry within urbanity, these city models present the city as stilled, inert and dormant. In representing the city in this way, a lull is provided, fostering a steadiness of gaze: a pause is created, within which to examine the city.[56] It is in this examination of the city, the act of gazing at the model as object, that identifies further specificity of the city model and relationships to other representations are possible.

The objecthood of the city model

The physical size of city models involves issues of how the viewer moves around, or over them in order to view their enormity. To view the Panorama model during the World's Fair, visitors took an eight-minute sky-ride, during which visitors slowly circled its over 150M periphery in railcars and listened to Lowell Thomas's recorded narration. Billed as a 'helicopter

[56] Novelist Lionel Shriver writes of this notion of pause within the city, in reference to a character's reaction to 9/11: 'For she ordinarily took for granted the architecture of her personal life, even more so did she take for granted the literal architecture of the city from which she hailed. Granted, history lends itself to the conclusion that pause is rare, that any respite is as merciful as it's bound to be brief, that the very nature of existence is unstable and it is therefore best to be prepared for just about any catastrophe lurking right around the corner on any arbitrary morning. Thus the only real surprise should be those single sunny awakenings on which there is no surprise.' L Shriver, *The post-birthday world*, Fourth Estate, London, 2007, p. 448.

trip' around the city, the ride simulated views from 90 to 600M.[57] Such a vantage point is unusual for any visitor to a city. It accentuates the scale differences between the real city and its model, and heightens the graspable nature of the model.[58] Adnan Morshed, in describing the aerial viewing technique of the Futurama model at the 1939 New York World's Fair, writes that this view reveals the presence of early twentieth century modernist visuality.[59] Morshed uses the term 'aesthetics of ascension' to describe the modernist logic that if the viewer saw the total picture, with all its linkages and relationships, then a new understanding of ordering and disciplining the picture could occur.[60] The model's spectator, therefore, was capable of reaching both the literal and conceptual vantage from which to envision utopia.[61]

One's enchantment with the miniature stems from the sense of power that it instils in the viewer.[62] Since it is easily manoeuvred and manipulated, the miniature grants the viewer a sense of authority. Further to this, when the miniature is observed, the viewer is engaged in a private closeness, leading to an implicit intimacy.[63] Due to this, models create qualities of the giant in the viewer, leading to exclusion and distance.[64] The city model, while allowing the viewer to read the city in an intimate way, excludes the viewer from the experience of being within the city. Yet this distance provides a reading of the model that creates similarities with other forms of representation.

In making the city comprehensible, this view of the city is different from the one most experience, either walking within it or viewing it through a window. Susan Stewart has written that such a view is 'within a definite frame and limited perspective, mediated and refracted through the glass of the city's abstraction of experience'.[65] This view from above, as one experiences viewing a model, 'remains a view from elsewhere, a view which in making the city

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[57] This is similar to the technique of viewing the Futurama model at the 1939 New York World's Fair. This was an eighteen-minute ride on a suspended, winding conveyor belt that simulated the experience of flight. According to Adnan Morshed, '*how* the future was seen had become as appealing as *what* was seen in it.' A Morshed, 'The aesthetics of ascension in Norman Bel Geddes's Futurama', *Journal of Society of Architectural Historians*, vol. 63, no. 1, March, 2004, p. 77. The Panorama sky-ride was replaced in the early 1990s, by New York City-based architect Rafael Viñoly, with a sky-walk around the periphery. Ballon & Jackson, p. 310.

[58] Morris writes that the miniature offers 'instant totality'; the city is able to be grasped not by breaking it down into parts, but seeing the whole. Morris 2006, p. 11.

[59] A Morshed 2004, 'The Aesthetics of Ascension in Norman Bel Geddes's Futurama', *Journal of Society of Architectural Historians*, vol. 63, no. 1, March, p. 77.

[60] Morshed 2004, p. 77.

[61] Morshed 2004, p. 78.

[62] Busch 1991, p. 11. Bel Geddes, when working on the Futurama project, wrote of the quasi-divine experience of 'walking around with pockets and hands full of skyscrapers'. Morshed 2004, p. 89.

[63] Busch 1991, p. 11.

[64] S Stewart, *On longing: narratives of the miniature, the gigantic, the souvenir, the collection*, Duke University Press, Durham, 1993, p. 70. Other examples of scale models include members of the International Association of Miniature Parks, such as Mini Israel, Madurodam, in the Netherlands (scale 1:25), and Bekonscot, in England. Visitors walk among these models, breaking down the cohesion of the scale. Although the viewer is 'within' the model, they are still excluded due to their giant-like presence being emphasised.

[65] Stewart 1993, p. 79.

other must correspondingly employ metaphors of otherness'.[66] Hence, the city model is removed from the city inhabitant's experience, yet in doing so, offers the representation of that which is familiar, to the inhabitant of the city, or that which is becoming familiar, to the visitor. Viewing the miniature city, within that city itself, offers the opportunity for a reflection on the familiar. A similar idea is offered by the novelist Margaret Atwood, who has written that maps 'contain the ground that contains them.'[67] City models also contain the ground that contains them; the viewer is able to trace their journey to visit the model, on the model itself.

This situation allows a relationship between the city's model and its maps to develop. Robert Harbison writes that from cities in the physical realm to cities on maps is a path of increasing conceptualisation.[68] However, to turn the map upside down changes this pure conceptualisation into an illusion, a picture. The view is just as authentic yet its meanings have shifted. According to Harbison, the map operates by reinforcing the sense of where the viewer is, in relation to all else, as though the viewer is always standing like a statue, facing the same way.[69] City models, having the ability to be walked around, do not have a map's 'top' and 'bottom' to their reading, as Harbison describes. However, models exist in relation to their symbiotic city maps, which are no doubt more familiar to the viewer. Hence, the model is perhaps read with the same orientation in mind as its map, with north pointing 'upwards'. Maps, therefore, have a strong relationship to the city model and become the mediator between the city and its model.

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[66] Stewart 1993, p. 79.

[67] M Atwood, *The robber bride*, Virago Press, London, 1994, p. 557. Equally, on the Panorama is a version of the QMA itself, and 'as your gaze sweeps across the whole of the city it can pause at the museum and watch itself in a moment of solipsism'. M Meis, 'Devils work: secret doings at the Queens Museum of Art', *Harper's Magazine*, April, 2004, p. 65.

[68] 'The mind's miniatures: maps', in R Harbison, *Eccentric spaces*, André Deutsch, London, 1977, pp. 124–39.

[69] 'Maps sedulously reinforce and protect our sense of where we are, a sense which can be very elaborate without being deliberately worked out, and which we can derange artificiality by obliterating the reference point east or west to which we habitually look.' Harbison 1977, p. 124.

Harbison writes that since the system of roads is often emphasised, maps may be seen as documenting the paths of routes taken.[70] But while documenting the familiar, maps must also contain the unknown, for them to be interesting to 'read'.[71] As a city becomes more familiar, this balance of the known with the unknown shifts, and one's relationship with the map of the city is the proof of this: '[m]aps of places becoming familiar are records of learning and proving grounds for it'.[72] One gains a certain map knowledge. City models operate similarly, and one gains a model knowledge. This comes about by living within the city and travelling within it. Therefore, the place is thought of mainly as a surface.[73]

Figure 13: Photograph taken on the Panorama model for an 'I Love a Clean New York' advertisement (c. 1970.)

The familiarity that the Panorama model elicits within viewers results in the model gaining a presence in itself. It has become the city's metaphor. In the 1970s, an advertisement appeared, with a woman sweeping the Panorama with a broom, to promote a 'Keep New York Clean' campaign[74] (Fig. 13). New York City Mayor Edward I. Koch once used the Panorama to trace the route of the New York marathon in a television promotion, emphasising the notion of the viewer travelling over the surface of the representation.[75]

The model, therefore, develops a relationship with its containment: both with the QMA and with the city itself. This is demonstrated in the work of the members of Flux Factory, an artists' collective in Queens, New York who occupied the museum daily for three months, in order to create an *in situ* work for the Queens International exhibition. On day eighty-eight, they

[70] An analogy between maps and models is possible: 'Maps simplify the world somewhat in the way a heavy snowfall does, give the sense of starting over, clarify for those overstimulated by the ordinary confusion. Each path in the snow shows, the ground keeps a record but also makes one feel there is a manageable amount going on.' Harbison 1977, p. 127.

[71] 'All maps are abbreviated places … The better we know a place the less we want it reduced, because to stay interesting a map must contain many things we do not know with some we do, and will bore us simply as a reminder … It is very satisfactory to see the little slice we know pillowed in the surrounding unknown. Though it might be diverting to have a map that materialized as we learned the places, we would miss the pleasure of keeping track of what we do not know.' Harbison 1977, p. 133.

[72] Harbison 1977, p. 133.

[73] Harbison 1977, p. 128.

[74] Miller 1990, p. 43.

[75] Miller 1990, p. 41.

discovered how to get under and onto the Panorama.[76] Onto the Panorama, Jean Barberis placed a model, by one of the artists John Norwood, on the spot in Queens where Norwood has his studio. In the act of placing this new building, Barberis spontaneously took one of the modelled boats from the Hudson River. That evening as they drove to the West Side of upper Manhattan, a video was taken of the boat traversing the streets and bridges along the way. The boat is then returned to the actual Hudson River, at about the spot where it was removed from the model. On the side of it Barberis wrote 'If found, please return to the Queens Museum of Art'.[77] The Panorama exists within the 1:1 city, and by this act, is released into that city.

The representation of the city as surface is reinforced by the depiction, on the Panorama model, of the city as a seamless, designed entity. When represented as a surface, the city is seen as possessing a holistic organisational pattern. The wordlessness of models, compared to a map's evocative, unfamiliar placenames, promotes the search for the familiar.[78] According to Harbison, the prominence of roads on maps alludes to journeys, and so the viewer of the map is involved in an imaginary traversing over the page. This places the maps' context within that of future travel and, hence, foreignness. Maps may reside folded in a drawer, with disparate cities sitting on top of one other. The Panorama model needs no unfurling, and it is viewed within the city it depicts, that is, the full-scale holds the miniature within it. Hence, the gaze of the viewer is encouraged to travel over the model, similar to one's journey over the city. Therefore, the city, represented in this way, is read as the place over whose surface one traverses. The static representation of the city has within it the potential motion of the viewer.

The notion of the city as surface is explored in the models of Studio Daniel Libeskind. However, it is not the physical city that is represented, but rather the intellectual context of the architect's philosophy that is shown. The site model for the Potsdamer Platz project (1991) is built from distinct segment blocks, which represent his image of the city, splintered by disparate 'muse lines' that traverse the geography of Potsdamer Platz, as well as the topology of Berlin's culture[79] (Fig. 14). The model's detachable pieces interlock as in a jigsaw, representing symbolic fragments of memory in a literal rendition of his concept of site-as-puzzle.[80] This model presents

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[76] A 'transgression of the highest order. If there is one thing at the museum that verges on the sacred it is the Panorama.' Meis 2004, p. 70. Six days earlier, the group entered themselves retroactively into history, by altering the circular model of the World's Fair that sits just outside the entrance to the Panorama. Onto this they placed a modelled version of the Flux Factory pavilion. Meis 2004, p. 70.

[77] 'At first the boat just bobs along. Then it catches a current and disappears north along the Hudson. Maybe one day it will be found.' Meis 2004, p. 71.

[78] Harbison compares the relationship of wordless photographs of the earth taken from the Gemini space capsule to maps, as being similar to the relationship of early photographs to painting, and show that maps are more than representation. Harbison 1977, p. 125.

[79] D Libeskind, *El croquis editorial 80: Daniel Libeskind, 1987–1996,* Madrid, 1996, p. 76.

[80] Moon 2005, p. 97.

the surrounds as having an absence of scale. The materiality of the context has connections well beyond the site's boundaries.

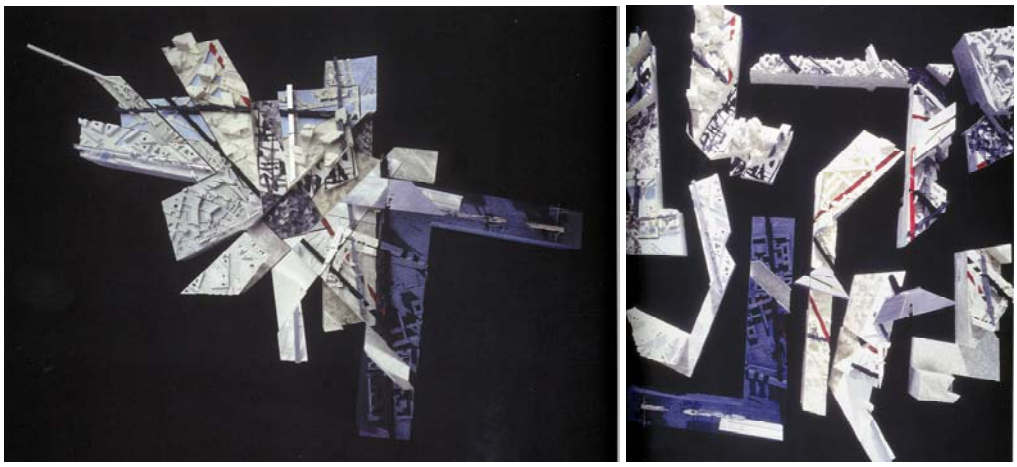

Figure 14: Studio Daniel Libeskind, Potsdamer Platz project, Berlin, Germany (1991). Model assembled and disassembled.

On the base of Libeskind's model for the Extension of the Berlin Museum (with the Jewish Museum Department, 1989–1999) are the names of German Holocaust victims. It is these people, named on the actual model, whose history is interpreted in the museum (Fig. 15). In this way, Libeskind is documenting the intellectual placement of the physical museum, but also the origins of his content.

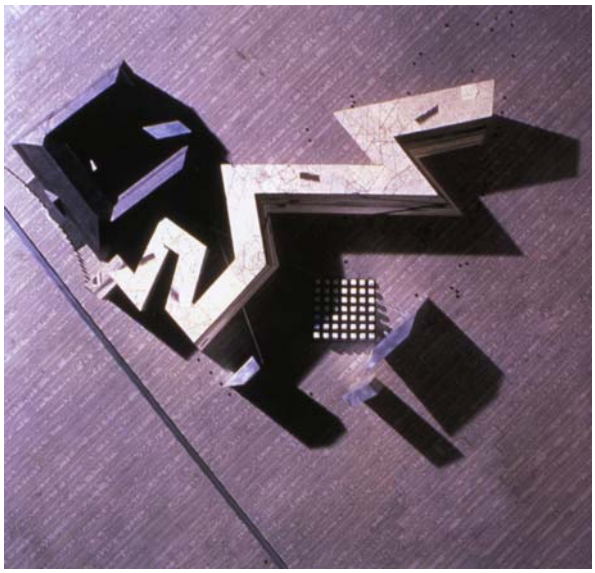

Figure 15: Studio Daniel Libeskind, extension of the Berlin Museum with the Jewish Museum Department, Germany (1989–1999). Model, printed paper and wood, 1989.

In Libeskind's work, the city as surface is one that the viewer may not physically walk over, yet must travel over in order to understand the intellectual, conceptual or mythic origins of the architecture. These models make visible the invisible. The model takes on the role of being a personal record of, and response to, site analysis. It is not just the visual object that is used for comment, but the technique of modelmaking itself.[81] By showing the reading of place and intellectual context, these models

[81] For example, Libeskind's models use surfaces of collages of significant printed fragments. Layered applications were used in the early twentieth century, with models constructed from blueprints, as recommended by a writer in *Architecture* in 1926. In the seventeenth century, on a pasteboard and paper model of University College at Oxford, drawings were made on paper and then attached to the rough model surface. Moon 2005, p. 177.

offer the manifestation of the origins of the thinking behind the proposal; both reflection and proposal are offered. Since design intentions come about through interpretations, these are models of interpretations, which are subjective more than documentary. However, since it is not the personal route of the viewer that is able to be mapped on these models, they depict a less intimate city.

The Panorama of the City of New York model is an example of *post factum* documentation of the city. The particularities of this type of representation allow certain qualities of the city to be shown, different from the full-scale version. Between each update of the model, the city is in stasis. The city is then represented as a series of moments in a sequence of the model. This succession of states holds the next, latent within it. The city is stilled in this pause that the model offers. The representation of the temporality of the city, as shown on the Panorama model, does not render spaces of indefiniteness, instability, fluctuation or the *terrain vague*. Instead, the city model renders the city as a seamless entity, without fallow sites. This objecthood has a sense of finish and closure to it, as a city of a designed destiny. The city as surface that one's gaze travels over is offered by these city models. This traversing contains the inherent movement of the viewer, and an inhabitation of the model occurs. The Panorama model offers a site for reflection on the city. This is not a neutral documentation, but a representation that offers an alternate view of the city, and one that influences designs for the architecture of the city.

Chapter 3: The full-scale *post factum* model

The use of the full-scale model by designers to assist in the development of a project has a long history. There is evidence of the importance to Greek architecture of *paradeigma*, full-scale specimens of detailed building components, such as capitals, made of wood, stucco or clay.[1] From these mock-ups, repetition from replicas could be achieved without the need for scaling up or conversions, as builders could extract detailed dimensions with callipers.[2] There was a brief revival of the full-scale model tradition in the twentieth century. For example, Charles McKim had a significant part of the corner of the Public Library in Boston erected at full-scale as an on-site model and Ludwig Mies van der Rohe had a full-size model of canvas stretched over a wooden frame constructed of the Kröller-Müller House in Wassenaar, the Netherlands.[3]

However, these examples are usually only sections of the proposed building, or temporary mock-ups. Also, they are all models to 'get to' a building, made in order to clarify a design for a project. The example of the reconstruction of Mies van der Rohe's German Pavilion, designed for the 1928/29 International Exposition in Barcelona (referred to as the Barcelona Pavilion), nearly sixty years after the original was dismantled, is a different situation. The reconstruction of this pavilion can be seen as a full-scale *post factum* model, which explores issues of the original, the replica and authentic representation. Naming the reconstructed building a *post factum* model shifts the reading of the process by which it was recreated, and recasts the intervening representation of the 1929 pavilion. This examination of the full-scale *post factum* model allows for a redefinition of the model and acknowledges the limits, specificity and design that are present within representation.

The Barcelona Pavilion

Barcelona hosted the Universal Exposition of 1888 and its positive contributions to the city created a desire to host another, grander exhibition. In 1914, a committee of politicians and industrialists took the initiative of announcing a new exhibition. Due to World War I, it was postponed for many years. The Exposition Management Committee adopted the system of a series of independent buildings devoted to different branches of production, such as steelmaking, transport, and agriculture, as well as national pavilions. The initial response from

[1] JJ Coulton, *Greek architects at work: problems of structure and design*, Granada, London, 1977, p. 55–8.
[2] T Porter & J Neale, *Architectural supermodels*, Architectural Press, Oxford, 2000, p. 3.
[3] Also the architects Raubin, Kellogg and Crane had a full-size model of one and a half bays of the Department of Agriculture Building erected on-site in 1905 on the Mall in Washington, D.C.; Carrère and Hastings carried out a similar operation in New York to assess the firm's design for the Public Library in 1902. Also IM Pei sketched out, *in situ*, a full-scale, metal frame model for the planned glass pyramid extension to the Louvre. K Moon, *Modeling messages: the architect and the model*, Monacelli Press, New York, 2005, p. 57, 59; see also chapter 3, 'A question of scale' for more twentieth century full-scale model examples.

Germany for this was negative, with the agreement between the German and Spanish authorities only being reached less than one year before the day of opening.[4] The German authorities gave Mies van der Rohe the responsibility for the setting up of the physical fabric of the German Exposition building, which was referred to as a *Raumsraëpresentation*[5], that is, a space freed of any practical use for exhibition and intended purely for official functions.

The process of designing and building the pavilion was subject to much pressure, haste and last-minute change. Mies van der Rohe made frequent trips to Barcelona, and was instrumental in shifting the location of the planned pavilion. The Barcelona International Exposition was inaugurated by King Alfonso XII on 19 May 1929; Germany inaugurated its pavilion a week later.[6]

After the exposition, in early 1930, questions were raised as to the future of the building.[7] Eventually it was decided to dismantle the pavilion. Demolition began in January 1930, seven months after its opening. The materials were sold, to try to offset the deficit created by the pavilion. The foundations were covered over by a modest garden with palm trees.[8] However, the status of the pavilion did not suffer from its non-existence; it was seen as a masterpiece, by many who had never seen it.[9]

The pavilion received modest coverage in the press, according to Juan Pablo Bonta[10], however, Ignasi de Solà-Morales, Cristian Cirici and Fernando Ramos in their book, *Mies van der Rohe: Barcelona Pavilion*, cite references to laudatory texts refuting this.[11] The pavilion, between its being dismantled and its resurrection, existed in the form of black and white photographs, the

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[4] I de Solà-Morales, C Cirici & F Ramos, *Mies van der Rohe: Barcelona Pavilion*, Gustavo Gili, Barcelona, 1993, p. 7. For a study of the Barcelona International Exposition of 1929, see I de Solà-Morales, '*L'Exposició International de Barcelona 1914–1929', Arquitectura i Ciutat*, Barcelona, 1985, cited in Solà-Morales, Cirici & Ramos 1993, p. 7.

[5] According to Dodds, Mies titled the pavilion '*Repräsentationspavillon*'. G Dodds, *Building desire: on the Barcelona Pavilion*, Routledge, London, 2005, p. 3. The pavilion had the specific, honorific function of a chamber for the reception of the Spanish king and queen by the German ambassador; Curtis names it a '*Repräsentationsraum*'. The pavilion had the ambassadorial function to represent the cultural values of a new Germany eager to distance itself from its imperialist past. The Weimar Republic wished to 'project an image of openness, liberality, modernity, and internationalism.' WJR Curtis, *Modern architecture since 1900*, Phaidon Press, London, 1996, p. 270–1.

[6] According to Solà-Morales et al, there is much anecdotal evidence as to the hasty completion and the fragile state in which the building was opened. Solà-Morales, Cirici & Ramos 1993, p. 20.

[7] One option was to sell it. Schools warehouses and homes were the final destiny of the pavilions of Sweden, Denmark, Belgium. At one stage, German authorities were negotiating with a Barcelona businessman interested in turning it into a restaurant. Solà-Morales, Cirici & Ramos 1993, p. 21.

[8] The metal structure from one of the ottoman stools supported a slab of marble to provide an occasional table in Mies van der Rohe's apartment in Chicago. Philip Johnson acquired one of the armchairs. Solà-Morales, Cirici & Ramos 1993, p. 21.

[9] For example, Colin Rowe, according to Dodds, placed the pavilion, which he knew solely from photographs and drawings, among the International Style exemplars of the 1920s. Dodds 2005, p. 144.

[10] JP Bonta, *Architecture and its interpretations*, Lund Humphries, London, 1979, p. 218. Beatriz Colomina writes that the pavilion was seen by so few people because of limited travel in 1929. B Colomina (guest ed.), J Ockman (ed.), *Architectureproduction, revisions 2*, Princeton University Press, New Jersey, 1988, p. 18. The opening of the pavilion a full week after the exposition's official opening may have contributed to this also.

[11] Solà-Morales, Cirici & Ramos 1993, p. 12, note 15.

Berliner Bild-Bericht master prints from Mies van der Rohe's personal collection. According to George Dodds, these are the most historically significant and immutable extant documents of the pavilion.[12] The fame of these sixteen prints, representing fourteen distinct views, pre-date any publication of Mies van der Rohe's drawings of the building.[13] According to Dodds, they are more important than any surviving drawings and more illuminating than Mies van der Rohe's comments.[14] In the absence of the Barcelona Pavilion, these photographs had 'become' the pavilion, and when the pavilion was reconstructed, the reading of them shifted.

The reconstructed pavilion

A plan to rebuild the Barcelona Pavilion was suggested as early as 1959. Mies van der Rohe agreed to be part of this restoration plan, but due to a lack of support from official bodies, it was never carried out. In 1974, Fernando Ramos organised a seminar at Escola Tèconica Superior d'Arquitectura de Barcelona to study the pavilion's construction problems. This then led to an exhibition in 1979, for the fiftieth anniversary of the pavilion, organised by Ludwig Glaeser, as director of the Mies van der Rohe Archive. This was a first attempt at compiling information, including graphic, written and direct testimony, about the pavilion. According to Solà-Morales, Cirici and Ramos it was only at the start of the 1980s, with the imminent celebration of the centenary of Mies's birth, that the inventory of sources and comparative study of data resulted in a more precise understanding of what the building had been.[15] In 1981 Oriol Bohigas, on being appointed to the position of director of Urbanism and Building by Barcelona City Council, revived the initiative of twenty-two years earlier, to reconstruct the pavilion. Solà-Morales, Cirici and Ramos were commissioned to produce a scheme that was finally built.[16] The reconstruction of the pavilion was inaugurated in 1986.

In undertaking the reconstruction of the Barcelona Pavilion, Solà-Morales, Cirici and Ramos encountered an early problem: the plans published up to then by biographers and scholars of Mies van der Rohe contained significant differences in dimensions and detailing. The Civil War in Spain and the Second World War in Germany affected many individuals and institutions that had been responsible for the production and administration of the pavilion.[17] The pavilion was recreated through drawings, by Werner Blaser in 1964, in Mies van der Rohe's Chicago office,

[12] See Dodds 2005, p. 8–9, 47–8, note 3 for a detailed account of these photographs.
[13] Dodds 2005, p. 53, note 31.
[14] Dodds 2005, p. 9. Also: 'Seventy-five years of unabated publication and speculation have transformed its photographic images from that of a temporary building representing the possible into a permanent cultural icon demonstrating the probable.' Dodds 2005, p. 5.

[15] Solà-Morales, Cirici & Ramos 1993, p. 6.
[16] Solà-Morales, Cirici & Ramos 1993, p. 26.
[17] Solà-Morales, Cirici & Ramos 1993, p. 6.

under Mies's supervision.[18] However, these drawings do not reproduce with complete fidelity the reality of the building constructed in 1929.[19] The inaccuracies were less of a concern for Mies van der Rohe; the drawings are more about corresponding with his ideal of the plan. If the image reproduced his idea, then for Mies it was true.[20] The process of designing and building the original pavilion was subject to so much change that it would be misleading to speak of any definitive state of the pavilion, whether as a drawing on paper showing how the building was intended to be, or even for the finished building, in the sense of its definitive physical materialisation.[21] The approach of Solà-Morales, Cirici and Ramos was to recreate something of the process, by which the solution was ultimately adopted and constructed, giving a physical form and a precise definition.[22] It proved necessary for them to reconstruct the entire process, beginning with the successive versions of the pavilion in the plans in the possession of the various centres of documentation.[23]

Architectural documentation is undertaken in order to 'get to' a building, that is, to envisage an imagined building. Working drawings are a tangible representation of an object that has no tangible existence. They represent that which is to be built. Therefore, the building comes into being via this set of drawings. Although originally drawn to act as a manual for constructing the building, working drawings can potentially be reused, to construct the building again. This is similar to taking multiple prints from film negatives. However, in the case of the Barcelona Pavilion, comprehensive documentation of this type did not exist, and the drawings made afterwards were not an accurate documentation of the building that was built.

This highlights the relationship between the intention and the tangible that is present, yet not clarified, in architectural documentation. Working drawings, produced before the project has been built, have an inherent quality of intention, that is, display Robin Evans's notion of reverse directionality. During the building process, when decisions, and hence changes to the building are made on site, the drawings are amended to record that which has been built. At this moment, a subtle shift occurs in the role of the drawings: they become a response to the tangible. These drawings 'mediate these retrospective and prospective temporalities, condensing into the present the possibilities of past and future'.[24] When these drawings are produced after the project is

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[18] C Hirsch (ed.), *Mies van der Rohe: the art of the structure*, Buenos Aires, 1965 and Dodds 2005, p. 129.

[19] A second attempt at redrawing was undertaken by Dr Ruegenberg. These are more a personal proposal of a new way of constructing the building than a faithful description of the material characteristics of the building as actually constructed. Solà-Morales, Cirici & Ramos 1993, p. 6.

[20] Dodds 2005, p. 129.

[21] Solà-Morales, Cirici & Ramos 1993, p. 9.

[22] Solà-Morales, Cirici & Ramos 1993, p. 9.

[23] Solà-Morales, Cirici & Ramos 1993, p. 26.

[24] D Leatherbarrow, 'Showing what otherwise hides itself: on architectural representation', *Harvard Design Magazine*, Fall, 1998, p. 52.

finished, there is the assumption that they document that which has been built, and that they have shifted to display nonreverse directionality.[25] However, the drawings produced by Blaser of the pavilion still operated within the field of reverse directionality, rather than document that which had been built. The drawings' usual shift to reflect the tangible, or that which had been built, had not occurred. This shift was undertaken by the new set of drawings made, that were produced to rebuild the Barcelona Pavilion.

Within this context, the 1929 pavilion is assumed to be the source of all reference. However, the status of the Berliner Bild-Bericht photographs questions this notion. These photographs took on the role of accurate *post factum* documentation, since accurate documentation drawings did not exist. Once the pavilion was dismantled, the photographs became the tangible representation of an object that had no tangible existence. They, therefore, became central to recreating the pavilion, by assisting in creating the working drawings of it. Solà-Morales, Cirici and Ramos were compelled to base the recreation on the evidence as documented in the photographs.[26] They became projective representation. They are part of a tradition of images, and the interpretation of those images, in the lineage of representation.[27]

As a recreation of two-dimensional photographs, the new version of the pavilion recasts the reading of the Berliner Bild-Bericht photographs. These photographs, while documenting the 1929 building, also have elements of the original, in their role of depicting the building. It is they, not the 1929 building, that need to be situated within the physical context of the exposition grounds, according to Dodds.[28] Evans's comment that '[b]uildings are not always better than pictures show them to be' or rather, that three-dimensions are not always better than two, is interesting in the context that the reconstructed building was reliant on the intervening 'pictures'.[29] Dodds describes the new Barcelona Pavilion as 'a permanent monument to architectural ephemera' in reference to the fresh insights the building gives to the photographs from 1929.[30] Generations of designers and researchers looked to the representation of the pavilion in the

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[25] Therefore, it is possible for a set of working drawings of an unbuilt project to look the same as those of a project that has been built. With some sets of working drawings, it is hard to know whether the act of building was a seamless carrying out of the intentions of the drawings, or if there were continual shifts needed in the drawings to keep up with the building site; whether things were worked out on paper with a scale ruler, or decided on site, at full scale. Christopher Alexander refers to this in saying: 'You are constantly finding out about the building while constructing it, and what you will find out is inherently and necessarily unpredictable. You are watching a developing wholeness.' C Alexander, cited in S Brand, *How buildings learn: what happens after they're built*, Phoenix Illustrated, London, 1997, p. 200.

[26] Dodds 2005, p. 81.

[27] Dodds 2005, p. 73.

[28] Dodds 2005, p. 73.

[29] R Evans, 'Mies van der Rohe's paradoxical symmetries', in *Translations from drawing to building and other essays*, Architectural Associations Publications, London, 1997, p. 234.

[30] Dodds 2005, p. 7. These photographs focus on the central question of Dodds's book, that is, what precisely is 'the object' being critiqued in various interpretations of the Barcelona Pavilion. Dodds 2005, p. 34.

form of the black and white photographs, as 'a substantive paradigm for modern design'.[31] The reconstruction of those photographs, in the form of the recreated building, offered the opportunity to test the validity of the black and white photographs.

The reconstructed pavilion dissipated the energy that the original generated as icon, in existing as a presence confined to the pages of books. A building that existed as a graphic reference for more than fifty years was made three-dimensional. Solà-Morales, Cirici and Ramos were not merely recreating the 1929 pavilion, they were recreating a building that had reached mythic status, partly due to its non-existence. Once the reconstruction was completed, a new relationship was established between the original and the photographs, and the photographs and the recreation. The photographs became the intervening medium between the two full-scaled buildings.

In recreating the Barcelona Pavilion, Solà-Morales, Cirici and Ramos entered into notions of replica and reinterpretation. The book *Mies van der Rohe: Barcelona Pavilion* covers the investigative study, critical decisions and technical solutions undertaken in reconstructing the Barcelona Pavilion.[32] Due to the recreation occurring over fifty years after the original was built, decisions had to be made depending on the available information and with different technical conditions. For example, such aspects as services, security and the solidity of the roof were approached differently due to issues of durability and permanence.[33] According to Solà-Morales, Cirici and Ramos, it was not merely restitution, but rather it was a project of its own. However, the recreation was generated from a desire to make manifest something that *had been*, that only existed in representation. The reconstructed pavilion is intimately connected to the 1929 version, and although a project in its own right, it is another version of the original, that is, a full-scale *post factum* model.

This contradicts Evans's reading of the reconstruction of the pavilion. In a postscript to his essay 'Mies Van Der Rohe's Paradoxical Symmetries', he applauds those responsible for the reconstruction, yet dismisses the significance of issues of authenticity and reproducibility.[34] While his essay is concerned with elements of symmetry present within the original, of particular concern to him is the shift in his own thinking, elevating the pavilion from 'a mere phantom, its reputation built on the flimsy evidence of a few published photographs', to a building that is important enough, he argues, to force a reappraisal of the word symmetry, *after* visiting the

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[31] Dodds 2005, p. 7.
[32] Solà-Morales, Cirici & Ramos 1993.
[33] Solà-Morales, Cirici & Ramos 1993, p. 29. For example, on the exterior side and rear walls, plastered brick painted green and yellow was used instead of green Alpine marble and travertine. J Hill, 'Weathering the Barcelona Pavilion', *Journal of Architecture*, vol. 7, no. 4, Winter, 2002, p. 320.
[34] Evans 1997, p. 272.

reconstruction.[35] This conclusion was gained not just by viewing the photographs, but by viewing them alongside the full-scale version.

The model as replica

By comparing the reconstruction of the Barcelona Pavilion with other types of *post factum* modelmaking, the specificity of this particular example may be shown. Paul Bonfilio, commissioned by the Metropolitan Museum of Art, New York, reconstructed Frank Lloyd Wright's house, Fallingwater (Edgar J. and Liliane S. Kaufmann House, Pennsylvania, 1934–7)[36]. The model in this instance is to scale, a miniature that condenses the built work. Similar to the Barcelona Pavilion, it is the 'as built' version that is referred to, with Bonfilio remeasuring the existing house for his own set of drawings from which to build. Bonfilio writes that it was necessary to document and photograph the building from the point of view of a modelmaker.[37]

Solà-Morales, Cirici and Ramos, in a passage titled 'Final reflection: In defence of a replica', cite other examples of the building of imitations. Hadrian had replicas constructed, at his villa in Tivoli, of the architectures that had most impressed him on his travels, in the same way Lord Burlington recreated Palladian villas in the gardens at Chiswick.[38] Christopher Alexander describes how the medieval architect would take journeys in order to study and measure the proportions of 'full-sized specimens'.[39] There are examples of knights returning from the crusades with small-scale models of holy structures. These were copied as full-scale buildings and can be seen as religious icons.[40] The original in this way could be read as the full-sized specimen, and the model as the temporary, portable information for the next full-sized replica.

The model of Fallingwater operates similarly to these other examples due to its scale, but also due to another factor: the original is extant. However, in the case of the Barcelona Pavilion, it is not. Bonta, writing in 1979 before the reconstruction, likens the pavilion to examples of unbuilt architecture.[41] This is due to the notion of the building existing more strongly in its

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[35] Evans 1997, p. 234, 271.

[36] P Bonfilio, *Fallingwater: the model*, Rizzoli, New York, 2000. Bonfilio also built a model of the Barcelona Pavilion for MoMA. Interestingly Bonfilio was commissioned to build another, identical model of Fallingwater for a private client, five years after completing the first one. Bonfilio 2000, p. 10.

[37] This involved photographing each elevation of a room, the stonework on the floor, and the inclusion of a ruler to measure scale within the photo. At least 600 photographs were taken over a two-day period for this. Bonfilio 2000, p. 13–17.

[38] Solà-Morales, Cirici & Ramos 1993, p. 38.

[39] T Porter & J Neale, *Architectural supermodels*, Architectural Press, Oxford, 2000, p. 3.

[40] AC Smith, *Architectural model as machine: a new view of models from antiquity to the present day*, Architectural Press, Oxford, 2004, p. 18.

[41] 'It seems to me, however, that the Pavilion deserves a place within an additional category of the unbuilt — not listed in the book [A Sky & M Stone, *Unbuilt America*, Abbeville Press, New York, 1983] — constituted by buildings built but shortly thereafter demolished. Most of what [George R] Collins [in his introduction to the book which traced the history of unbuilt architecture beyond the limits of the American experience, and explored

representations, such as in text and photographs. By representation 'standing in' for something no longer there, it can be elevated to 'evidence of an event's facticity'.[42] In the case of the Barcelona Pavilion, before the reconstruction, there was the possibility of mistaking a photograph of a temporary pavilion for an '*in situ* experience of permanent building'.[43] Once the reconstruction was completed, there is the possibility of it being substituted for the experience of being within the 1929 building. By recreating that which does not exist elsewhere, potentially allows the reconstruction to sit *in place of* the original. Kester Rattenbury has written of this potential for the replica to usurp the original:

> Sometimes a photo or a drawing — done either before or after construction — frames a specific architectural interpretation so successfully that it becomes the quintessential image: the 'real' or 'authentic' version of it, of which the occupied, adapted … or inaccessible building seems only a partly valid version. Sometimes, as the only record of a demolished building, it almost replaces the architecture in the idea of being 'real'.[44]

This has the possibility of 'conflat[ing] simulacra with the thing imitated'.[45]

For this not to occur, the original and the replica can be separated by either an interval of time, or by the different form that a reinterpretation provides. In the case of the Barcelona Pavilion, it is the interval of time between the original and the reconstruction that stands to separate the two and overcome the common factor of the two occupying the same site. This timespan allows the reconstruction to sit *next to* the original, as another version.

A variation on this type of separation is provided by the work shifting location. Frank Lloyd Wright's Loren Pope House (1940) was destined for demolition by the state highway department. The house was donated by its second owner, Mrs. Robert Leighey, to the National Trust for Historic Preservation in 1963. It was disassembled and moved fifteen miles from its original site in Falls Church, Virginia, to a similar wooded, hilltop site on the Woodland Plantation.[46] While slightly different from other types of reconstructions that are remade within museums spaces,

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its bibliography] has to say about the unbuilt is also applicable to this category, of which Barcelona is, indeed, a paradigmatic example.' Bonta 1979, p. 171. Also: 'Possibly the Barcelona Pavilion will be regarded as an example to show that an idea about a building, rather than an actual building with all its material data and implications, can affect the course of architectural history.' Bonta 1979, p. 217.

[42] Dodds 2005, p. 7.

[43] Dodds 2005, p. 7.

[44] K Rattenbury (ed.), *This is not architecture*, Routledge, London, 2002, p. 57.

[45] 'While it has become a commonplace of the early twenty-first century to conflate simulacra with the thing imitated, the two remained relatively distinct between the wars. It was the difference between the two, not their similarity, which prompted Walter Benjamin to write such seminal essays as "The Mimetic Function," and "The Work of Art in the Age of Mechanical Reproduction."' Dodds 2005, p. 5.

[46] A Sanderson, *Wright sites: a guide to Frank Lloyd Wright public places*, Princeton Architectural Press, New York, 1995, p. 100.

this Usonian house becomes a model of itself due to its shift in location, yet retains elements of the original.

Similarly, Wright's Francisco Terrace Apartments Archway (1895) in Chicago underwent a similar shift in location. After years of neglect, Francisco Terrace was demolished in 1974, despite attempts by local preservationists to save the structure. The archway, all cut stone, terra-cotta coping, and corner courtyard stair motifs were, however, dismantled and reconstructed in Oak Park at the entrance to a building of similar exterior design yet smaller scale and plan.[47]

An example of work occupying the same site, but separate from the original, is displayed in the project 'House' (1993), by the artist Rachael Whiteread. This project was an *in situ* cast of an entire terraced house, in East London, the last surviving house of a typical terraced row. The work was achieved by casting a series of independent concrete boxes which formed the negative of each room. This exposed the interior of the house, including the marks on the walls, by making solid the void of the house.[48] By casting the absent, it stood as a 'solidification of memory'.[49] Although this work stood on the site of the original house, its very different form enabled it to be seen as another version of it. This distance exists between the original and the replica because of the reinterpretation that the replica demands.[50] Similarly, as Solà-Morales, Cirici and Ramos write, in hearing the St Matthew Passion, it is impossible to hear it as Bach conducted it in the church of St Thomas in Leipzig. Rather, it is heard as a contemporary interpretation.[51] In this reading, 'House' could be referred to as a full-size, *post factum* model.

The Barcelona pavilion, therefore, is an example of a *post factum* model whose original is no longer extant; it is the only full-scale, three-dimensional version of the original building. Hence, it possesses elements of the notion of the original.[52] In this way, the intentions and the characteristics of reverse and non-reverse directional documentation become less distinct.

This notion of the original may be seen by recounting the experience of Edgar Wind, cultural and art historian. Wind watched and listened as President Franklin D. Roosevelt delivered the inaugural address in 1941 for the National Gallery of Art building in Washington D.C. The

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[47] Sanderson 1995, p. 48.

[48] Italo Calvino also inverts the usual figure-ground. In *Invisible cities* he describes Argia, a city that has earth instead of air: 'The streets are completely filled with dirt, clay packs the rooms to the ceiling, on every stair another is set in negative, over the roofs of the houses hang layers of rocky terrain like skies with clouds … From up here, nothing of Argia can be seen … At night, putting your ear to the ground, you can sometimes hear a door slam.' I Calvino, *Invisible cities*, Picador, Great Britain, 1979, p. 100.

[49] R Shone, in J Lingwood (ed.), *House*, Phaidon, London, 1995, p. 52. This phrase is reminiscent of Dodds's description of the rebuilt pavilion being a 'permanent monument to architectural ephemera'. Dodds 2005, p. 7.

[50] Solà-Morales, Cirici & Ramos 1993, p. 39.

[51] Solà-Morales, Cirici & Ramos 1993, p. 39.

[52] Conversely the 'original' also comprises of 'reproduction' in that, according to Colomina, the Barcelona Pavilion contains reproductions of preceding works and projects by Mies himself, by Bruno Taut and by Peter Behrens. Colomina 1988, p. 19.

speech was broadcast on the radio, and so the President's mind was on the microphone in front of him. Those present in front of him were like 'eavesdroppers, listening in on a performance not for them'.[53] Wind writes that those listening to the broadcast assumed that they were getting 'only a reflex of his speech, a sort of echo, but they were mistaken: what seemed like an echo was the substance'.[54] Similarly, the 'echo of the Barcelona Pavilion'[55] can be seen as the substance. Dodds's book refers to the Berliner Bild-Bericht photographs of the pavilion as the echo that was the substance; the reconstructed pavilion, as a full-scale model, could equally be referred to in this way. The *post factum* model, therefore, is both echo and substance.

Representation may also be appreciated as the site of architectural production, displaced from the construction site into the seemingly immaterial sites of publications, exhibitions, competitions and journals. Beatriz Colomina writes that Mies van der Rohe became known almost exclusively through photography and the printed media. Paradoxically, these more ephemeral media were in many ways more permanent, 'as they secured a place in History, a historical space (designed not just by the historians and critics, but also by the architects themselves who deployed these media)'.[56]

As well as seeing the representation as the substance, Colomina writes that, alternatively, the architecture *is* representation, rather than something simply represented:

> The building itself should be understood in the same terms as drawings, photographs, writings, films, advertisements, and so on, not only because these are the media in which we often encounter it, but because the building is a mechanism of representation in its own right. It is a 'construction' in all the senses of the word. This means, among other things, that the building is not simply represented in images but is a mechanism for producing images.[57]

The pavilion, in this context, can be seen to reside within the lineage of representation. This shifts the emphasis away from the built work being read as the finality of the design process; instead the built work goes on to exist beyond its time and place of construction, in other forms.

Another example of a full-size model demonstrates this idea of the representation having a presence beyond the echo. In 1999, Mario Botta created a full-size model of Borromini's San

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[53] E Wind 'The mechanization of art', in *Art and anarchy*, Faber and Faber, London, 1963, reprint Northwestern University Press, 1985, p. 70, cited in Dodds 2005, p. 6.
[54] Wind, cited in Dodds 2005, p. 6.
[55] Dodds 2005, p. 7.
[56] B Colomina, 'Mies not', in D Mertins (ed.), *The presence of Mies*, Princeton Architectural Press, New York, 1994, p. 213. Also: 'Architecture does not start when two bricks are put together, but when those two bricks, one way or another, enter the space of architectural discourse.' Colomina, in Mertins 1994, p. 214.
[57] Colomina, in Mertins 1994, p. 214.

Carlo alle Quattro Fontane, in Rome[58] (Fig. 1, 2). This was the centrepiece of an exhibition at Lugarno's Cantonal Art Museum to commemorate the 400th anniversary of Borromini's birth. Students at the Mendrisio Academy carried out a complete survey of San Carlo using high-precision photogrammetry. Botta used computer and construction technologies to render the interior as a form of wood-built architecture. Half the interior of the church was reproduced, including the dome and lantern, made of thirty-five thousand planks of Norway spruce, each 450mm thick. These were set one on top of the other, in horizontal planes, separated by small wooden spacers. They were then trussed together with steel wire in modular sections and mounted on a steel frame, on a buoyant platform on Lake Lugarno.

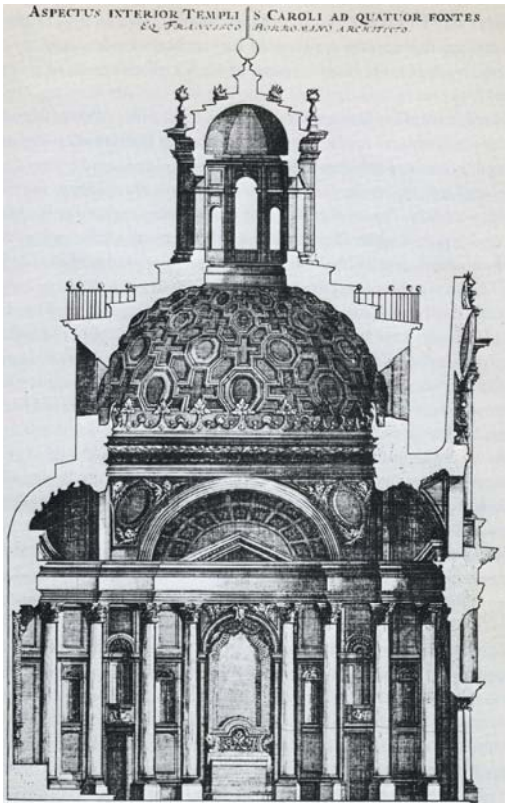

Figure 1: Section engraving of Borromini's San Carlo alle Quattro Fontane, in Rome.

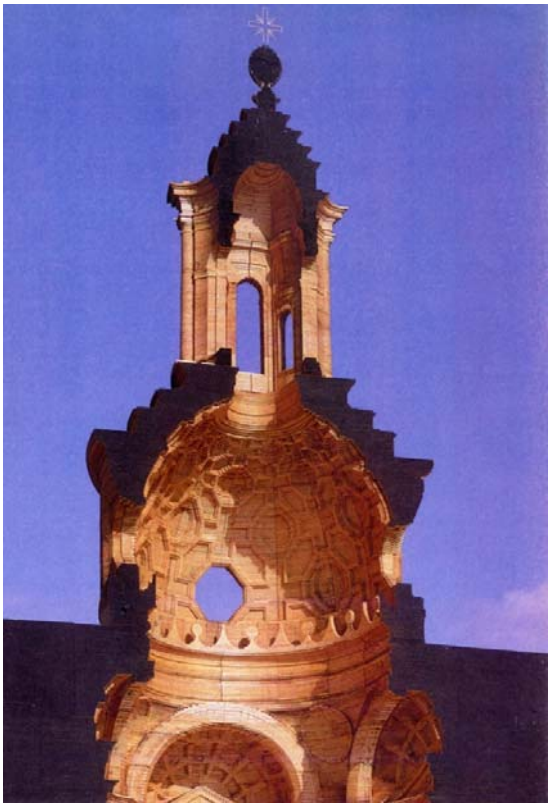

Figure 2: Mario Botta's full-size model of San Carlo alle Quattro Fontane (1999).

[58] This was Borromini's first entirely independent work of architecture. The Church, built between 1634 and 1641, is part of a larger complex belonging to the Trinitarian Friars of the Redemption, an austere sect of Spanish monks. Borromini initially designed, within the restricted site limited by the via Felice and the via Pia (and the existing and immovable fountain where these two streets met) a dormitory, refectory, cloister, and small church. According to Hopkins, the interior of San Carlo 'won instant fame and notoriety for its architect. It was the first building since those of Michelangelo and Palladio in which every single detail was minutely designed and which established a significantly new interpretation of architectural space and vocabulary. This little church demonstrates and encapsulates, more than any other building of the period, the radical innovations in design that immediately altered architectural developments in Rome and then spread throughout Italy and eventually Europe.' A Hopkins, *Italian architecture from Michelangelo to Borromini*, Thames and Hudson, London, 2002, p. 201. Borromini refused all fees for building San Carlo. A Blunt, *Borromini*, Allen Lane, London, 1979, p. 84.

In rendering San Carlo in this way, much information is omitted, such as the original building's location, age and function. In having identical overall dimensions and proportions, yet such different materiality and method of making from the original, enabled the model to turn from emulation to analogy.[59] The model brings to the foreground the section-line, representing the architectural form in the same way contour lines represent the relief of terrain[60] (Fig. 2, 3). San Carlo still stands in Rome; this model was not seen as taking the place of Borromini's Baroque Roman masterpiece. This model's place within a lineage of representation is due to its representation's 'distorting mirror, the common factor both connecting the copy to the original and separating it from it'.[61]

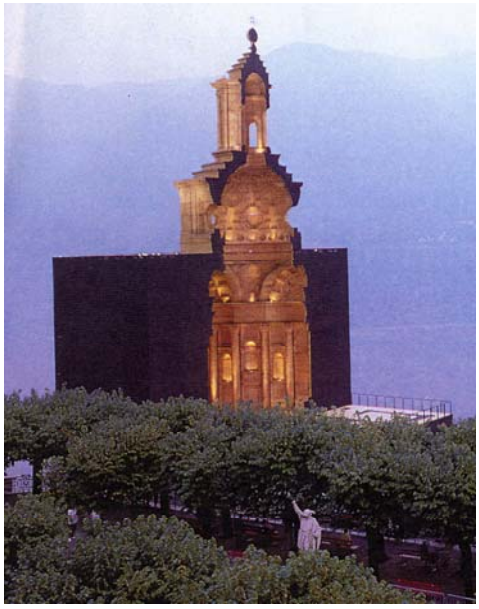

Figure 3: Mario Botta's full-size model of San Carlo alle Quattro Fontane (1999).

Alessandro Rocca's review of this project is titled 'This is Not a Model: The San Carlino of Lugano'. This is due to Rocca's reading of the project as greatly differing from Borromini's version, by employing a different argument and means. According to Rocca, Botta's project 'stems from an attitude and culture that are strongly biased toward the act of design'.[62] The rigour undertaken in the exact reconstruction of the Barcelona Pavilion, 'as it was and where it was'[63], is seen by Rocca as separate from this relationship with design. However, according to Solà-Morales, Cirici and Ramos, their task displayed a tension between imitation and invention, equally divided between a faithful adherence to the colour, texture and shine of the materials involved in the pavilion and their creative capacity to act as architects interpreting what was, in their judgement, Mies van der Rohe's intention at the moment of choosing the material, the cut and the finish.[64]

According to Rocca, the version of San Carlo made in 1999 does not just belong to the body of Botta's own work, but may even:

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[59] A Rocca, 'This is not a model: the San Carlino of Lugarno', *Lotus,* no 103, 1999, p. 33, note 4.
[60] Rocca 1999, p. 30.
[61] Rocca 1999, p. 33, note 4.
[62] Rocca 1999, p. 32.
[63] Rocca 1999, p. 32.
[64] Solà-Morales, Cirici & Ramos 1993, p. 33.

> Represent one of its most unequivocal elements, as a manifesto that, read between the lines of Borromini's own design, puts forward a clear and concrete vision of today's architecture.[65]

To Rocca, such a result should not be called a model. This implies that a model cannot incorporate such separateness from the original and be so propositional towards the contemporary.

Dodds acknowledges this incorporation of the maker and that being made, within a work. According to Dodds, any reconstruction results in a reproduction of the image of a building and an image of its builders.[66] Similarly, Sigfried Gideon has written of the phenomenon of 'anonymous history':

> History is a magical mirror. Who peers into it sees his own image in the shape of events and developments. It is never stilled. It is ever in movement, like the generation observing it. Its totality cannot be embraced: History bares itself only to facets, which fluctuate with the vantage point of the observer … Anonymous history is directly connected with the general, guiding ideas of an epoch. But at the same time it must be traced back to the particulars from which it arises.[67]

In this way, the reconstructed Barcelona Pavilion puts forward a proposition as strongly as Botta's reconstruction. A model can be both representation and its own project.

To classify such works as independent projects, that is 'not models', undermines the potential of the model. Instead, the status, potential territory and effects of a model should be examined, so that its definition encompasses the notion of the independent project. The working or conceptual model has achieved such autonomy, coming out from the shadow of its, as yet, unbuilt work. The *post factum* model is still predominantly seen as neutral documentation, whose original looms large. The *post factum* model is separated from the strictness of the role of 'getting to' a building. Due to this, it may be seen as being both generated from a building, and within a lineage of representation. It has elements of the unique and is able, in turn, to be strongly within a design process and influence representations that succeed it.

A model is, therefore, both a version of another representation and is independent of it. To define a model otherwise undermines its power of representation. To call Botta's work a model

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[65] Rocca 1999, p. 31–2.
[66] Dodds 2005, p. 132–5.
[67] S Gideon, *Mechanization takes command: a contribution to anonymous history*, Oxford University Press, New York, 1948, p. 2, cited in Dodds 2005, p. 132.

does not diminish its power of autonomy, its separateness from Borromini's work, the strength of its design component or its scale. To call it a model elevates the potential of representation and acknowledges the interconnectedness of architecture's forms.

The *post factum* model as series

Botta's version of San Carlo differs from the Barcelona Pavilion in that it is only a fragment of the original building. The pavilion reproduces Miesian space, Botta's model does not attempt to meticulously reconstruct the sense of the interior of San Carlo, but rather alters the philological system, to see the building in another way.[68] By adopting a particular style, constructional technique or material choice of modelmaking, cohesive sets of *post factum* models allow comparison across architectures. The models' similarities assist in critiquing the architecture.

One example of such a set of models is a project undertaken over a twenty year span, by architecture students at the Technical University in Munich. Two hundred models were made in timber, at a scale of $1{:}33^{1}/_{3}$, of major built and unbuilt works by modernist architects.[69] The timber is not intended to represent timber, but rather, the material sheds its former associations and becomes the lens through which the form of the architecture may be examined.[70] It becomes the *lingua franca* of the models.

A similar outcome is achieved in another set of models using the technique of folding and cutting paper to make volumetric elevations, as documented by Masahiro Chatani.[71] Twenty examples of American houses, including the tepee, a pueblo dwelling, the eighteenth century DeTurk House and Mount Vernon, Fallingwater, Vanna Venturi House, through to Eisenman's House VI, are all made by only cutting and folding white card (Fig. 4).

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[68] Rocca 1999, p. 32.

[69] F Kurrent (ed.), *Scale models: houses of the twentieth century*, Birkhäuser, Basel, 1999.

[70] Sandra Kaji-O'Grady has written that 'this material is deprived of its own identity such that it occupies a kind of perpetual transparency'. S Kaji-O'Grady, 'Speculating on architectural models', in GT Moore & L Trevillion (eds), *Architecture and education*, proceedings of the Association of Architecture Schools of Australasia international conference, University of Sydney, 2000, pp. 45–51. A similar situation occurs with the models made of Claude-Nicolas Ledoux, at the Salt Works of Chaux, Arc-et-Senans, France. All are finished in whitewash and built at the same scale. Morris 2006, p. 90.

[71] M Chatani, *Origami architecture: American houses pre-colonial to the present*, Kodansha International, New York, 1988. Chatani writes that the original impetus for this book was to raise the status of architecture as a profession in Japan by introducing architectural aesthetics within schools, by encouraging them to conceive and plan imaginative, original buildings. Chatani 1988, p. 81–2.

By employing the same constructional technique, unity is created within a set of houses, namely 'American houses', that otherwise had no unified tradition. These models represent complexity by *post factum* conceptual simplicity. In his introduction to Chatani's book, David Stewart writes that:

> [T]he reductionism built into Chatani's modelling technique compels a synthesis. With the disappearance nowadays of most constructional limitations, architecture itself is rarely forced to be truly selective of themes and means. There remains, by contrast, in origami architecture a residue of structural process — in short, a form of discipline.[72]

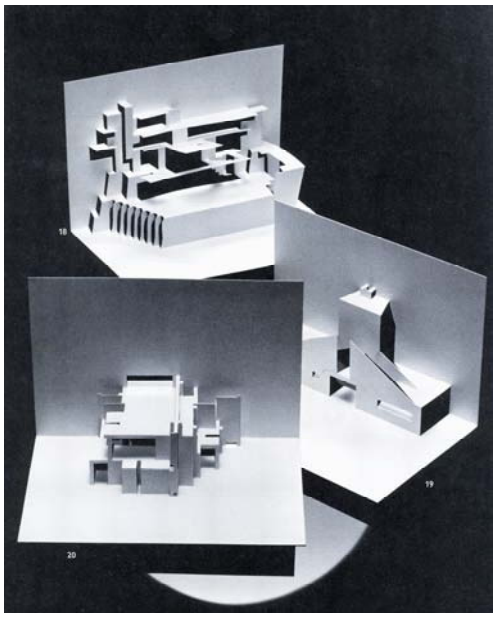

Figure 4: Origami architecture examples, including Fallingwater, Vanna Venturi House and Eisenman's House VI.

It is these limitations that allow the work to be seen in a new way. This device of placing seemingly dissimilar architectures next to each other, allows connections and similarities to be speculated upon, due to the similarity of their constructional technique, that would not exist at a built scale, or across pages of drawings.

A similar method of construction is offered in Edmund V. Gillon's *Cut and Assemble Frank Lloyd Wright's Robie House: A Full-Color H-O Scale Model of an Architectural Masterpiece*[73] (Fig. 5). This book prints house parts on card in colour, with step-by-step instructions for assembly. The outcome of a model built in this technique is so definite in displaying its origins of construction, that it forces connections to be made when other examples of architecture are assembled in a similar way.[74]

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[72] Chatani 1988, p. 10.

[73] EV Gillon Jr, *Cut and assemble Frank Lloyd Wright's Robie House: a full-color H-O scale model of an architectural masterpiece*, Dover Publications, Inc., New York, 1987.

[74] Dover Publications also offers *Cut and assemble Victorian houses* as part of this series.

Figure 5: Model of Frank Lloyd Wright's Robie House.

These different sets of models, based upon constructional techniques, are then able to have a point of connection to each other, by way of one specific example of building common to them. For example, Wright's Fallingwater resides within both the wooden Technical University, Munich set and the origami architecture technique of making. These examples could be taken out of these series, and be put alongside another example of *post factum* making, that is Bonfilio's version of Fallingwater. These different versions of the one project emphasize the degree to which reinterpretation is essential to the *post factum* model.

The *post factum* model starts to occupy a space that continues beyond the building's existence, and sits within the design of representation. Therefore, the context of the reconstructed Barcelona Pavilion can be seen to be that of other *post factum* models of the building. This again shifts the emphasis of the design process away from the original full-scale building as outcome to the realm of the design of representation, which goes on after the building has been completed.

This relationship between the building and its reverse directional representation is referred to by Christian Hubert, in his essay 'The Ruins of Representation':

> [T]o think of buildings themselves as only referents, as pure objects, is to overlook their own participation in a process of vision and of language. Buildings too can be representational … The building may also become imprinted with the traces of its own representation.[75]

An example of this notion of the imprinting of the representation within the built form can be seen in Dennison and Hiron's development of the Liberty Tile and Trust Company building in Philadelphia in the 1920s. Dimensions were taken from the final models, and working drawings were made using these measurements. The finished building then was an exact enlargement of the final models.[76] Another example of this relationship between the model and the full-scale is

[75] C Hubert, 'The ruins of representation', in K Frampton & S Kolbowski, *Idea as model,* Rizzoli, New York, 1981, p. 19.
[76] Moon 2005, p. 205.

the Wall House, also called Bye House, designed in 1973 by John Hejduk. In 2002, the project was posthumously constructed in Groningen, the Netherlands. According to Morris, it looks like a scaled up model.[77] With this continuum of representation in mind, the directionality of Hubert's comment can be reversed: alternatively, in the situation of the pavilion as a *post factum* model, the reconstructed pavilion becomes imprinted with the traces of its own original building.

The inhabitation of the *post factum* model

The Barcelona Pavilion has another quality separate from the above examples of *post factum* models: it is able to be entered. This is also different from the Berliner Bild-Bericht photographs of the pavilion, from which people are absent. The full-scale model, while not held within the hands of the viewer, is instead able to contain the viewer.

The essay 'Fear of Glass: The Barcelona Pavilion', guides the visitor through the 1929 pavilion. The pavilion's function was to be the site for a reception of the king and queen of Spain, in the model that Germany proposed of itself of the future, in images of the modern house.[78] However, this 'house', due to its imaging of the future and modernity, makes an anachronism of the present. The visitor, José Quetglas argues, does not have a place in this modern house, it cannot be recognised as their own, and is a place of a self distinct from all that they are. It is a house that is marked by their exclusion and a place of the Other; it references both the void and the future.[79] It has been noted that Kolbe's statue is the pavilion's only anthropomorphic element.[80]

Due to this, the user has been usurped by the 'viewer' and is at once both within the space and is the audience. The theatre is the paradigm on which the pavilion is modelled.[81] The reflectivity of the building allows the visitor to be both outside the building and reflected within its interior.[82] Caroline Constant writes that:

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[77] Morris 2006, p. 65. Hubert offers the examples of Eisenman's 'cardboard architecture' and the buildings of Michael Graves or Aldo Rossi: they are 'at once pictures and buildings'. Frampton & Kolbowski 1981, p. 19. Tod Williams and Billie Tsien include a concrete model, cast *in situ* in a stairwell in the Hunter Science Building, Emma Willard School, Troy, New York, 1998. H Arnold (ed.), *WorkLife: Tod Williams Billie Tsien*, The Monacelli Press, New York, 2000, p. 183.

[78] J Quetglas, 'Fear of glass: the Barcelona Pavilion', in Colomina 1988, p. 124.

[79] Quetglas, in Colomina 1988, p. 124.

[80] C Constant, 'The Barcelona Pavilion as landscape garden: modernity and the picturesque', *AA Files,* no. 20, Autumn 1990, p. 50.

[81] Quetglas, in Colomina 1988, p. 124.

[82] 'It is said that its windows are mysterious because a person standing in front of one of these walls sees himself reflected as if by a mirror, but if he moves behind them, he then sees the exterior perfectly. Not all of the visitors notice this curious particularity whose cause remains ignored.' Quetglas, in Colomina 1988, p. 130. Also: 'Some of these glass walls, dark and neutral, reflect objects and people in such a way that what you see through the glass becomes confused with what you see reflected upon it.' NM Rubió Tudurí, cited by Quetglas, in Colomina 1988, p. 132.

> [D]espite its overwhelming interiority, the pavilion resists inhabitation. The role of the spectator is fleeting, transitory. The reflective surfaces of glass, polished marble and chromium-plated steel absorb any human presence, casting doubt even on the body's own substance.[83]

Quetglas contrasts this with the experience of entering Bruno Taut's Glass Pavilion (1914) at Cologne. In this situation, the visitor approached the pavilion as a passive spectator confronting a stage set. But once there, the visitor realized that it was they themselves who constituted the centre of the action: rather than it being the surroundings that were unfamiliar, it was the visitor's own body that was unknown, and no longer the focal point.[84] Colomina writes that Quetglas's notion of exclusion leads the observer to an ambiguous position, 'at once inside and outside the architectural work. No longer is critical detachment between the viewer and the object possible'.[85] This is in part due to the quality of uninhabited space that the pavilion possesses; it is a 'house without a master'.[86] The pavilion is like a space someone has just left: the 'departure of the invisible occupant seems always to precede the visitor, who follows his passage'.[87]

Commentators writing about the reconstruction have 'waxed excitedly about finally being able to walk freely and unencumbered through the "pavilion itself"'.[88] Rather than the concern being that the pavilion is now able to be occupied, the reconstructed pavilion demonstrates the Berliner Bild-Bericht photographs' tenuous relation to occupiable space. Recreating the pavilion, via these photographs, questions the representation of the occupiable space in the original. Although the reconstructed building is able to be walked around, it is observable but not occupiable, similar to the space depicted in the photographs.[89] It highlights the difference between the implicit space of the photographs and the explicit space of a building.

Placing the body within the model has been attempted in various ways. Larger sized models have allowed a viewer, by crouching down, to line up their eye to mirror the gaze of the intended inhabitant. Another way has been to place the viewer's eye within the model. The model of Fredrich Wilhelm Kraemer's new library building (1961) allowed for the viewer's head to be within the space of the 1:20 scale model[90]. The model then becomes a panorama at close range.

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[83] Constant 1990, p. 50.
[84] Quetglas, in Colomina 1988, p. 141.
[85] Colomina 1988, p. 19.
[86] Quetglas, in Colomina 1988, p. 143.
[87] Quetglas, in Colomina 1988, p. 144.
[88] Evans 1997, cited in Dodds 2005, p. 7.
[89] Dodds 2005, p. 46.
[90] R Janke, *Architectural models*, Thames and Hudson, London, 1968, p. 71.

This presence of the gaze within the model does not allow an approximation of inhabitation or a resemblance of the actual view, but rather, allows the viewer to see inside the 'box' of the model.

This sense of the unlived-in is inherent within both the 1929 and 1986 versions of the pavilion. It is precisely due to this emptiness that richness is able to be revealed within the pavilion.[91] Quetglas's essay takes the visitor through the 1929 pavilion. However, the post-reconstruction visitor, while walking through the pavilion, has in their head the memory of walking through the original, in the form of textual readings, and in gazing at the Berliner Bild-Bericht photographs, while outside, the context is not early Modernism, but rather the manifestation of Modernism's effects. Quetglas's reading of the pavilion cannot be transposed to a reading of the reconstructed pavilion. The visitor is not merely walking through a 'new' three-dimensional space, but a colourised version of an earlier, remembered one. Viewing colour photographs of the reconstructed pavilion is different from viewing the black and white images: the coloured version possesses the possibility of actually moving through the space. Due to this quality of potential verification, these images embody something of Benjamin's notion of authenticity[92], although they are still reproductions. Hence, reproductions of an extant building have a presence separate from those representing a demolished one.

Display houses, built on housing developments, also can be read as full-scale models that are able to be walked within. While the Barcelona Pavilion promotes its separation from the act of housing inhabitants, it is exactly this inhabitation that display houses attempt to recreate, yet fail to allow. These houses are built only to be walked around, not lived within. They are buildings as models, prototypes at a 1:1 scale. Hence, they display reverse directionality. They are a prototype that can be built numerous times.

According to Solà-Morales, Cirici and Ramos there was a widely received idea, very much in line with the interpretation of Mies van der Rohe's architecture in the 1950s, that the Barcelona Pavilion also was a prototype, a perfect, autonomous spatial experiment capable of being reconstructed anywhere.[93] This theory was rejected by them, after a more rigorous knowledge of the relationship between the site and the building. Dodds suggests that the original pavilion was a full-size maquette, designed anticipating its reproduction and publication in a limited number

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[91] Quetglas, in Colomina 1988, p. 143.

[92] 'In even the most perfect reproduction, *one* thing is lacking: the here and now of the work of art — its unique existence in a particular place. It is this unique existence — and nothing else — that bears the mark of the history to which the work has been subject ... The here and now of the original underlies the concept of its authenticity.' W Benjamin, 1939, 'Work of art in the age of reproducibility (Third version), in H Eiland & MW Jennings (eds), *Walter Benjamin: selected writings, volume 4, 1938–1940*, Harvard University Press, Cambridge, Massachusetts, 2003, p. 253. Jean-Louis Cohen observes: 'The recovered colour [as in the photographs] appears somewhat forced, so much had the image in black and white photographic reproductions affected the aura of authenticity, inverting in some manner the remarks of Walter Benjamin.' J-L Cohen, *Mies van der Rohe*, Spon, London, 1994, p. 52, cited in Dodds 2005, p. 81.

[93] Solà-Morales, Cirici & Ramos 1993, p. 28.

of carefully framed black and white photographs, followed by its purposeful physical erasure.[94] In this way, the original may be seen as a prototype of its own representation and, eventually, of its replica. When this reconstructed version weathers and ages too much, it may be rebuilt. The replica is a prototype of its own replacement.

Johnathan Hill writes that it is not just habitual occupation that is absent from the 1986 pavilion, but also Germany and the passage of time, or weathering. He argues that one of the purposes of the reconstruction was to emphasise the pavilion's relationship to Barcelona and disregard its connections to Germany, Spain and internationalism.[95] He proposes reinstating the two by introducing the weather in Germany during the time of the 1929 pavilion's existence into the reconstructed pavilion.[96] Hill's aims are to disturb the current experience of the pavilion as an object of contemplation and to introduce the element of decay to the pavilion. These will make the pavilion 'less art and more architecture'.[97]

Display houses, as models, are still extant after versions of them have been built and inhabited. In this way, they act as unintentional *post factum* models. The visitor is freer to walk within these neutral spaces than within the privacy of their occupied offspring; they may be unlived in but they operate within public space. Due to this, they are seen as solid, 'real'; similarly, in the case of the Barcelona Pavilion, the representation, in the form of the reconstructed pavilion, is less ephemeral than its earlier representations. However, by the presence of colour photographs of the Barcelona Pavilion, the 'aura of authenticity' that the black and white photographs had assumed is affected.[98] Jean-Louis Cohen and Dodds both observe that this reverses, to some extent, Walter Benjamin's argument that the mechanical reproduction of photography effectively cut off the work of art from the world of tradition.[99] An analogy of this may be seen in 'Mirrabooka' (1961–64), a house by Sydney architect Bruce Rickard. The interior sandstone walls of random coursing and projecting pieces were directly

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[94] Dodds 2005, p. 106. Also: 'One suspects, however, that in Mies's eyes, the prolonged existence of the pavilion, particularly if it were reprogrammed with such a prosaic function [as a restaurant], would have diminished much of what the Berliner Bild-Bericht photographs had achieved. Moreover, Mies was plainly aware of how this building, built using materials and techniques appropriate for temporary construction, would have required substantial physical alterations to become the monument that the canonical prints depicted. After all, the Berliner Bild-Bericht photographs had been published throughout Europe and the United States; Mies had what he wanted. Given the choice of preserving the master prints or the building, Mies chose the photographs.' Dodds 2005, p. 82.

[95] He writes that two masts were placed symmetrically in front of the 1929 pavilion flying the German and Spanish flags. The masts were rebuilt but the flags are absent in all the photographs of the 1986 pavilion in the book on the reconstruction. Hill 2000, p. 322.

[96] The project is called 'Weather Architecture'. Hill 2000, p. 323.

[97] Hill 2000, p. 325.

[98] Cohen 1994, p. 52.

[99] Dodds 2005, p. 81.

influenced by the Van Damme residence in Alfred Hitchcock's 'North by Northwest' (1959).[100] Photographs of the set from MGM studios in Hollywood were used by the stone masons as reference on site. Here, the seemingly ephemeral form of film is made tangible.

This combination that the pavilion as model possesses, of being able to be walked within and yet not inhabited, highlights the limitations of representation. The pavilion is similar to models built to allow the eye to be within them, such as Kraemer's library model, yet these do not allude to inhabitation. Therefore, the pavilion is connected to the space depicted in the Berliner Bild-Bericht photographs, that is, a space that is observable but not occupiable.

Dodd's book *Building Desire: On the Barcelona Pavilion*, questions what is the 'object', or the original, of the Barcelona Pavilion that is being critiqued in post-reconstruction discussions of the pavilion. Instead, the principal concern could be shifted to examining what is gained from casting the recreated version as a *post factum* model. That which preceded the 1986 version may then re-examined in the light of this reading.

Referring to the Barcelona Pavilion as a *post factum* model recasts the original black and white photographs and the 1929 building. The photographs became projective, in providing the documentation of the 1929 building, and so were the intervening medium between the two full-scale buildings. Once reconstructed, the notion of the authenticity of the black and white photographs shifts.

But more importantly than these outcomes, naming the pavilion a *post factum* model allows an examination and redefinition of the role of the model. Models are predominantly seen as generative, strongly linked to reverse directional documentation, with the emphasis on working or conceptual models. *Post factum* documentation is usually seen as neutral depiction. It is seen as separate from the design process due to its chronological positioning, that is, being made after the project has been completed, at which moment, the design process's endpoint is seen to have been reached. However, in referring to the reconstructed Barcelona Pavilion as a *post factum* model shows that documentation needs to be examined as reinterpretation, and hence, is strongly aligned to the design process. *Post factum* models are not miniature versions standing in the shadow of the, as yet, unformed version of the project. Rather, they acknowledge and promote the design that is present within representation. In reverse directional documentation, the design within the model is attributable to the building it represents. In contrast, Botta's reinterpretation of San Carlo, while referencing the work of Borromini, strongly asserts his own design capabilities. It has a presence, separate from the original, yet linked by the lineage of

[100] G Jahn, *Sydney architecture*, Watermark Press, Sydney, 1997, p. 167.

representation. The *post factum* model then has the potential to shift the reading of the original work.

In the case of the Barcelona Pavilion, for the reconstructed version *not* to be seen as a *post factum* model, allows the possibility of the reconstruction to usurp, not just the original building, but any subsequent representations, including the black and white photographs. To call the reconstruction anything but a model also undermines the level of interpretation that the work embodies.

The reading of a building as a model 'denies the epistemological fantasies of an architecture that postulates both an object and its adequate representation as its origin or end'.[101] To highlight the role of the *post factum* model allows for a revision of the territory of the model. To read a building as a model allows object, process and representation to be within an unending play, since the notion of an endpoint has been omitted.[102]

The Barcelona Pavilion as model questions the long held notion within design education that the full-scale is the authentic, superior endpoint to its own representation. The building as ultimate referent is not adhered to within the realm of the *post factum* model. Named a *post factum* model, the limitations and specificity of representation inhabit the building. This creates a relationship between the original building and its representation, not of one usurping the other, but rather of all occupying complementary positions.

Considering the reconstructed pavilion as a model allows the building itself to be within a greater context beyond the immediacy of the enclosed space. Mies van der Rohe used a model with moveable parts to design the original pavilion. The model had a plasticine base, on which planes of celluloid and cardboard, covered with Japanese paper simulating the pavilion's material qualities, were manipulated to capture the perceptual character of the spatial sequence.[103] Rather than the original pavilion being seen as the endpoint of this pre-1929 model, it is bookended by its own reverse and non-reverse directional representations.

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[101] Hubert, in Frampton & Kolbowski 1981, p. 4.

[102] Buildings can be read as models in the sense representing that which does not exist, or can perhaps never fully exist. Some buildings suggest greater scales or ambitions than were actually allowed them: they remain miniatures of their true selves. For example the work of Lutyens, Le Corbusier and centralised churches of the Renaissance. R Harbison, *Thirteen ways: theoretical investigations in architecture*, MIT Press, Cambridge, Massachusetts, 1997, p. 84. Smith posits that the Catholic religion itself is measured through the cathedral, and is thus an example of a scale model machine. Smith 2004, p. 64. However, these readings are of buildings as models displaying reverse directionality, not *post factum* models.

[103] Constant 1990, p. 47.

Chapter 4: The exhibition of architecture as *post factum* model

The exhibition of architecture has traditionally aimed to be either a substitute for the experience of visiting the building or city displayed, or display the architect's methodology of thought and design process. Integral to these aims is the notion of the documentation of architecture through exhibition.[1] There is a conventional display hierarchy of architecture of sketch, plan and model, produced during the design process, shown with the post-construction photograph. They are presumed to present architecture.[2] In architectural exhibitions, the model has traditionally been included as it is seen as more accessible due to its legibility, three-dimensionality and claims of objectivity. It has also been included as an example of the work of the design office. Miniaturisation lends a playful dimension to models. In an exhibition, it gives the public the impression of understanding architecture, and even the illusion of being able to make it.[3] However, exhibitions of drawings, photographs and models are a reductive way of showing architecture; the model as a representation of the final state of a project, or a miniaturization of a static site, undermines the potential of the model to structure the exhibition. Shifting the model from an elemental object within an exhibition, to the structure of the exhibition itself, allows the model to operate autonomously. Rather than the model being presented as an artefact of a process, the installation as model offers far more to the exhibition of architecture.

This chapter investigates the notion of the exhibition of architecture as a type of *post factum* documentation. In this role as three-dimensional documentation, the exhibition can be seen as a model of architecture. The exhibition of architecture as *post factum* model does not rely on the building as referent but rather, can be a discrete investigation into architectural space, by creating a full-scale model that can be walked around or within. Rather than being a simulation or representation of a particular building, the exhibition can be a space of integrity separate from the object-like displays of architecture's by-products. These exhibitions may also lie outside gallery spaces, in order to document different aspects of architecture. This chapter looks at a range of work from an expanded field both within architecture and beyond it, from painting and sculpture. Through examples of the work of Peter Eisenman, Herzog and de Meuron, El Lissitzky, Diller and Scofidio and Allan Wexler techniques of mapping and movement are examined, leading to the notion of the model of an action as *post factum* documentation of

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[1] An 'area of architectural praxis that most commentators avoid because of its ambivalence'. P Ursprung (ed.), *Herzog and de Meuron: natural history*, Lars Müller Publishers, 2002, p. 21.

[2] A Benjamin, 'On display: the exhibition of architecture', in H Abe, *Flicker*, Toto Shuppan, Tokyo, 2005, p. 108.

[3] Cohen, in Feireiss 2001, p. 32.

architecture. This then separates the model from the constraints of 'getting to' a building or for standing in for the design process.

Models, in architecture exhibitions, are seen as more accessible than drawings due to their ability to be grasped by non-professionals.[4] Historically, however, they were an adjunct to drawings and life-size casts in nineteenth century collections, such as in the Victoria and Albert Museum in London or the Musée de sculpture comparée in Paris.[5] The role of the model within the exhibition of architecture has changed considerably since then. Jean-Louis Cohen outlines the use of models in exhibitions, beginning with their role as second-best in a museography centred on drawings.[6] Early collections of models, open to the public, such as that of Sir John Soane in London, opened to the public in 1833 but founded in 1792, began to have an effect on how models were perceived. Models took a pre-eminent role between the two World Wars, asserting avant-garde themes.[7] Cohen argues that the model became the central strategy of persuasion for architects such as Le Corbusier and the Constructivists. As a break with the École des Beaux-Artes, models became both an instrument of the architectural project and a means of communication. This shift was bolstered by the emergence of international periodicals and specialist architecture publishers.

Historically, architecture exhibitions were held in museums for visual or applied art. This influenced how architecture exhibitions were made, and that influence continues implicitly today, according to Bart Lootsma.[8] In this context, there was a latent competition between these works and the other works of art on display. Hence, the preference was for emphasising the originality of works of architectural reproduction, displaying original sketches, drawings and models from architectural offices. The selected architects for exhibitions were presented as artistic geniuses.[9] This then resulted in monographic exhibitions, rather than thematic investigations.

Before the 1970s, models were usually exhibited as adjunct to drawings.[10] In the 1970s, exhibitions then began to shift from focussing on drawings and became centred on the model, making them the basis of the narrative. One of the earliest such exhibitions was in 1973; sixteen

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[4] J-L Cohen, 'Models and the exhibition of architecture', in K Feireiss (ed.), *The art of architecture exhibitions*, Netherlands Architecture Institute, Rotterdam, 2001, p. 25.
[5] Cohen, in Feireiss 2001, p. 26.
[6] Cohen, in Feireiss 2001, p. 26.
[7] Cohen, in Feireiss 2001, p. 26. An example of this is the exhibition at MoMA, entitled 'Modern architecture: international exhibition' (1932), usually referred to by the title of Philip Johnson and Henry-Russell Hitchcock's book *The International style: architecture since 1922*, which accompanied the exhibition. The exhibition centred on four models by Mies van der Rohe, Le Corbusier, JJP Oud and Walter Gropius.
[8] B Lootsma, 'Forgotten worlds, possible worlds', in Feireiss 2001, p. 17.
[9] Lootsma, in Feireiss 2001, p. 17.
[10] K Moon, *Modeling messages: the architect and the model*, Monacelli Press, New York, 2005, p. 18–19.

wooden models of Palladio's villas, built at the same scale, were exhibited in the Basilica in Vicenza, designed by Palladio himself.

The exhibition 'Idea as Model' (1976), curated by Peter Eisenman, presented the model as having an artistic and conceptual existence independent of the project they represented. The exhibition proved that the model was a conceptual, rather than a narrative tool, on the 'border between representation and actuality'.[11] This exhibition and accompanying catalogue shifted the notion of the building as the referent of the model, revising the potential territory of the architectural model.

Karen Moon suggests that the new attention lavished on the objects of architectural representation was also linked to theories of conceptual art, and its importance of the documentation of process.[12] 'Idea as Model' was followed by other shows, and models and drawings began to be taken up by galleries, with more vigorous collecting in the 1980s.[13] The setting up of new architectural museums in the 1980s coincided with growing academic attention on the architectural process, architectural practice, and to the representation of architecture.[14] Entire issues of journals were devoted to models in the 1980s, and many one-off articles.[15] According to Lootsma, by the late twentieth century architecture and architectural representations had thus become part of the media industry.[16]

Recent symposia and exhibitions that have focused on the model have been concerned with the model's place within the design process. They have posited the theory that it is still the presentation model that is lauded as the main type of model, and that the working model has been ignored.[17] Hence, recent exhibitions have focused on the display of the working or conceptual model. These exhibitions result in a displaying of the artefacts of the design process: the model is seen as the detritus and desk clutter of architectural offices. In this context, models are perceived as exploratory and preparatory to a building, the emphasis is on their generative qualities, and their revelatory capacities in getting to the design. In their exhibition, the models

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[11] C Hubert, in K Frampton & S Kolbowski, *Idea as model,* Rizzoli, New York, 1981, p. 17.
[12] Moon 2005, p. 21
[13] Moon 2005, p. 22–3.
[14] Such as new museums: Canadian Centre for Architecture, the Netherlands Architecture Institute, the FRAC Centre (Frons Régional d'Art Contemporain) in Orléans, France, and the Deutsches Architekturmuseum in Frankfurt. MoMA intensified interest and other institutions like the San Francisco Museum of Modern Art began to include models in their scope. Moon 2005, p. 24.
[15] Moon 2005, p. 24.
[16] Lootsma, in Feireiss 2001, p. 22.
[17] For example: 'Models and drawings: the invisible nature of architecture,' AHRA conference, University of Nottingham, 18–19 November, 2005; 'Homo faber' symposium and exhibition, Melbourne Museum, 1 June–2 July, 2006; 'Durbach, Popov, Stutchbury, process: the role of sketches and models in the development of architectural concepts', Sydney, 17 January–4 February, 2006; and 'Supermodels: an exhibition of space and form in architectural models,' Sydney, 2–24 September, 2006.

are seen as objects within a space, rather than spatial examinations, and required to stand in for either the design process or the full-scale building.

The question of how well a non-linear process can be explained by objects within an exhibition arises. Displaying the work as records of a process implies a particular design process. Designers who work outside this process are, therefore, excluded. The Californian landscape architect Thomas Church drew no plans or perspectives of his designs. He took chalk bags and sticks on site and drew his design on the ground and staked the site. His work came about by the diagrammatic drawing within the space.[18] The traditional way of exhibiting architecture would not be able to express the work of such drawingless design.

A recent exhibition in Sydney is an example of the displaying of models as objects in space. 'Supermodels: An exhibition of space and form in architectural models' (2006) included nearly four hundred and fifty models made predominantly by Sydney architects and architecture students[19] (Fig. 1). The impetus of the exhibition was to create a medium between architects and the public, via the showing of their wares, to form a 'table-scape' of models. By placing seemingly dissimilar architectures next to each other, connections and similarities are able to be speculated on, that would not exist at a built scale, or across pages of drawings. By providing a core sample of three-dimensional representation, via a drift-net approach of curating, an overview of one city's architectural labours is able to be seen.

Figure 1: View of 'Supermodels' exhibition, Sydney, 2006.

Although some models in the 'Supermodels' exhibition were historical and *post factum*, these were the minority. The majority of the exhibition showed the model as preparatory to a design. Although these models were not exhibited in order to display the buildings that they represented,

[18] C Girot, 'Some thoughts about landscape education at Versailles', in B Goldhoorn (ed.), *Schools of architecture*, NAI Publishers, 1996, p. 28.

[19] Exhibition curated by Sam Marshall, with financial assistance from the Architects NSW Registration Board Byera Hadley Travelling Scholarship, 2–24 September, 2006, Sydney. See M Macken, 'Supermodels' exhibition review, *Architecture Australia*, November, 2006, pp. 39–41.

they were displayed to represent the design process of which they were a part. However, the models in this exhibition were no longer 'current' within their own design processes and hence, were separated from their earlier roles. They were originally made as ephemeral objects destined to be used and discarded in the course of the project.[20]

Exhibitions deal with 'dead matter', that is, exhibitions interpret a moment in time, and they do not have a lifespan after a few months.[21] The work is detached from the context within which it was made, surviving to 'bear witness to a particular moment'.[22] They become records of a process, inviting reflection that a space of time offers. An example of this is a clear perspex acrylic model of the Sydney Opera House, commissioned in 1966 by the Department of Public Works.[23] This was originally built during the planning stages to study services, such as the heating, cooling and ventilation requirements for the building. It is now a documentary model, remarkable for the technique of modelmaking — the mark of the hand — that is apparent in such an object.

An example of work that acknowledges the temporality of the exhibition is that of Peter Eisenman's project 'House X' (1975) (Fig. 2, 3). Eisenman constructed an axonometric model of 'House X' after the working drawings for the project were finished, and after it was decided not to proceed with the actual house.[24] This model, according to Eisenman, can be seen as the ultimate reality of the work, a final statement of the object's autonomy. This is not a model of the house as it would have been built, but is a work that explicitly comes after the completion of the design process to 'get to' the house's design, yet continues Eisenman's own, ongoing design preoccupations. It may be defined as a *post factum* model.

[20] Cohen questions the many roles the model can take in an exhibition. Cohen, in Feireiss 2001, p. 31.
[21] B Podrecca, 'The exhibition: a substitute reality', in Feireiss 2001, p. 54.
[22] Cohen, in Feireiss 2001, p. 31.
[23] S Meacham, 'After three decades a 2500-piece puzzle is finally solved', *The Sydney Morning Herald*, August 15, 2006.
[24] Frampton & Kolbowski 1981, p. 123.

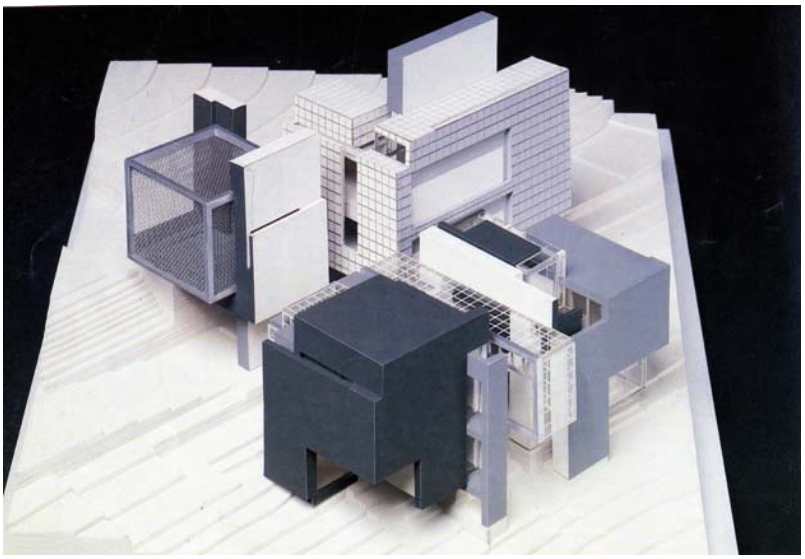

Figure 2: Axonometric model of Peter Eisenman's House X, Scheme H, view from northeast.

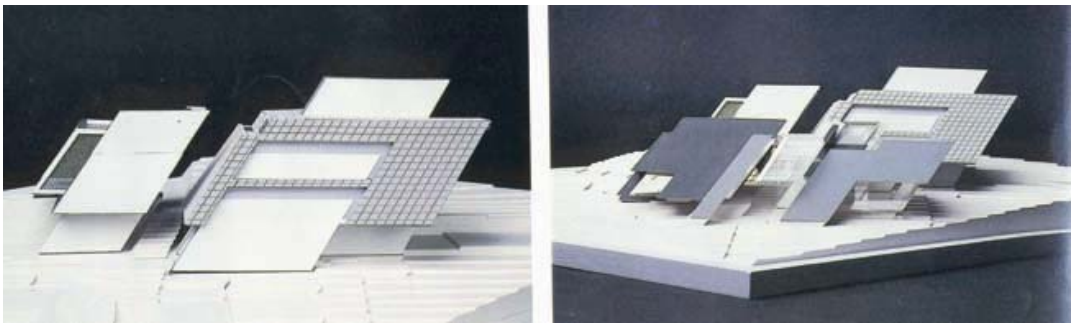

Figure 3: Axonometric model of House X, Scheme H, view from north of interior elevation and view from north.

This project was a model that documented a drawing, specifically the axonometric.[25] An axonometric drawing always has a fixed, usually frontal, viewpoint, different from a model which can be walked around. Eisenman's axonometric models expose the conventions of axonometric drawing by translating them literally into three-dimensional form.[26] The model of 'House X' was partially collapsed, all the uprights leaning forty-five degrees in the same direction.[27] Evans calls

[25] Evans writes that the increasing prominence of axonometric projection, with its subsequent incorporation into the conventional set of architectural drawings is one of two significant changes in drawing practice during the twentieth century. He cites the frequent resort to, and greater investment in, the sketch as the other. R Evans, 'Architectural projections', in Blau, E & Kaufman, E (eds) 1989, *Architecture and its image: four centuries of architectural representation: works from the collection of the Canadian Centre for Architecture* exhibition catalogue, Canadian Centre for Architecture, Montreal, MIT Press, Cambridge, Massachusetts 1989, p. 33.

[26] Hubert, in Frampton & Kolbowski 1981, p. 19–20. Evans has written that it is the axonometric projection that is the most confined within its own geometric definition. Evans, in Blau & Kaufman 1989, p. 34. According to Somol, 'the axonometric simultaneously renders plan, section, and elevation, thus again collapsing the vertical and horizontal'. RE Somol, 'Dummy text, or the diagrammatic basis of contemporary architecture', in P Eisenman, *Diagram diaries*, Thames and Hudson, London, 1999, p. 16.

[27] 'Not to be used for wrapping purposes: A review of the exhibition of Peter Eisenman's Fin d'Ou T Hou S', in R Evans, *Translations from drawing to building and other essays*, Architectural Associations Publications, London, 1997, p. 131.

this the only true transformation, in the mathematical sense of the word, that Eisenman has ever performed on his work.[28]

The axonometric model of 'House X' is a three-dimensional construction made to provide the image of a two-dimensional drawing.[29] The model and the building are both realizations of the drawing.[30] This model can only be seen from a fixed viewpoint, as any deviation from this leads to distortion.[31] According to Eisenman, the viewer is forced into one viewpoint, and hence, sees the model as though through a camera. In this way, the actual photograph of the model is the reality, because it is 'the view which reveals its *conceptual essence* as an axonometric drawing'.[32]

This model does not provide knowledge of the object in a dimensional sense; it is not about reality, but about fiction:

> [I]t provides phantasmogoric images — a sequence of anamorphisms — among which the 'right' image is very difficult to discover. It makes the 'normal' image appear to be an anomaly: we perceive it only at the instant where we see the false image — the model as a two-dimensional drawing — while the 'abnormal' images are in fact the only ones that describe the true nature of the three-dimensional object, the model.[33]

Eisenman's understanding of the power of representation, and the connections between various types of representation, are made explicit in this project. Rather than asking the model to be a substitute for the 1:1 scale version, Eisenman exhibited work within the realm of representation, and sought to subvert the workings of that representation.[34] It is this point, of the explicitness of the limitations and specificity of representation, that influences the exhibition of architecture.

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[28] Evans 1997, p. 132.

[29] Similarly, Coop Himmelb(l)au have said of their work, that the 'the drawing is narrated into the three-dimensional model'. G Zugmann, *Gerald Zugmann: blue universe: transforming models into pictures: architectural projects by Coop Himmelb(l)au*, MAK, Hatje Cantz, Ostfildern, 2002, p. 35. Also architects Durbach Block describe their models as 'a spatial diagram of a drawing'. P McGillick, 'Introduction', *Durbach, Popov, Stutchbury: process: the role of sketches and models in the development of architectural concepts* exhibition catalogue, Utopia Art Sydney, 17 January – 4 February, 2006, n.p.

[30] R Harbison, *Thirteen ways: theoretical investigations in architecture*, MIT Press, Cambridge, Massachusetts, 1997, p. 98.

[31] The model, when viewed from the side and from eye level, is seen as raking in different directions. Then when viewed from a slightly raised angle on the oblique, it is seen as a conventional orthogonal model. Finally when viewed from the oblique at a forty-five degree angle with one eye closed, it appears to flatten out and assumes the precise aspect of an axonometric drawing. Eisenman has said that such a model challenges the traditional idea of possessing the model as an object, since no possession is possible except from a particular point of view. Frampton & Kolbowski 1981, p. 123.

[32] Frampton & Kolbowski 1981, p. 82.

[33] M Gandelsonas, 'Introduction: from structure to subject: the formation of an architectural language', in P Eisenman, *House X*, Rizzoli, New York, 1982, p. 28.

[34] Hubert, in Frampton & Kolbowski 1981, p. 19.

In the 'Supermodels' exhibition, by contrast, architecture is documented by dwelling on the artefacts of architecture's process, hoping that they will elucidate, narrate and comment. This is similar to the notion, as demonstrated by an architecture student's presentation, that via a sequence of sketch models, the 'biography of a design; and by extension, the autobiography of the designer' may be shown.[35]

In displaying the model, exhibitions such as 'Supermodels' are trying to explain the *œuvre*:

> [E]xhibitions of architecture present only documents whose relation to the creative process is indirect. The distinction between the *ouvrage* and the *œuvre*, used in the French legal and political context, but so difficult to translate into other languages, takes on its full meaning here. It is not the *ouvrage*, or the completed building, that is physically present in the exhibition, unless in the case of a prototype or a modular building; it is the *œuvre*, i.e. the project, the intellectual work crystallized in sketches, scale drawings, texts, and of course, models.[36]

This comment relates to displays of models as objects, that take full-scale buildings as their referent and impetus. Drawings and models present architecture, because they are taken to be architecture's representation:

> The drawing and the model deployed in this way, and with this intent, work with a conception of architecture that has two defining characteristics. The first is that they aim to represent part of the process or envisaged outcome. The outcome and the process are determined by a conception of architecture that is structured by the image. The second is that to the extent that representation and the image are dominant then the architectural effect becomes the relationship between representation and meaning. Architectural effect is the registration of architecture's presence.[37]

Since the 'matter' of architecture can never be excluded, the central concern to the documentation of architecture then is the display of that matter, when it has been reduced to its image. Since the question of display takes as a general premise that meaning is an after-effect of the work of technique, Andrew Benjamin argues that matter is not just material presence, but the site of techniques.[38] This then separates matter from tectonics. Therefore, display, and thus

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[35] Morris 2006, p. 40. Also: 'The project's evolution, illustrated by these, stands in for the project as a whole.' Morris 2006, p. 40.
[36] Cohen, in Feireiss 2001, p. 30.
[37] Benjamin, in Abe 2005, p. 108.
[38] Benjamin, in Abe 2005, p. 109.

the exhibition of architecture, becomes the display of technique. What is seen in exhibitions is the tangible realization of the relationship between the material and the immaterial.[39]

This approach can be seen in the exhibitions of the architectural firm Herzog and de Meuron. A strand of their work is purely devoted to the notion of exhibition, which they regard as laboratories of design.[40] In response to the usual type of architectural exhibition, they have said:

> We are not out to fill the exhibition space in the usual manner and to adorn it with records of our architectonic work. Exhibitions of that kind just bore us, since their didactic value would be conveying false information regarding our architecture. People imagine that they can follow the process, from the sketch to the final, photographed work, but in reality nothing has really been understood, all that has happened is that records of an architectural reality have been added up together.[41]

Herzog and de Meuron archive the work produced in their office. They curate, and recurate, their own work, with intra-firm cataloguing and archiving. For them, architecture exhibitions are not about documenting a finished project, or their design process, but rather an exploration into the genre of the architectural exhibition itself.

For the exhibition 'Herzog and de Meuron: Archaeology of the Mind' (2000) at the Canadian Centre for Architecture, it was imagined that the curator was an archaeologist from the future who came across hundreds of models in the Herzog and de Meuron archive without knowing what they meant[42]. The models were then arranged according to formal and morphological criteria, set out to suggest links; they were organised into six lines of development, to imply coherence and to make the contingency of any arrangement clear.[43] These exhibits were not attempting to clarify a linear process but rather were highlighted as fragments seen out of context.[44]

Within the exhibition, each of these objects had its own label. There were no panels of text, no photographs or pointers to existing buildings and no plans were included.[45] Herzog and de

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[39] Benjamin, in Abe 2005, p. 109.
[40] T Weaver, 'Rumble in the jumble', *Log*, Fall, no. 6, 2005, p. 15.
[41] 'Gespräch zwischen Jacques Herzog und Bernhard Bürgi', 14, in Ursprung 2002, p. 21.
[42] The project initiator was Kurt Forster and the curator Philip Ursprung. Ursprung 2002, p. 36.
[43] These lines of development were: Transformation and alienation, Appropriation and modification, Stacking and compression, Imprints and moulds, Interlocking spaces, Beauty and atmosphere. Ursprung 2002, p. 36–7.
[44] Ursprung 2002, p. 37.
[45] Related to the exhibition of architecture is the associated writing that accompanies any contemporary exhibition. The ubiquitous catalogue is seen to have a presence that goes beyond the exhibition, due to its longevity on the bookshelf. Unusually, 'Herzog and de Meuron: an exhibition' (2005) at the Tate Modern in London, had no

Meuron call these archived objects nothing but 'waste products'.[46] Due to this, they have a connection with natural history: as accumulated archival documents, or bones or fossils, they would all be:

> [L]ifeless waste were it not for the special gaze, the creative, attentive, sometimes even loving gaze of the interested beholder who is able to interpret and interrelate the moulded shapes, grooves, indentations and discoloration … We have opened our archive to the interested viewer like a *Wunderkammer* and transferred its contents to the space of the gallery. Since architecture itself cannot be exhibited, we are forever compelled to find substitutes for it.[47]

This 'evolutionary collective', including studies from nearly every one of their architectural works, eschews the overriding conception that meaning in architecture resides in the singular image or artefact.[48] Instead, the display of over one thousand objects almost becomes a landscape itself.[49]

Another point of importance with the exhibitions of Herzog and de Meuron is the location of their work: 'Herzog and de Meuron: An exhibition' (2005) was exhibited at the Tate Modern in London. The exhibition of models has moved from museums to contemporary art galleries, in this case, interestingly, designed by the exhibitors themselves.[50] This potentially paradoxical situation, of exhibiting architecture *in* architecture, is overcome by their reappraisal of their own work: it is not miniature models of the Tate project that are displayed, but rather this work is presented as part of a greater architectural lineage with a degree of variability.

The notion of the difference of the gaze, as mentioned by Herzog and de Meuron, shares a relationship with the exhibition 'Stilled Lives' (2001), by Janet Lawrence. This exhibition used specimens of birds, animal skins, shells and minerals from the Melbourne Museum's reserve collection. Similarly, her exhibition 'Birdsong' (with Ross Gibson, 2006) used the collection from the Australian Museum in Sydney. These exhibitions explored the role of the natural history

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catalogue to accompany it. Weaver compares this to Rem Koolhaas's book *S, M, L, XL* which he sees as a catalogue for a show that never existed. Weaver 2005, p. 17.

46 Herzog and de Meuron 2002, cited by Ursprung 2002, in p. 74.

47 Herzog and de Meuron 2002, cited by Ursprung 2002, p. 74–5.

48 Weaver 2005, p. 17.

49 Weaver 2005, p. 12. This is similar to the assemblage of models of OMA/AMO exhibited at the Neue Nationalgalerie in Berlin in 2004. See C Brensing, 'Koolhaas curated', *Architecture Review*, vol. 215, no. 1283, January, 2004, p. 8; and Oshima, KT 2004, 'Content: Rem Koolhaas/OMA/AMO: buildings, projects and concepts since 1996', *A+U*, February, pp. 6–11.

50 'They won the commission for the museum, as Tate director Nicholas Serota has testified, by committing themselves to preserving the massive emptiness of the central hall. But now, in stuffing this interior with their own architectural works, the architects seem to have succeeded in the ultimate demonstration of having their cake and eating it too.' Weaver 2005, p. 12–13.

museum in shaping our understanding of the world. In reordering and recurating museum collections, the objects were read differently in their new context. By reclassifying objects, their lineage and relationships differ from former natural history categories.

Herzog and de Meuron's process of archiving separates the model from its former, projective role within a design process. The exhibited model does not speak implicitly for the design process, or stand in as a miniature version of the building it developed. Herzog and de Meuron acknowledge the different reading of a model that a span of time creates; no longer does a model sit with others made within the same design process. Herzog and de Meuron realign their models across other projects, and so the models are related to the entirety of the firm's work. The context shifts from one building to that of the firm's greater design process.

These examples of exhibitions that understand the space of time between their making and their display are important for the exhibition of architecture. They acknowledge the different readings of the work due to this gap in time. Other, earlier architecture exhibitions in the 1960s and 1970s, while not concentrating on models *per se*, also influenced the exhibition of architecture.[51] Jean Leering, as director of the Stedelijk van Abbe Museum, Eindhoven from 1964 to 1973, was important in this regard. The van Abbe Museum staged an exhibition of the work of Vladimir Tatlin (1969) which recreated a large model of Tatlin's paper project 'Monument to the Third International' (1919–20). A model of this had been previously exhibited at an exhibition in Moscow in 1920, yet was mainly known from photographs, drawings and descriptions. Thus the exhibition maker, Pontus Hultén of the Moderna Museet in Stockholm, sought to offer visitors a direct experience of the world Tatlin had imagined.[52]

Leering took a similar approach in the Museum's exhibition of the work of El Lissitzky in 1965/66, which reconstructed Lissitzky's 'Axonometric Projection of the Proun Room', originally installed at the Greater Berlin Art Exhibition in 1923 (Fig. 4). Lissitzky produced and exhibited a body of pictorial and graphic work under the general heading of the 'Proun', a neologism coined by Lissitzky, which is an acronym for the Russian equivalent of 'Project for the Affirmation of the New'.[53] Lissitzky defined this as the 'interchange station between painting and architecture'.[54] Lissitzky was concerned about the effect that an unsympathetic display could have on the viewer's response to his work and explored an experimental approach to display

[51] Lootsma, in Feireiss 2001, p. 18.
[52] Lootsma, in Feireiss 2001, p. 18.
[53] AC Smith, *Architectural model as machine: a new view of models from antiquity to the present day*, Architectural Press, Oxford, 2004, p. 103.
[54] C Lodder, 'Seeing red: Lissitzky's abstract cabinet and the ideology of display, *Umění=The Art*, vol. 47, no. 6, 1999, p. 512.

with his Proun Room. Here the entire space was conceived as an installation, an idea central to Lissitzky's new approach.[55]

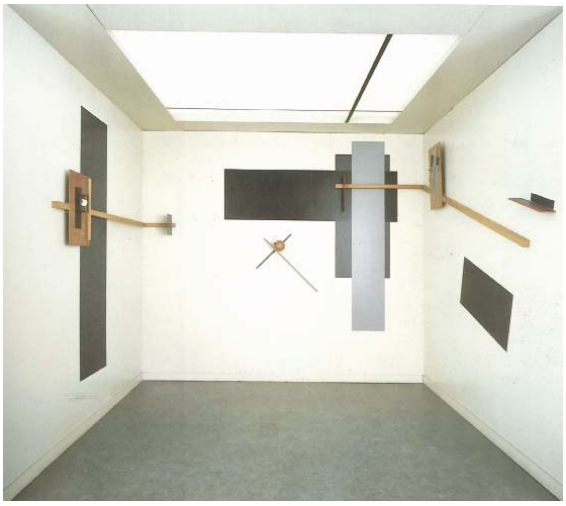

Figure 4: *Prounenraum* (Proun Room), reconstruction (1965, 1923), 300 x 300 x 260cm.

Lissitzky extended the formal language of his Proun composition onto the walls, the ceiling and even the floor, though for technical reasons, the floor element was eventually omitted. Rather than the walls being seen as 'resting places' for pictures, the white planes defining the literal space of the room were absorbed into the work, becoming a direct equivalent to the pure white ground which constituted the infinite spatial backdrop in his Proun paintings.[56] Lissitzky wanted the viewer to move around the room, to explore the shifting optical effects and to gauge the changes produced by seeing the paintings against different colours.[57] Lissitzky writes:

> We saw that the surface of the Proun ceases to be a picture and turns into a structure round which we must circle, looking at it from all sides, peering down from above, investigating from below. The result is that the one axis of the picture which stood at right angles to the horizontal was destroyed. Circling round it, we screw ourselves into the space ... We have set the Proun in motion so we obtain a number of axes of projection.[58]

Yve-Alain Bois writes that Lissitzky wanted to destroy the spectator's certainty and the usual viewing position, that is, 'facing the painting, facing the horizon'.[59] Instead, in a space in which orientation is deliberately abolished, the viewer must be made continually to choose their visual field's coordinates, thereby rendered variable.[60]

Lissitzky designed a similar exhibition space in Hanover, which he referred to as *Demonstrationsräume*, or 'Demonstration Rooms or Spaces'. Here he used display drums, which the viewer turned to see all of the works, and incorporated some of the paintings into a system

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[55] Lodder 1999, p. 513.
[56] Lodder 1999, p. 515; 513.
[57] Lodder 1999, p. 518.
[58] E Lissitzky, 'Proun – not world visions, but world reality', 1922, in Lissitzky-Küppers, *El Lissitzky*, p. 343, in Y-A Bois, 'El Lissitzky: radical reversibility', *Art in America*, vol. 76, no. 4, April, 1988. p. 174.
[59] Bois 1988, p. 174.
[60] Bois 1988, p. 174.

of sliding panels, also to be moved by the viewer. The space of the Proun Room was dematerialised, metaphorically, and the viewer became an integral physical participant in the work of art.[61] Lissitzky stated that the space of the room must be 'lived in' and not be a purely optical experience, with the organisation of the room providing an inducement to walk around in it.[62] Lodder cites this as the first permanent interactive system for showing modern abstract art.[63]

This example is important for the exhibition of architecture for numerous reasons. In its original context, as an exhibition in 1923, it sought to display art work, and hence, to consider that work, in a different, more interactive way. The effect of the display of artwork to which Lissitzky was adverse, is referred to by Johnathan Hill in his essay 'Weathering the Barcelona Pavilion'.[64] Hill writes that artwork in a gallery is primarily experienced in a state of contemplation:

> The contemplation of art is a form of visual awareness, of a single object by a single viewer, in which sound, smell and touch are as far as possible eradicated. Placed in an hermetic enclosure and protected against decay, the artwork is seen but never used. The viewer leaves no trace or mark.[65]

Lissitzky sought to avoid this state of contemplation, by encouraging the viewer to interact with the display. In museums where art formerly held positions of autonomy, it is the spatial organisation which is dominant in this instance. Lodder argues that by exerting control over the individual artworks, Lissitzky endowed the viewer with ownership of the works.[66] The viewer's physical actions, such as moving screens and bending down to see works hung low to the ground, conveyed the idea that the art was not for passive contemplation.[67]

This movement of the visitor, in relation to the articulated walls of Lissitzky's design, is similar to a scratch on the surface of a window appearing to move in relation to the landscape beyond.[68] This is a space created from the relation of objects, directly linked to the movement of the observer; therefore, it exists coincident with the space of the room.[69] It is this point that is integral to the possibilities of architectural exhibitions.

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[61] Lodder 1999, p. 513.
[62] Lodder 1999, p. 513.
[63] Lodder 1999, p. 518.
[64] J Hill, 'Weathering the Barcelona Pavilion', *Journal of Architecture*, vol. 7, no. 4, Winter, 2002, p. 321.
[65] Hill 2002, p. 321.
[66] Lodder 1999, p. 519.
[67] Lodder 1999, p. 519.
[68] RJ Difford, 'Proun', *Journal of Architecture*, vol. 2, no. 2, Summer, 1997, p. 134. Difford attributes this observation to Manuel Corrada, in M Corrada, 'On some vistas disclosed by mathematics to the Russian avant-garde: geometry, El Lissitzky and Gabo', *Leonardo 25*, no. 3/4, 1992, p. 239.
[69] Difford 1997, p. 135.

The Proun exhibition is also important, in the context of the 1965/66 exhibition, in that it is a reconstruction. The reconstruction of spaces is a strong element within the exhibition of architecture. Other examples are the reconstruction of rooms of Frank Lloyd Wright's Francis and Mary Little House II (1912). When this last Midwestern house of Wright's was slated for demolition in the early 1970s — the owners could not find a suitable buyer or alternate use — the Metropolitan Museum of Art, New York stepped in to save parts of it. The living room is reconstructed in the Museum, and the library in the Allentown Art Museum in Pennsylvania. Another space designed by Wright, his San Francisco Field Office (1951), is reconstructed in the Heinz Architectural Centre of the Carnegie Museum of Art in Pennsylvania.

As a metaphor for architecture exhibitions, and more specifically, the notion of reconstruction, Lootsma refers to the Japanese film 'After Life' (1998), directed by Hirokazu Koreeda.[70] The film is set in limbo. Before being admitted to heaven, the deceased are asked to choose their most precious memory. This is then diligently recreated on film, to accompany them to eternity. Extensive discussions are held, in which the deceased have to describe the event as accurately as they can. The setting is then reconstructed as faithfully as possible, the right climate, light and smells simulated, and extras dressed up in order to create the most authentic possible re-enactment of the original experience. The film centres on both how people summon up memories and the notion of a film about making a film, that is, the idea of reconstruction. Lootsma likens this to the issue of making an architecture exhibition. The exhibition is never capable of actually evoking the experience of the building or a piece of the city for the spectator. The experience has to be evoked using different techniques, each of which contributes in its own way to the reconstruction pieced together in the visitor's mind.[71]

The reconstructed Proun exhibition highlights the notion of the visitor being within the work. It is not a reconstruction as the Wright examples are, of the visitor standing in a roped-off doorway looking into the remade space. Rather, the visitor interacted with the artworks in the same way as the 1923 visitor. The visitor is both within a representation of the exhibition, and within the exhibition itself. This offers the opportunity for exhibitions that are no longer contained within exhibition spaces, but become continuous with them.[72] The exhibition of architecture then shifts the status of the model: it is not merely the exhibited, miniature, reverse directional work produced in order to get to a building, but rather, it is the exhibition itself. The reconstructed Proun exhibition may be defined as an exhibition that operates as a *post factum* model of architecture.

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[70] Lootsma, in Feireiss 2001, p. 16.
[71] Lootsma, in Feireiss 2001, p. 16.
[72] Hubert, in Frampton & Kolbowski 1981, p. 20.

A space can be faithfully recreated; however it cannot be inhabited in the same way in which it was originally. Therefore the notion of reconstruction inherently excludes the visitor from being 'within' the exhibition, due to the space that a gap in time creates. The recreated Wright spaces do not allow for inhabitation or interaction either; this is due to their museum-like qualities of hermetically sealed spaces, static at a moment in time. Wright's surviving *in situ* houses are similarly unoccupied by the visitor. These spaces fall under Hill's notion of the contemplation that occurs when experiencing art.

Hill argues that contemplation is not the familiar experience of the building, or a positive one, but architecture is regularly defined in terms similar to art.[73] According to Hill, this is due to the high status accorded to gallery-based art and artists. Therefore, to affirm the status of the architect, 'the experience of the building is equated with the contemplation of the artwork in a gallery, a condition disturbed by the irreverent presence of the user'.[74] This is emphasised by the sense of the unlived-in that is present within the reconstructed Barcelona Pavilion.

Hill writes that the reconstruction of Mies van der Rohe's Barcelona Pavilion displays this act of contemplation. According to Hill, although Solà-Morales, Cirici and Ramos state that the purpose of the reconstruction is to allow the building to be experienced, rather than the black and white Berliner Bild-Bericht photographs, the experience they describe is one in which the visitor is absorbed by the 'artwork', that is, one of contemplation.[75] The previous chapter details this exclusion of the inhabitant, which contributes to the act of contemplation.

Hill proposes that while many contemporary artists are critical of contemplation and attempt to expand the ways in which art is experienced, architects depend on this most traditional experience of art.[76] The Barcelona Pavilion, according to Hill, has been perceived in conditions most similar to that of the artwork, and the pavilion implies that contemplation is the experience most appropriate to buildings. This, he reasons, affirms the authority of the architect and denies that of the user.[77]

The exhibition as model

What, then, of the exhibition of architecture, and more specifically the model, that continues the investigations of Lissitzky's installations of the 1920s? Exhibitions that are displays of the artefacts of the design process, or reconstructions of built projects, are still the dominant modes of exhibiting architecture. At a time when galleries are 'being invaded by screens', whose virtual

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[73] Hill 2002, p. 321.
[74] Hill 2002, p. 321. This could be likened to the notion of exhibiting a full-sized rubbing of a house.
[75] Hill 2002, p. 321.
[76] Hill 2002, p. 321.
[77] Hill 2002, p. 322.

images allow the simulation of movement and the effect of immersion, merely employing various media is not enough to engage the visitor.[78] According to Kristin Feireiss, former director of the Netherlands Architecture Institute, this active engagement calls for a new focus, which must 'facilitate the alternation between concentration and relaxation, entertainment and information, and all must go hand in hand with sensory experiences', yet not attempt the approximation of reality.[79] As Daniel Libeskind writes, architecture exhibitions are most successful when they are not mere representations of a building or a particular work:

> I see them as giving reality to architecture in its experimental form. I do not believe that an architecture exhibition should be considered a simulation or representation of a project, but as a unique testing ground for new ideas on building. Such an approach creates an opportunity to make spaces whose structural and architectural integrity are already part of an organic and ongoing project. This shifts the object-like notion of an exhibition to an investigative process whose results are just as original and as precise as those some call 'real' architecture.[80]

Hani Rashid writes that the architectural exhibition, where a particular notion of 'space' is conveyed, represented, received and experienced, presents a unique opportunity for the architect.[81] It is in these exhibitions that the subject can be enfolded and embedded within the form and space of the exhibition itself.[82] Architectural museums embraced the role of education strongly in the 1980s, seeing the exhibition of architecture's role to inform the public of the potential of architecture, the role of the architect and the social, political and environmental aspects of architecture. However, freed of this instruction, environments may be created that go beyond the merely didactic. These built installations offer the opportunity to experiment at a scale that escapes the constraints of the conventional model.[83]

Rashid cites early examples of this notion of exhibition, such as Donato Bramante's perspectival experiment within Santa Maria presso Santo Satiro (1482), a small church in the centre of Milan. It had no space for a chancel, so Bramante feigned one in flat relief[84], creating perhaps the earliest application of *scenographia* or *perspectiva artificialis*.[85] According to Rashid, this

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[78] Cohen in Feireiss 2001, p. 31–2.
[79] Feireiss 2001, p. 10.
[80] D Libeskind, in Feireiss 2001, p. 66.
[81] H Rashid, 'Installing space', in Feireiss 2001, p. 34.
[82] Rashid, in Feireiss 2001, p. 34.
[83] Rashid, in Feireiss 2001, p. 34.
[84] N Pevsner, *An outline of European architecture*, Penguin, Great Britain, 1951, p. 129.
[85] A Pérez Gómez & L Pelletier, *Architectural representation and the perspective hinge*, MIT Press, Cambridge, Massachusetts, 1997, p. 24.

was a test environment for the future Saint Peter's Church in Rome, allowing Bramante to envision his ideas at full-scale.[86]

Another early example is that of Andrea Palladio's Teatro Olimpico (1584) built in Vicenza. This stage, through the use of principles of perspective, was an environment for envisioning Palladio's model of city space.[87] The Teatro constitutes:

> [A] strategy for the renovation of the city, through an introspective transformation of the city into a theatre … the perspectival representation literalizes a realm lying somewhere between actuality and illusion.[88]

Hubert suggests that this is the space of the model. Aldo Rossi used the same methodology of the theatre set, to transform the actual city into theatre.[89] Rossi's 'Teatro del Mondo' (1980), built for the biennale of architecture, floated across the lagoon from Fusinal to Venice. The model brought together the images that recurred in Rossi's designs and drawings of imaginary structures.[90]

These works, in moving from the didactic, allow the model to take on the role of critique. To be critical, architecture must be 'at a distance from itself and yet within its own boundaries'.[91] Eisenman writes that this dislocation is a preserving, rather than destructive, mechanism for architecture. Architecture must not dislocate itself from reality to simulation, but from reality to reality.[92] The model as the integral structure of an exhibition, rather than a generative miniature within an exhibition, offers the alternate 'reality' to which Eisenman refers, in order to elucidate, narrate and comment. As Herzog and de Meuron write, the reality of architecture 'is not built architecture: an architecture creates its own reality outside the state of built or unbuilt and is comparable to the autonomous reality of a painting and a sculpture'.[93] It is not just the architecture to which the models refer, that is being critiqued, but the genre of the architecture exhibition also: within this context, the hierarchy between finished buildings, sketches, and models can be discussed.[94]

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[86] Rashid, in Feireiss 2001, p. 34.
[87] Rashid, in Feireiss 2001, p. 34–5.
[88] Hubert, in Frampton & Kolbowski 1981, p. 22
[89] Hubert, in Frampton & Kolbowski 1981, p. 22
[90] A Rocca, 'This is not a model: the San Carlino of Lugarno', *Lotus,* no 103, 1999, p. 32.
[91] P Eisenman, 'Critical practice: American architecture in the last decade of the twentieth century', in J Hejduk, E Diller, D Lewis & K Shkapich (eds), *Education of an architect*, Rizzoli, New York, 1988, p. 191
[92] Eisenman, in Hejduk, Diller, Lewis & Shkapich 1988, p. 191.
[93] Ursprung 2002, p. 35.
[94] Ursprung 2002, p. 39.

The examples of the work of Palladio and Rossi, while not trying to recreate a space, could both be seen as propositional, in a reverse directional way. It is not architecture *post factum* that they are trying to document. Similarly, Lissitzky's original Proun exhibition is reverse directional; the imaginary space of the Prouns influencing the real space of architecture, while not a smooth transition, was still the aim. They acted as experiments for the applicability of visual devices to the real world.[95]

To examine exhibitions that are *post factum* and that explore space similar to Lissitzky's work requires an alternative way of documenting architecture. This alternate way of documenting, and hence, exhibiting architecture needs to redefine architecture. A space can be delineated by its form, its edges, or it can be defined by the actions that are performed, and the connections between people that occur, within it. By defining a space as that which encapsulates actions, rooms may be delineated by the reach of a person, carved out by the actions of a person, as though they are leaving a trace as they move, a windscreen wiper of living, through the repetition of an act.[96]

Reverse directional documentation does not directly show the actions that take place within a space; we must infer these from the rooms' fittings and fixtures, and the names on the plan. Italo Calvino, in his book *Invisible Cities*, defines a city by the relationships between its inhabitants, rather than by its buildings:

> In Ersilia, to establish the relationships that sustain the city's life, the inhabitants stretch strings from the corners of the houses, white or black or grey or black-and-white according to whether they mark a relationship of blood, of trade, authority, agency. When the strings become so numerous that you can no longer pass among them, the inhabitants leave: the houses are dismantled; only the strings and their supports remain … Thus, when travelling in the territory of Ersilia, you come upon the ruins of the abandoned cities without the walls which do not last, without the bones of the dead which the wind rolls away: spiderwebs of intricate relationships seeking a form.[97]

Defining architecture by that which it encapsulates, allows the 'spiderwebs of intricate relationships' to be given form or materiality. Modelling the actions that are performed in the space of architecture, therefore, models the architecture. This is referred to as a model of an

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[95] Smith 2004, p. 106.

[96] 'The border is not a product of repetition. Repetition is only the means of making the border visible. The line of the border is covered with dust, and repetition is like the whisk of a hand removing the dust.' M Kundera, *The book of laughter and forgetting*, Alfred A Knopf, New York, 1980, pp. 216–8.

[97] I Calvino, *Invisible cities*, Picador, Great Britain, 1979, p. 62.

action. In examining the model of an action, the possibilities of the exhibition of architecture as *post factum* model may be seen.

The model of an action

The Shinkenchiku competition, The Plan-Less House (2006), explores the representation of a space, without using conventional plans.[98] The organisers suggested mapping the use of the house by its inhabitants, similar to the idea of the model of an action. The house could be described by a technique of scanning: those areas that came into contact with the body would be mapped. Therefore, the representation of the house is not connected with spatial division, that is, by marking the location of walls, but rather, with its use by inhabitants.

The work of Allan Wexler, Elizabeth Diller and Ricardo Scofidio also explores this realm of the body in space documenting architecture. Diller and Scofidio, both architects and artists, extend the idea of models, to include work that may lie outside the conventional realm of the architectural scale model. Their work may not 'look' like models, as conventionally perceived, but there are things that make it 'like' a model, that is, they offer an account of relationships of drawing, models and buildings and, defined as documentary, their work sits within the definition of model of an action. While their work centres on making pseudo-environments, drawing on performance and media art, it can be seen as *post factum*.

Diller and Scofidio have written of the traces the inhabitant makes upon a space, the path of the person and the arc of their actions, within the space of a building. These traces of the everyday:

> [P]unctuate floor and wall surfaces: the intersecting rings left by coffee glasses on a tabletop, the dust under a bed that becomes its plan analog when the bed is moved, the swing etched into the floor by a sagging door.[99]

It is these marks, these traces, that signify the inhabitation of architecture, and to Diller and Scofidio, the body is inseparable from the conception of space. It is this investigation that they pursue in their exhibitions, and may be seen as examples of the documentation of architecture as *post factum* models.

American artist Allan Wexler defines architecture as 'choreography without a choreographer, structuring its inhabitant's movements'.[100] Bernd Schulz writes that:

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[98] 'Shinkenchiku competition 2006: the plan-less house', *The Japan Architect*, Winter, no. 64, 2007, pp. 7–12.
[99] E Diller & R Scofidio, *Flesh: architectural probes*, Princeton Architectural Press, New York, 1994, p. 99.
[100] GG Galfetti (ed.), *Allan Wexler*, GG Portfolio, Barcelona Spain, 1998, p. 22.

> If a man standing upright was the measure of all things for Le Corbusier … then for Wexler the measure is man in motion. Humans are dancers who create their space through rhythm and movement.[101]

Diller and Scofidio's notion of the body in space as documenting the space, is shared by Wexler. In examining the work of these artists and architects, the possibilities in documenting a space *post factum* may be analysed.

By looking at their work, and that of others, three different ways of representing this inhabitation of space are seen. These are to represent the objects involved in a particular action, or patterns of movement, that occurs in the space, in a way that highlights the action; to document the action itself; or to document the result of the action. These can all be defined as models of an action.

The first way, the examination of the body in a space via an action's objects, is explored in Wexler's project 'Crate House' (1981) (Fig. 5). In this project, he divided the house into its basic activities: bedroom, bathroom, kitchen and living room. Each of these is then defined by their artefacts, contained in their own crate on wheels, which is rolled out when needed. At any point in time, the entire house becomes the activity due to its crate:

> When a room such as the kitchen is needed, that crate is rolled in through one of the door openings. When the occupant is tired, the entire house becomes a bedroom, and when the occupant is hungry, it becomes a kitchen … I view each crate as if it is a diorama in a natural history museum — the pillow, the spoon, the flashlight, the pot, the nail, the salt. We lose sight of everyday things. These things I isolate, making them sculpture: their use being theatre.'[102]

[101] B Schulz, 'Introduction', in Galfetti 1998, p. 7.
[102] Galfetti 1998, p. 42–5.

Figure 5: Allan Wexler, 'Crate House' (1991).

The work of Andrea Zittel explores similar ideas. 'A–Z Comfort Unit with Special comfort Features by Dave Stewart' (1994–5) is made up of five segments, the centrepiece being a couch/bed, which is surrounded by four ancillary units on castors. These offer a library, kitchen, home office and vanity unit. The structure allows the lodger never to need to leave the cocoon-like bed, as all desires are an arm's reach away.

Another of Wexler's projects, 'Scaffold Furniture' (1988), also represents the objects involved in an action, to highlight the activity (Fig. 6). This project examines the ritual of eating a meal. The components of the dining table are isolated, without the structure of the table to join them: the chair, plate, cup, glass, napkin, knife, fork, spoon and lamp are suspended by scaffolding. Their connection, rather than being that of objects sharing a tabletop, is seen to be the (absent) hand that uses them during a meal. Hence, the act of eating is highlighted. In these examples, the actions performed within a space are represented by the objects involved in the action.

Figure 6: Allan Wexler, 'Scaffold Furniture' (1988).

Similarly, the work of artists Claire Healy and Sean Cordeiro indirectly references the activity within a space, by the collating of detritus involved in the act of living in a space. Their work 'Hamper (9 months and a hangover)' (2006) collected every piece of printed material that entered their house during residencies in Tokyo and Berlin, alongside the beer bottles that remained after

their going-away party. In 'Deceased Estate' (2005) they wrapped the entire contents of an abandoned warehouse in string, like a giant parcel. The objects left behind stood in for the actions with which they were involved.[103]

A second way of representing the patterns of movement within a space is to represent the action itself. The Japanese tea ceremony breaks the act of drinking into many parts, separating and dissecting the whole as a way of then reassembling it as though it is one continuous action. Wexler likens this to an Eadweard Muybridge film of a human in motion.[104] This one action is then housed in a particular building, so that when devoid of people, the action itself still has a presence.

Another example of documenting the inhabitation of architecture, by drawing the actions within the space, is time and motion studies, such as those of Rene W.P. Leanhardt[105] (Fig. 7). In one series of photographs, lights were attached to a housewife's wrists, to demonstrate the difference in time and effort required in the preparation of a dinner prepared entirely from scratch in ninety minutes, and a pre-cooked, pre-packaged dinner of the same dish, which took only twelve minutes (Fig. 8). These studies are lines of light, recorded as line drawings on a photograph of the kitchen. They record the movement of the person in the room, of the action they perform, but they also draw the kitchen in a way conventional documentation does not.

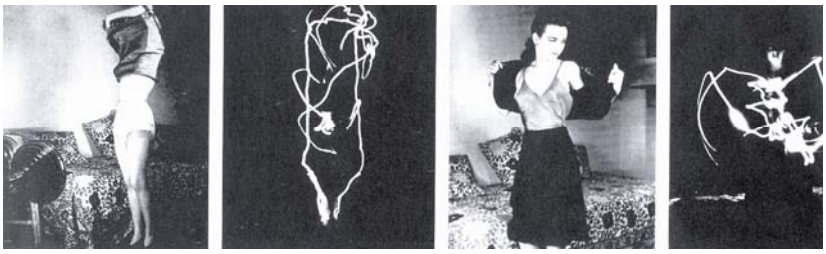

Figure 7: Time-motion studies titled 'The Camera Reveals that You are Ungraceful' by Rene W.P. Leanhardt.

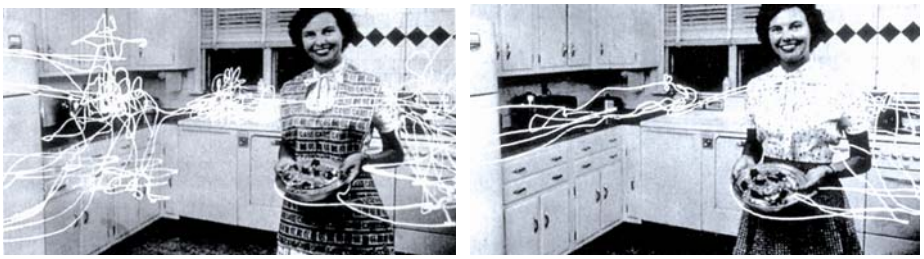

Figure 8: Time-motion study: lights attached to a housewife's wrists in the preparation of a meal.

[103] Similarly, 'Self-storage' (2006), part of the Balnaves Foundation Sculpture Project at the AGNSW, was the housing of their left-behind possessions after a two year absence from Australia. Stored in boxes in a garage, they were rehoused, upon their return, in the gallery.

[104] Galfetti 1998, p. 31. He is referring to Muybridge's 'The human figure in motion' (1887–1901), which filmed activities such as, for men, 'lifting log' and 'walking upstairs and downstairs' and for women, 'standing and ironing' and 'falling onto mattress'. See E Muybridge, *The human figure in motion*, Dover Publications Inc., New York, 1955 [1901].

[105] Diller and Scofidio 1994, p. 40–1.

Another example of modelling the action within a space is Diller and Scofidio's examination of the activity of housework. As one of the networks of systems organising bodies, objects, actions and spaces in what is known as the 'home', it may also be seen as a model of architecture. Housework operates on 'hourly, daily, weekly, monthly and seasonal cycles — each repetition, a habitual restoration to an ideal order'.[106] Their project 'Bad Press' (1993) examined ironing in relation to the cult of efficiency and the domesticated body. Ironing is governed by minimums:

> In pressing a shirt, for example, a minimum of effort is used to reshape the shirt with a minimum of flat facets into a two-dimensional, repetitive unit which will consume a minimum of space … When worn, the residue of the orthogonal logic of efficiency is registered on the surface of the body.[107]

Their work questions the aesthetics of efficiency, freeing ironing from this practice, to result in what they term 'dissident ironing'.[108]

Diller and Scofidio see ironing, as emblematic of housework, as within the network of practices that are therapeutic because of their repetitive motions and their part in maintaining domestic order and control.[109] Their project 'the withDrawing Room' (1987) examines the home's other organising strategies, such as property rights, rules of etiquette and the marriage contract. By creating a series of domestic *mise-en-scènes*, Diller and Scofidio portray that which representational drawings of the house do not. According to Georges Teyssot, this project renders visible 'the shattering of conventional domestic space, through the dis-embodiment of place and the dis-placement of body'.[110] The visitor does not occupy the space of the exhibition. This absence refers to the notion that the body inhabiting architecture leaves traces, and it is these which are exhibited.[111]

Examples of the model of an action have been shown, that represent the objects involved in a pattern of movement, to highlight the action, and as documents of the action itself. A third way of representing the inhabitation of architecture is to document the result of an action. As an analogy, Raoul Bunschoten writes of the marks of a knife being the manifestation of the act of cutting:

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106 Diller & Scofidio 1994, p. 61.
107 Diller & Scofidio 1994, p. 43–4.
108 Diller & Scofidio 1994, p. 43–4.
109 Diller & Scofidio 1994, p. 59.
110 G Teyssot, 'The Mutant Body of Architecture', in Diller & Scofidio 1994, p. 9.
111 The 'traces of non-occupation as well as of occupation seemed to provide a schematic archaeology by which to begin again'. A Vidler, in C Reed (ed.), *Not at home: the suppression of domesticity in modern art and architecture*, Thames & Hudson Ltd., London, 1996, p. 174.

> [I]ncisions imply the use of a cutting tool. Together, cuts and cutting tool embrace a special condition. The actual movement of the incision is fleeting, the cut or mark stays behind, the knife moves on, creating an apparent discontinuity … The space of the cut is a reminder of the knife, its shape and its movements: the preparation, the swoop through the air, the cutting, withdrawal, the moving away. These movements remain implicitly connected with the cut as its imaginary cause, as a mnemonic programme about a hand holding a knife, incising a surface, severing skin.[112]

As a method of documenting actions, the paintings of Jackson Pollock can similarly be seen as a manifestation of an act. In the late 1940s, Pollock began to drip paint onto a canvas laid flat on the floor; his tools were sticks and old caked brushes. This process clarified his work, allowing him to walk around it and work from all four sides. Robert Hughes describes it as 'painting "from the hip" … swinging paintstick in flourishes and frisks that required an almost dancelike movement of the body'.[113] The result had no figure-ground, no holes; the canvas was filled, the picture plane turned into a 'continuum of small incidents, loops and spatters of paint; particles across the surface'.[114]

Pollock's gestures were made manifest by these paintings. As his arm swung in space, the dripping paint followed that arc, to be preserved on a flat plane as pictorial space. Pollock's lines are not tracing a contour or delineating a form: line 'was no longer *out*line. It did not mark edges or define edges'.[115] Rather the line documented the result of Pollock's action, similar to Bunschoten's metaphor of the cut indicating the act of cutting. By shifting to working on the horizontal, Pollock's works are no longer paintings, but documents.[116] In this regard, they display a link to the paradigm shift that occurred in Lissitzky's work, that is, the alternative viewing of art that the Prouns offered.[117] Leo Steinberg writes, in reference to this shift, that 'the horizontality of the bed relates to *making* as the vertical of the Renaissance picture plane relates to *seeing*'.[118] This is the status that Lissitzky wanted to assign to his Prouns.[119]

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[112] R Bunschoten, 'Cutting the horizon: two theses on architecture', *Forum*, November, 1992, p. 40.
[113] R Hughes, *The shock of the new: art and the century of change,* British Broadcasting Corporation, London, 1980, p. 154.
[114] Hughes 1980, p. 154.
[115] Hughes 1980, p. 262. What Pollock discovers, according to Deleuze, is the "'catastrophe" of the visual — catastrophe not as content (as in romanticism), but as a force or potential inherent in pictorial space as such'. J Rajchman, *Constructions*, MIT Press, Cambridge Massachusetts, 1998, p. 68.
[116] Bois 1988, p. 174
[117] Bois writes that Leo Steinberg saw this same shift in the work of Rauschenberg, and is present in the work of other twentieth century artists, such as Mondrian. Steinberg used the term 'flatbeds', that is, surfaces upon which data is entered and information may be perceived, printed or impressed. Bois 1988, p. 174.
[118] L Steinberg, 'Other criteria', in *Other criteria — confrontations with twentieth-century art*, Oxford University Press, London, pp. 84–90, cited in Bois 1988, p. 175.
[119] Bois 1988, p. 175.

A more recent example of the documentation of an action, by representing the result of the action itself, was undertaken by Asymptote and the students at Columbia University Graduate School of Architecture in their exhibition at the Venice Biennale of Architecture in 2000. A gymnast moving through the interior space of the pavilion was recorded using a process of digitization and augmentation. Using modelling procedures, the spatial information was then reconstructed to become a full-scale architectural re-enactment of the gymnast's trajectory through the room.[120] This is similar to a recent performance by Australian contemporary dance company Chunky Move, called 'Glow'. Infra-red video tracking took a picture of the dancer twenty-five times a second. This was used to generate shapes and images based on the movements of a solo dancer, which were projected onto the floor and onto the dancer herself. In the past, when the company has used DVDs or videos, the dancer has had to match what they were doing to the projection. This shifts the technology to following the dancer.[121] These are both examples of the documentation of an action to create a model of an action. They relate to the reconstruction of Lissitzky's Proun space, that is, representation of the space, in the space.

In another study, Wexler also recorded the manifestation of an action. He placed a chair in a one-room building. It was attached to lengths of timber that extended outdoors through slots in the walls of the building. As the chair moved inside the building, its projections carved grooves in the ground outside. As the chair moved in a particular pattern, deeper grooves were created: '[e]ventually, the occupant of the chair has no choice in his movement; the architecture moves him'.[122] The pattern of movement creates a result, which in turn influences the movement. As a model of an action, this could also be called a model of the architecture of habit.

By defining architecture as that which embodies actions, allows the inhabitation of space to be documented by the model of an action. This shift in the reading of architecture due to a different definition allows the model of an action to be a *post factum* documentation of architecture. Architecture, then, is not exhibited by the reductive methods of displaying the artefacts of the design process to 'get to' the building, or through reconstructed spaces. It is exhibited by the documentation of the use of the architecture. These examples of documenting architecture as *post factum* models of an action allow the model to operate autonomously, separate from the confines of the projective miniature. The model of an action acknowledges the intimate relationship between the inhabitant, the action and architecture.

An outcome of documenting the space of architecture by its actions is that the perimeter of architecture can be extended. No longer is the building bounded by its doors and walls, but

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[120] Rashid, in Feireiss 2001, p. 40.
[121] P Bibby, 'Dancer in the dark is light years ahead', *The Sydney Morning Herald*, March 22, 2007, p. 3.
[122] Galfetti 1998, p. 14.

rather, by the extent of its patterns of movement. A homeless person, who roams the city to perform various functions, could define their house by their route, by the extent of where their domestic activities take place, so a 'bedroom' might be kilometres from a 'kitchen'. By conventional documentation, a homeless person is, therefore, also drawingless.

Artist and architect Richard Goodwin made a film with John Drews and Peter Dallow called 'The Inhabitant' (1980). The subject was an old man, Joseph Cindric, who pushed a steel trolley with motor bike wheels around Sydney. The circular path he trod was constant, choosing homelessness over architecture in an attempt to make sense of his own life.[123] Goodwin describes this trolley, now held at the Powerhouse Museum in Sydney, as an 'exoskeleton for the body'.[124]

This film could be seen as documentation of Cindric's home. Rather than seeing architecture as a closed system, such documentation begins to interact with the city. This allows a different reading and representation of the city from that shown in the Panorama model of New York and other city models.

Redefining architecture by what it encapsulates rather than by the enclosure itself allows architecture to be documented by the *post factum* model of an action that occurs in that space. This leads to the exploration of architecture, formed by the body within it, since the documentation and representation of architecture starts to affect the reading of architecture. Architecture may then be seen as that which encloses the inhabitant.

The model of enclosure

The documentation of the body and the space it makes is explored in the work of the Hungarian architect Imre Makovecz. Makovecz, and a circle of like-minded architects and artists, embarked on a series of experiments analysing the patterns of human motion and subsequently set up a competition based around the search for a minimum existential space. This consisted of mapping human motion in certain spatial conditions and situations. Small light bulbs were attached to points on the limbs and joints and photographed, creating a series of curves and forms. This led to a competition called 'Minimal Space' (1971–2), in which architects, artists and designers were invited to consider a minimal space for containting the human body and a new notion of personal containment. Makovecz's own repsonse took the form of a bell-like capsule

[123] R Goodwin, 'Freedom from the sewer', lecture transcript, 'The big sky: landscape on the Pacific edge' landscape architecture conference, UNSW, 27–30 September, 1995.
[124] Goodwin 1995.

composed of a double shell expressing its presence and location in both time and space[125] (Fig. 9). As Makovecz explains it, the inner-wall is the time-sensitive personal life itself, dependent on the individual, and the outer wall is stationary in time.[126]

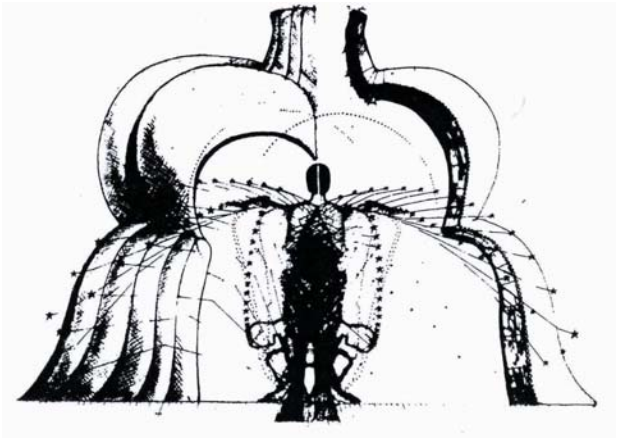

Figure 9: Imre Makovecz's entry for the 'Minimal Space' competition (1971–2).

This example is similar to Leanhardt's time and motion studies in that it is a drawing of a body in space. However, in 'Minimal Space', the architecture arises from the actions of the body in space, that is, its actions give it form.[127] In Leanhardt's studies, the body inhabits and documents an existing space.

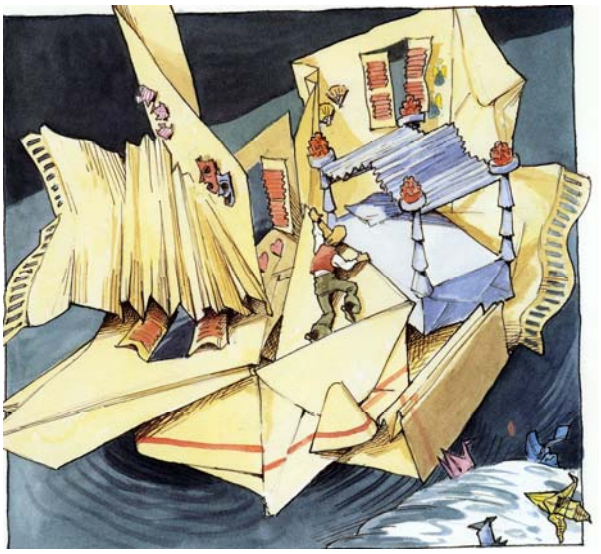

Figure 10: Illustration from the book *Paper John*.

The children's book *Paper John* continues this notion of architecture as the body's surrounds. It follows the story of a man who folds paper to create his house and his world: '[h]e set to work, bending, scoring, pinching as fast as he could. The walls of the house began to change shape'[128] (Fig. 10). This is an example of an architecture that not just encloses actions, but is created by the inhabitant's action of encompassing. This reading of architecture requires, therefore, different *post factum* documentation.

[125] E Heathcote, *Imre Makovecz: the wings of the soul*, Academy Editions, West Sussex, 1997, p. 120.
[126] Heathcote 1997, p. 120.
[127] Heathcote 1997, p. 120.
[128] D Small, *Paper John*, Farrar, Straus and Giroux, USA, 1987, n.p.

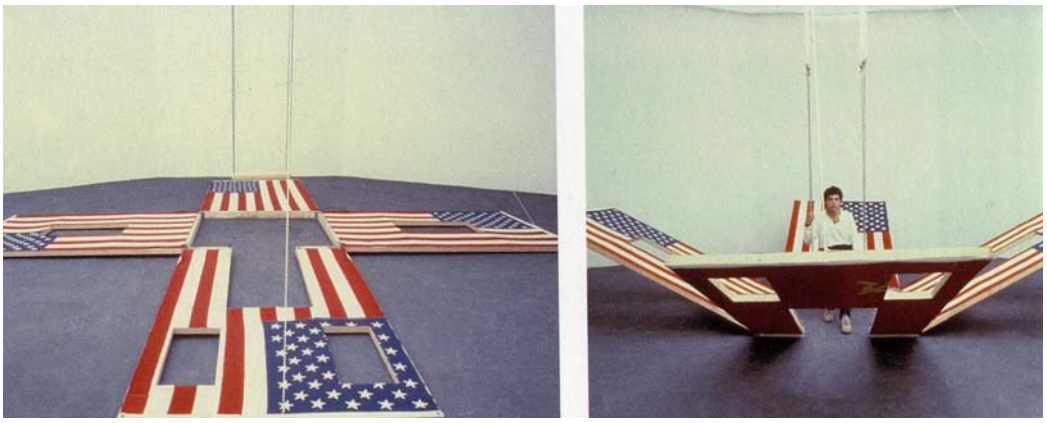

Figure 11: Vito Acconci, 'Instant House (1980).

Vito Acconci, an artist turned architect by virtue of his installation work, explores this notion of enclosure in his work.[129] In 1980 Acconci began his series of 'self-erecting architectures,' vehicles or instruments involving one or more viewers whose operation erected simple buildings.[130] In his project 'Instant House' (1980), a set of walls lies flat on the floor, forming an open cruciform shape (Fig. 11). By sitting in the swing in the centre of this configuration, the visitor activates an apparatus of cables and pulleys causing walls to rise and form a box-like house. It is a work that explores the idea of enclosing, of a space being something that has to be constructed, in the same way, for example, one builds up meaning.[131] According to Rashid, Acconci's installations, while implicating a new sort of urban space predicated on experimental environments, invert the situation of the architectural installation, transforming the urban situation into an installation itself.[132]

This documentation of architecture directly references the inhabitation of architecture. As a *post factum* model of architecture, Acconci's work is closely linked to the body in space and the actions they perform. By examining the actions and movement patterns within a space allows the inhabitation process to be seen as a dynamic process. David Owen likens this to the biological process of 'ecopoiesis': the process of a system making a home for itself. He describes the

[129] Rashid, in Feireiss 2001, p. 38.
[130] V Acconci & K Linker, *Vito Acconci*, Rizzoli, New York, 1994, p. 114.
[131] C Poggi, in Reed 1996, pp. 247–8. On these walls are emblazoned American and Russian flags; the participant brings these signs to view.
[132] Rashid, in Feireiss 2001, p. 38.

building and its occupants jointly as the new system, in a system of shaping and reshaping themselves until there is a tolerable fit.[133]

The definition of architecture as being that which encloses us, interests Edward S. Casey:

> In standing in my home, I stand *here* and yet feel surrounded (sheltered, challenged, drawn out, etc.) by the building's boundaries over *there*. A person in this situation is not simply in time or simply in space but experiences an event in all its engaging and unpredictable power. In Derrida's words, 'this outside engages us in the very thing we are', and we find ourselves subjected to architecture rather than being the controlling subject that plans or owns, uses or enjoys it; in short architecture 'comprehends us'.[134]

This shift in relationship between the inhabitant and architecture also shifts the documentation and reading of the exhibition of architecture. The redefinition of architecture as that which encloses the actions of the inhabitant allows the documentation of those actions to be a method of documenting the architecture. Those actions can then be seen to influence the architecture. Architecture, in this way, encloses the inhabitant and hence, leads to Casey's notion of architecture comprehending the inhabitant.

This chapter investigates the notion of the exhibition of architecture as a type of *post factum* documentation. In this role as documentation, the exhibition can be seen as a model of architecture. A specific example of this is the model of an action. Through an examination of the work of architects and artists such as Peter Eisenman, Herzog and de Meuron, El Lissitzky, Diller and Scofidio and Allan Wexler, the model is placed within an expanded field, releasing it from the constraints of solely documenting an unbuilt project or from representing the design process in an exhibition. To call this work *post factum* models shifts the model from being an object within the space, to being the premise of the exhibition. The model as documentation allows the definition of architecture to be reassessed, while revising the potential and territory of the *post factum* model.

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[133] Owen, cited in S Brand, *How buildings learn: what happens after they're built*, Phoenix Illustrated, London, 1997, p. 164.
[134] ES Casey, *The fate of place*, University of California Press, California, 1998, p. 314.

Conclusion

Within architecture, the word 'documentation' is used to describe drawings that are made to imagine an unbuilt building. These are seen to be produced at the end of the design process. Due to the appropriation of the word by this drawing practice, *post factum* documentation is seen to be similarly excluded from the design process, but even more removed, supposedly coming well after the 'design' has been completed. Hence, *post factum* models are aligned with replicas of historical buildings: they are seen to be three-dimensional substitutes for full-scale work. These are perceived as separate from the design process, with sketch or process models seen as 'design' models. It is these models that are seen as the dominant practice within architecture and hence, command the subject of design conversations. This thesis explored the notion of *post factum* documentation of architecture, specifically the role, potential, specificity and limitations of *post factum* architectural scale models.

An outcome of this investigation is to reposition the model within an expanded notion of the design process. *Post factum* models are not neutral representation that merely document a presence. As the case studies have shown, these models are interpretive and, therefore, exploratory and generative. Placing *post factum* documentation within the design process gives a different reading to after-the-fact documentation. Giving a presence to the under-examined realm of *post factum* documentation questions the hierarchy of certain activities within the design process: by including that which is seen to exist separate from and outside the design process brings the notion of reflection to reside within the design process.

This results in questioning the notion that the unrelenting endpoint of design is the 1:1 scale building. There is a long held perception within design education that the full-scale is the authentic, superior endpoint of representation. The building as referent concentrates on design as an outcome, that is, design-the-noun. Examining *post factum* documentation within the context of the design process acknowledges the reflective and recursive nature of the design process and shifts the emphasis, instead, to design as a process or design-the-verb.[1] Concentrating on design-the-verb acknowledges the ongoing, individual design process with which a designer is engaged. The discourse then extends and accumulates across many

[1] R Glanville, 'An irregular dodekahedron and a lemon yellow Citroen', in L van Schaik (ed.), *The practice of practice: research in the medium of design*, RMIT University Press, Melbourne, 2003, pp. 259–60.

projects by a designer, rather than being confined to one project's process. Thus the model is freed of the constraints of 'getting to' a building.

Reading *post factum* documentation as existing strongly within the design process acknowledges the level of interpretation within the work. For the work to be excluded from a design process undermines the level of design intent that the work embodies. For example, the Panorama of the City of New York model gives a particular reading of the city: it is seen as a site of stasis between each update of the model, having a quiescence that leads to movement via each phase of the model. The temporality of the city as shown on the model renders the city as a seamless entity, without fallow sites: a designed destiny whose surface predominates. The specificity of this type of representation allows various readings of the city. Hence, *post factum* documentation is the site for exposition and commentary of the city.

Aligning *post factum* documentation with the design process acknowledges the inherent design potential of the work, both in its making and its reading. For example, naming Mario Botta's interpretation of San Carlo a full-scale *post factum* model allows the work as model to be both documentary and propositional. It demonstrates the possibilities of the model to be both connected to the original seventeenth century work by Borromini and be projective and relevant to contemporary architecture and representation.

Hence, to call a work a 'model' does not diminish the power of autonomy of the work, the strength of its design component, or its scale. Rather, to name it a 'model' elevates the potential of representation and acknowledges the interconnectedness of architecture's forms. A model then is both a version of another representation and is independent of it. To define a model otherwise undermines its power of representation.

For the case studies *not* to be named '*post factum* models' allows the possibility of conflating simulacra with the thing imitated.[2] In the case of the reconstructed Barcelona Pavilion, calling the work a *post factum* model eliminates the possibility of the work usurping the original or any subsequent representations. To read a building as a model omits the notion of the 1:1 scale building as endpoint: the building as ultimate referent is not adhered to within the realm of the *post factum* model. The pavilion is seen then as part of a lineage of representation, and object, process and representation shift in relation to each other. Representation is seen as the site for architectural production, not subservient to the full-scale object.

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[2] See G Dodds, *Building desire: on the Barcelona Pavilion*, Routledge, London, 2005, p. 5.

Examining the exhibition of architecture as *post factum* documentation allows the notion of the model of an action to represent architecture. This shifts the model from being an object within the space, to being the premise of the exhibition. The model is not standing in for the process of design, or the full-scale building. Instead, the model of an action questions the act of contemplation inherent within exhibitions, and the model as critique may be examined. As Harbison writes, models and model-like procedures 'often function as revealers or dissectors of reality'.[3] *Post factum* models offer the potential for three-dimensional architectural critique and theory, that is, the model as response.

[3] R Harbison, 1997, *Thirteen ways: theoretical investigations in architecture*, MIT Press, Cambridge, Massachusetts, p. 92.

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