



**The Model Image**  
**Changing Perspectives for Architectural**  
**Modelling in the Context of Design Imaging**

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## **Introduction**

Designing is a specialized, unpredictable development process which is to a large extent visually generative and reflective – and, as such, predominantly pre-linguistic. Architectural designers make creative use of various imaging techniques, in order to elucidate design concepts that would otherwise remain ‘figments of the imagination’. By projecting their ideas, into readable information, these may be shared, communicated, evaluated and developed further.

In this context, various types of models play an important role on different levels of design driven enquiry and representation.

This contribution explores the dynamic conditions and potentials of models in architecture, in particular as a prerequisite for visual exploration and communication.

## **The mental model**

Architects and urban designers talk and write extensively about their plans, but this all too frequently amounts to ‘putting into words’ what has been conceived visually beforehand, using some kind of design medium (or: combination of media).

Expressing the many faceted, explicit and implicit qualities of a design verbally often proves to be no easy thing. As a consequence, architectural rhetoric can come across as fuzzy or veiled. As such, imaging methods and techniques remain an indispensable feature of the ‘language’ of design.

The most direct design medium is undoubtedly the (free hand) drawing. Active drawing is an efficient way of ‘capturing’ aspects of the transient and elusive mental model of the design concept. Essentially, such design-driven delineation activities involve the transformation of an imagined spatial composition, or its constituting parts, putting them ‘down’ into a two-dimensional graphic format. In the process of doing this, it frequently becomes clear that a designer’s mental construction is not ‘fixed’, but pliable and open to changes in interpretation and explorative variation.

In the course of such designerly enquiry, conceptual shifts can occur freely and be incorporated into the transformed concept. Through the art of drawing, design considerations are put into action via the eye-hand ‘extension’ the brain.

Such design driven study, involving consecutive (re)drawing cycles, can lead to almost spontaneous reinterpretation, redefinition, alteration and refinement. The way the 'model' of design has changed becomes evident when a package of successively developed design sketches is reviewed. This characteristic changeability of design notions may be considered a typical and acceptable trait of the associative and interactive phases of early design development, but this is very much less the case when more 'formalised' drawing platforms are introduced. When the ideas are translated into more definitive 'technical' drawings, by drafting on paper or in the computer, there tends to be far less freedom.

When working in such clear-cut design notation formats, it is imperative that certain elementary design aspects have been tested to such an extent that they are more or less fixed. The 'conversation' of the more or less spontaneous idea phase is replaced by a measure of order and internal 'consensus'.

### **The schematic model**

Architectural designers and researchers do not only rely on drawing techniques to 'picture' their ideas. Various types of model 'constructions' may also be considered and utilised as vital design media.

Modelling activities are generally accompanied by a measure of abstraction or reduction. For instance, in 'scientific' models of thought, an idealised situation is often created, in which distracting influences are as it were 'removed'. Thereby, a clearly focused view on the subject of study may be generated in such a way that hypotheses can be tested effectively. Similarly, in design it can be fruitful to 'isolate' one particular planning feature, so that the design problem at hand may be resolved clearly.

One of the 'irritating' characteristics of design is, however, that a successful design concept seldom amounts to a straightforward 'sum of separate parts'. Rather, architectural designs tend to be complex, intertwined 'wholes' in which distinctly different aspects are nonetheless

indivisibly interrelated – metaphorically speaking: coexisting in a state of symbiosis...

One way of viewing designing is as a series of deconstruction – reconstruction cycles, whereby the constituting parts are continually specified and fine-tuned in relation to each other, until the totality may be expected to ‘perform’ as a coordinated composition, in the form of a built environment.

Throughout the successive stages of design evolution, a wide range of models may be used, from generative to illustrative modelling types, using physical and digital platforms (increasingly in combination). The desired level of reduction or explicitness in a model may depend on a variety of factors, such as: the intermediate or definitive status of the design; the factor of scale and/or the required level of detailing; the intended representational or imaging qualities; the way in which particular features of design are to be emphasised or are considered as redundant; the relative informality or required perfection of execution; the communicative intentions in respect to the individuals or groups being targeted, to name but a few.

Besides using models that, at least to a certain extent, represent or mimic the architectural qualities of design, there is a marked tendency amongst professionals to make use of symbolic representations, such as schemes and diagrams. These may be used to denote and access a variety of interrelated data. Some examples: the influence of environmental factors; the comparison of effective design options; the structural behaviour of elements under different conditions and the consequences of economic parameters and time factors.

Increasingly, with the use of computerised platforms, such symbolic ‘data’ models can be generated and represented three-dimensionally, manipulated interactively and considered from different viewpoints.

### **The tangible model**

A particular strength of design modelling is that it offers unique potentials for spatial interaction with the subject matter, whether this is achieved using tangible, hand-made scale models or as virtual constructions.

Creating a model is in many ways comparable to the building process,

albeit on a reduced level. Characteristically, choices have to be made concerning the levels of reduction, scale and operational aspects of the model. In this respect, physical modelling confronts its maker acutely with the consequences of structure, repetition and the montage of elements, whereas in a virtual modelling involves a somewhat more detached approach, whereby digital components are sometimes inclined to ‘morph’ before the eyes indiscriminately.

Physical models pose the problem of how to ‘downscale’ materials, and to what extent architectural articulation, detailing and plasticity may be expressed sufficiently, in order to get a ‘realistic’ impression. In reduced scale physical modelling, considerable manual and organisational skills on behalf of the model builder(s) is a prerequisite. In a hastily constructed ‘conceptual’ model, shoddy workmanship may be acceptable, but in a professional representation model poor execution aspects become painfully apparent and are generally inexcusable.

To a large extent, virtual modelling also involves ‘constructing in space’... A fundamental difference with physical modelling is that working in the computer generally does entail working to a set scale, but rather in an imagined, ‘real size’ environment, whereby components may be modelled with as much detail as desired. In addition, modelling options such as expression of material qualities, using texture-mapped surfaces, artificial lighting, transparency effects etc. can be activated in different phases and varied relatively freely.

The advantages of computer modelling approaches are to a certain extent also their disadvantages. Creating the virtual geometry for an ambitious 3d model can be such a complicated and time-consuming enterprise, that the subsequent introduction of ‘materialisation’ aspects may be underdeveloped and lacking in balance. Virtual ‘materiality’ still all too frequently comes across as synthetic, even surrealistic. If the treatment of different components in the overall model is not sufficiently in accordance, a kind of perceptual discrepancy may be the result. If some elements that are explicitly detailed, materialised and textured whilst others, which should be on the same level, but are painfully lacking in information, there is a problem (a notorious example of this phenomenon in many virtual model presentations: staircases and balustrades).

In virtual modelling, the basic working interface can generally afford real time views and interactive manipulation. However, the resulting rendered images – and particularly animated renderings – viewed in prints or on a screen, frequently prove to be seriously lacking on the level of ‘visual tangibility’... Therefore, just as physical modelling demands a great deal from the model maker’s manual skills, so the virtual modeller has to be (come) skilful in digital modelling aspects, but also insightful concerning the ‘balancing act’ between too much and too little visual information.

One of the most interesting recent developments has been the introduction and increased availability of computer-aided modelling and manufacturing techniques, which have become very beneficial for physical modelling. In addition, the introduction of particular computer-aided prototyping techniques has made it possible to generate tangible versions of the kinds of symbolic models mentioned earlier.

### **The representational model**

An important ‘added benefit’ of models, considered as a category of design media, is that, besides being experienced directly as a model, it has increasingly become possible to draw qualitatively high-standing images from them.

Such model-generated images can consequentially be manipulated and enhanced using various multimedia techniques. The results can be distributed to other actors in the design development process or the public at large, through different communication media.

Traditional endoscopy involved the generation of eye-level views (either static, sequenced or dynamic), which were captured using specialized optical apparatus. For photographic stills, relatively simple, adapted optical lenses could be used, but dynamic urban environment simulation required costly facilities, with specialised navigation equipment. In recent years there has been a shift away from such flowing, locomotive simulation, whereby serial vision imaging, using miniaturised video cameras, has gained prominence. Besides the fact that such tools often had considerable restrictions, they also tended to (over)emphasise the shortcomings of the physical models being utilized.

In the last decade design visualisation on the basis of computer models

largely became the norm. However, in recent years, physical modelling (in combination with digital photography and graphic editing techniques) has been making a steady comeback, whereby influx of computer-aided modelling techniques has clearly given an important impulse.

In both cases (as well as in combinations of the two approaches) the quality of the model remains of primary importance, needing to be developed with the visualisation ambitions in mind and to be matched with the imaging platforms that are used.

Thereby it can be particularly rewarding to conceive and realise the model in such a way that different sorts of images can be drawn from the same model. When making – physical or digital – models, it is therefore worthwhile to keep the ‘studio’ potential of the model in mind, so that certain parts can be disassembled, giving insights into the building’s construction or interior qualities. In some cases – for instance in physical exhibition models – it can be advantageous, to build in a partial ‘strip tease’ of the building’s structure, for the benefit of insight and understanding. Similarly, computer models may be organised in such a way that groups of building components can be placed in different layers, allowing for deconstructions, montage sequences, as well as the systematic variation and comparison of design options on the level of design decision-making.

Due to the steady improvement of modelling techniques, the availability of professional photographic equipment and studio lighting, as well as digital editing and photomontage techniques, it is sometimes difficult to tell whether a published image has been taken from a realised project, or created using either a physical or a virtual model.

### **The research model**

Models that offer research potentials, can take on a variety of forms.

Scientific models, for instance, may address philosophical or theoretical issues and considerations. Alternately, they may be developed to explore and test particular hypothetical presuppositions empirically under experimental conditions.

Similarly, design-based models may also be used to develop or test the feasibility of a particular set of notions or conditions. In active design development, the generation of sketch models (frequently becoming a

series of models reflecting the design process's iterative nature) may be made instrumental to explore aspects, which are difficult to comprehend or to visualise convincingly in drawings. An added benefit of such types of models is that they afford the sharing of relatively complex design ideas via a spatial format. Furthermore, models can be used to simulate the effects of design proposals interactively. On the basis of data or visual information, proposals can be adapted and a consensus may be reached within the design team involved, or with other 'actors' in the design involvement process, such as clients, advisors or other concerned parties. Studying a design proposal in a model context – either physical or virtual – can take part in relatively controlled, experimental conditions, allowing for systematic variations and objective comparisons of effects in relation to desirability.

Models can also be particularly effective when wishing to study technological or environmental aspects. Typical examples of professional model-based simulation platforms are lighting models, acoustic and climatic models and models to test and demonstrate the effectiveness of load-bearing structures. A particular class of this category of testing models is the real-size component mock-up, potentially even a complete working prototype.

In architectural research, based on historic precedents and artefacts, modelling activity can be made instrumental towards creating a better understanding of a design's spatial organisation, structure and formal composition. Modelling initiatives of this sort can also be particularly rewarding when used as a pedagogical instrument in design education. One such application involves the interpretation – via model reconstruction – of iconic design artefacts, which have not been built, or which through time have been altered to such an extent that the original qualities have been lost...

In addition, (physical) presentation models can be used as an extremely effective medium for research. The exhibition format, making use of comparable scale models, deserves to be recognised as a platform for knowledge exchange, which on the level of research output is on a par with other formats, such as publications in books, scientific papers, web-sites, data-bases, etcetera.



## The aesthetic model

A good model is a thing of beauty...

This is often perceived as being the case with respect to models of thought on a conceptual level. If a model is experienced to be elegant, economical, transparent, or possesses qualities that may be expressed clearly and convincingly via formulae, calculations, schemes or symbolic representations, this tends to contribute to a theoretical conception's acceptance and dissemination. As such, the medium through which an idea is communicated, may not only to a large extent be of influence on 'the message', but arguably also on the method...

Media, through which concepts may be developed and expressed, give 'form' to an idea in such a way that they tend to acquire an added – or rather: intrinsic – appeal and aesthetic value.

Similarly, spatial and representational models become manifestations in 'the eye of the beholder' and do not merely come across as neutral translators of 'information', but also as expressive objects in their own right.

As in architecture, a model's functional, technical and operational restrictions may be implicitly recognised. The way in which such constraints are overcome in a model's execution highlights the level (or lack) of skill of the model's maker. Functionality and construction may be aspects that are essential to the aesthetic pleasure that a model may be capable of generating, but there is also an elusively autonomous, seductive quality to be recognised in many models, which tends to make them objects of affection and desire.

The tendency to want to 'possess' a model – usually by trying to touch it – appears to be an instinctive condition that is hard to suppress in admirers, whether they are young or old. Anyone who has been responsible for an exhibition of unprotected (physical) models, knows destructive potentials of the audience's interest in this respect...

As in design culture, it is possible to recognise cycles of convention and invention in model making. Particular techniques are characteristic of the craft of modelling in a particular era and are recognised as such more or less spontaneously. The introduction of new materials and techniques tends to generate a new wave of invention, which will subsequently become

adopted and implemented as the state of the art; the latest convention. Issues of tidiness, order and precision undoubtedly also play an important role in a model's appeal. Creating a model means taking clear decisions concerning what is or is not to be demonstrated, what should be explicit or even exaggerated or alternately: only be hinted at. Consequentially, the 'performance' of a model relies to a very large extent on how it articulates the underlying notions convincingly. At the same time, the act of modelling speaks through its execution; the implicit control of structure and dimensions; its codes and means.

The way, in which a model is perceived as having been conceived and constructed intelligently, contributes considerably to its aesthetic success.

## **Modelling perspectives**

Creating a model is a way of focusing one's mental capacities by doing, by actively modelling. It is a way of speaking from the imagination; the constructed artefacts of modelling activity – be they conceptual or representational, virtual or physical – clearly possess the capacity to lastingly speak to the imagination.

This contribution intended to explore characteristics and the changing perspectives of various types of models in architecture, specifically on the level of imaging potentials. This study forms an integral part of a research initiative of the Delft Form and Media Studies group that is intended to culminate in a comprehensive exhibition and an accompanying thematic publication: 'Models in Architecture'.

In the course of this undertaking, an attempt was made to identify and to provisionally 'map' various kinds of modelling applications. The overview, which is the result of the underlying accumulation process and included here, is intended to share our intermediate insights with groups of professionals and stimulate responses (see figure 1).

It is hoped that this discourse will contribute to the further awareness and continued appraisal – and development – of modelling potentials for the benefit of design, research and communication.

The Design Model	The Physical Model	The Representational Model	The Interpretational Model	The Virtual Model	The Analytical Model
The Scale Model	The Two-dimensional Model	The Descriptive Model	The Predictive Model	The Digital Model	The Generative Model
The Sketch Model	The Three-dimensional Model	The Realistic Model	The Abstract Model	The Four-dimensional Model	The Linguistic Model
The Development Model	The Sculptural Model	The Projective Model	The Comparative Model	The Interactive Model	The Verbal Model
The Presentable Study Model	The Picturesque Model	The Analogue Model	The Symbolic Model	The Animation Model	The Mental Map Model
The Presentation Model	The Seductive Model	The Reconstruction Model	The Deconstruction Model	The Game Model	The Decision Model
The Communication Model	The Rapid Prototyping Model	The Complex Model	The Reduction Model	The Collaboration Model	
The Spatial model	The Tangible Model	The Schematic Model	The Diagrammatic Model	The Zero Gravity Model	The Programmatic Model
The Design Level Model	The Material Model	The Didactic Model	The Thematic Model	The Scientific Model	The Relational Model
The Context Model	The Constructed Model	The Logical Model	The Insightful Model	The Empirical Model	The Information Model
The Situated Model	The Workshop Model	The Typological Model	The Form Study Model	The Methodological Model	The Systematic Model
The Landscape model	The Detailed Model	The Composition Model	The Designery Model	The Classification Model	The Mathematical Model
The Folder Model	The Object Model	The Case Study Model	The Iterative Model	The Coded Model	
The Delta Metropolis Model	The Eye-level Model	The Design Analysis Model	The Light Style Model	The Cognitive Model	The Historical Model
The Transformation Model	The Camera Model	The Exhibition Model	The Explorative Model	The Computational Model	
The Urban Design Model	The Dynamic Model	The Discovery Model	The Conceptual Model	The Research Model	The Vitruvian Model
The Urban Ensemble Model	The Imaginative Model			The Immaterial Model	The Disegno Model
The Urban Space Model	The Intuitive Model				The Classical Model
The Urban Detail Model	The Playful Model				The Utopian Model
The Architectural Model	The Expressive Model				The De Sij Model
The Building Complex Model	The Graphic Model				The Futurist Model
The Building Unit Model	The Colourful Model				The Modernist Model
The Interior Space Model	The Exploded View Model				The Avant-Garde Model
The Architectonic Model	The Drawn Model				The Post-modernist Model
The Structural Model	The Simulation Model				The New Babylon Model
The Construction Model	The Building Mechanics Model				The Blob Model
The Building Process Model	The Building Physics Model				The Cultural Model
The Building Technique Model	The Climate Model				The Theoretical Model
The Building Product Model	The Wind Tunnel Model				The Intellectual Model
The Building Component Model	The Lighting Model				The Psychological Model
The Building Fragment Model	The Acoustic Model				The Sociological Model
The Mock-up Model	The Endoscope Model				The Ideological Model
The Open Air Model	The Test Model				The Political Model
The Assemblage Model	The Experimental Model				The Metaphysical Model
The Prototype Model	The Demonstration Model				The Memory Model
The Real Scale Model	The Invention Model				The Artistic Model
The Technological Model	The Innovation Model				The Optimisation Model
					The Strategy Model
					The Role Model
					The Logistical Model
					The Philosophical Model

# MODELS IN ARCHITECTURE