Jack Breen

Unravelling Form and Space in Architecture – Visualisation Approaches in Design Artefact Study Initiatives

1. Introduction

Designing is a matter of projecting spatial configurations that may or may not as yet exist through concerted, design-driven study. If architecture is to be considered a kind of language, then ‘reading and writing’ its expressive manifestations is essentially a matter of imaging. As a consequence, the most effective means of communication in architecture tend to be visual…

Whilst some visual modes of communication may be relatively abstract, relying upon acquired codes and conceptions that need to be mastered through professional study or training, others may be able to speak more directly to the imagination, making the subject matter better understandable and even captivating, not only to experts in the field but indeed to the public at large. There are numerous ways in which, in some ways still ‘hypothetical’ architectures may be brought to life in the ‘eye of the beholder’.

Alongside the ‘classic’ medium of the Drawing, the architectural Model still unwaveringly demonstrates its merits as a perceptually captivating representational device. As a consequence, models appeal to different kinds of target groups: designers as well as laymen; decision-makers as well as scholars; enthusiasts as well as critics.

Such models may be physical (generally scaled-down versions of the actual artefacts under consideration) or graphic (such as the ‘drawn model’ of an Exploded View). They can be material (and thereby often bulky, difficult to transport and notoriously fragile) or virtual (existing only within ‘computational’ realms that need to be accessed via, essentially two-dimensional, ‘interface’ formats). (Fig. 1)

2. The communicative power of the spatial model

A truly successful model is often able to not merely convey ‘data’, but afford (sometimes surprising) insights, which may be cognitive, but just as easily emotive, even affective…

A state-of-the art instrument for the benefit of focused ‘insight-generation’ via models used to be the Endoscope, essentially an instrument for the acquisition of projected images (‘still’ or dynamic) using optical means from a physically ‘present’ scale model. Arguably, it was this sense of presence, brought about by capturing views from a model actually being perceived...
simultaneously in overview, that may have been one of the
greatest benefits of ‘old school’, analogue Endoscopy! However,
physical Endoscopy also had serious drawbacks, notably: the often
disappointing quality of the generated ‘views’ (revealing shoddy
surface textures, glue marks and crooked geometries); the
cumbersome means of operation (involving tricky navigation
systems and awkward mechanical means of locomotion) as well as
the relatively poor quality of visual output (due to un-professional
studio lighting and the serious limitations of the optical apparatus
being used).

By contrast, computer-aided modelling approaches were
anticipated from the outset to have potentially unlimited
advantages in this respect. In practice, however – due to a hard-
to-suppress tendency towards ‘impressing the audience’ (often by
overloading the viewer with (supposedly) seductive, restless
dynamic imagery) – CAAD visualisation initiatives frequently
missed the critical mark. As a consequence, study initiatives
involving computer-based visualisation platforms all too often
tended to merely skim the surface on a content level, getting no
more than ‘skin deep’ as far as the actual ‘body of architecture’
under consideration was concerned.

It may be argued that due to this inclination towards
computational ‘infotainment’ – rather than towards methodical,
design driven enquiry – too little progress has recently been made
towards reaching a deeper understanding of the workings of
architectural design on an academic level. This is regrettable, as
digital modelling techniques may (still) be expected to be
particularly beneficial for intelligent, imaginative design research
and development.

The good news: there are serious indicators that spatial
visualization and simulation is getting a refreshing new impulse
through the introduction of digital platforms that approach (and
in some cases: override) the benefits of more traditional,
‘analogue’ visualization techniques.

To name two:
- The introduction of computer-aided production techniques
  (specifically: 2D laser cutting, 2,5D milling and 3D printing),
  which have given Physical Modelling a new lease of life;
- The ‘bottom-down’ evolvement of digital visualizations using
  readily available ‘Sketch’ software allowing for real-time ‘line
  and colour’ renditions, comparable to ‘graphic novel’
  visualisations, but at the same time interesting in the context of
  spatial design analysis.
The influx of these 3D ‘Sketch’ techniques has been instrumental in refreshing the methodical approaches of the Delft Form and Modelling Studies group in recent years, particularly in the context of design precedent based research.

3. The Form and Modelling Studies case study projects

Since a number of years, a characteristic research approach of our group has involved the imaginative study of selected design artefacts in case studies, with the aim of identifying patterns in architectural composition.

A brief run-through of some of these case-based study initiatives:

- The UM (Umgebinde) Variations:
  An analytical visualization series, on the basis of a chance-encounter with the characteristic ‘Umgebinde’ farmhouses of south-eastern Germany (Lusatia). The surviving members of this historic ‘collection’ of dwellings all share the same, relatively strict formal typology, but at the same time demonstrate their individual character through the variation of recurring formal themes and the specific ways in which these are applied in combination.

- The TU (TU Delft) Variations:
  Initially an educational study initiative, focussing upon the compositional characteristics of a series of major faculty buildings, the project gradually developed into a more systematic analysis of design conceptions. In particular, the (since then destroyed) building of the faculty of Architecture proved

![Figure 2: Ten selected AA case studies, with an indication of modeled projects, highlighting the “de Klerk” casus (red)](image)
to be a treasure-throve for the study of design variation within a convincingly systematic ‘whole’.

- The LD (Ledoux) Variations:
  Triggered by the identification of recurring formal issues in the work of Claude-Nicolas Ledoux – particularly in his Tollgates for Paris – identified in the writings of Anthony Vidler, a digital ‘reconstruction’ project involving some of his buildings was carried out, in the context of education and research. These studies were particularly beneficial for the further evolvement of the AA Variations casus. (Fig. 2)

4. The AA Variations Casus

The design artefacts forming the basis of the AA Variations study are all to be found within one Dutch municipality: the market gardening community of Aalsmeer (hence: the AA Variations). Up to recently this village, situated in the vicinity of the capital city of Amsterdam, managed to remain a relatively coherent, predominantly agrarian enclave. Due to its strategic location and environmental conditions – notably fertile fields intersected by water (which initially played an important role in the transportation of goods) – the borough gained prominence as a flower growing and trading centre.

From the beginning of the twentieth century this led to a measure of affluence, enhanced by the predominantly Calvinist ethical and economic climate and a strong cooperative movement. The commercial growth, brought about by the flower trade and the growing importance of water sports and recreation, led to the building of new market gardener’s houses, auction facilities, yards and small-scale business ventures. Particularly during the ‘booming’ twenties and early thirties a number of ‘young and coming’ Dutch architects contributed works of interest to the built environment of the municipality.

The AA Variations project as a whole encompasses the compositional study of some ten freestanding buildings, spanning a period of over a century. These projects have been selected for the AA case-study programme on the basis of their architectural qualities, more or less as representatives for different aesthetic paradigms, or ‘styles’.

At this point six of the ten projects have been studied and modelled extensively, namely:
- Project 1: Amsterdam School, 1923, architect: de Klerk;
Each of these artefacts is studied on the following, interrelated, compositional levels:
> Form < > (Structure) < > Facade < > (Texture) < > Feature <

In the following paragraph one of these six projects – the expressionist dwelling with flower shed from 1923 by the esteemed Amsterdam School architect Michel de Klerk – will be discussed in some more detail on the level of context, composition and visualization. (Fig. 3)

5. An AA Case-study sample: de Klerk Variations

The ‘de Klerk’ casus is put forward her as being illustrative of the approach within the AA project as a whole, but particularly due to its intriguing spatial complexity and adventurously playful formal expression.

A brief characterization of the de Klerk ‘file’:
- **Context:**
  This market gardener’s home with integrated flower shed is exemplary of the Expressionist ‘Amsterdam’ school of architectural design, a group of architects mainly renowned for their urban architecture projects in the city of Amsterdam. This house is the last projects of the – then influential – group’s most renowned architect, Michel de Klerk and was completed shortly after his early death in 1923.

- **Composition:**
  The overall form brings together the two functional domains: flower shed and living space (including services and bedrooms). The eventual built artefact (the result of several intermediate designs) is ambitious, complex and perceptually adventurous: a strategic collection of geometric forms, held together by a very characteristic pitched roof construction. A variety of living spaces is concentrated around a central corridor, which is
reached via the ‘in between realm’ route of its external entrance area. Within the design, different rooms are given individual treatments, expressed in a variety of umbrella-like ceiling forms. The composition of functional spaces can as it were be read as a cluster of ‘tents’, with specific expressive interior elements such as hearths and cupboards. The result of this spatial treatment per room is that there is considerable ‘lost’ space to be found under the roof construction, which works as a visually binding element in the manifestation of the building as a whole.

Structurally, the building is far from systematic, with apparently ‘ad hoc’ solutions on the level of construction, with the flower shed as the most ‘straightforward’ element. The prevailing complexity in the interior is mirrored in the building’s façades. Rather than having one binding theme, the façade composition seems to change character constantly around its periphery, albeit with a skilfully expressive vernacular treatment. Visually captivating is the long bay window ‘wrapped’ around the front façade, connecting different interior domains. Similarly, the route towards the main entrance and the sculptural connection between the kitchen area and the main shed has been worked out with lively detailing and the accentuation of special decorative features, such as lamps. Although the windows have diverse treatments, subdivisions, corner solutions and articulations on the levels of measurement and profiling, the expressive affluence – bordering on ‘overkill’ – is kept in check by a measure of order and repetition in the basic window frames.

- Assessment and visualization:
The project is a fascinating, if arguably somewhat overdone exercise in architectural expression and variation. In the AA project, the de Klerk house has been studied in different ways, resulting in physical models (employing manual and digital techniques) and as an interactive digital ‘sketch’ model. Because of the overwhelming variety in spatial conditions, structural
solutions, material articulations and ornamental details, it proved extremely worthwhile (though difficult) to ‘re-construct’ the artefact in the form of a (digital) model. In the process of study, using original drawings and old and new photographs, several visits proved necessary to ‘unravel’ the composition’s (hidden) secrets. The model image series shows a step-by-step build up of characteristic themes, from overall formal set-up, via different levels of construction towards the architectural object as realized. (Fig. 4 and 5)

6. Conclusions and perspectives

What the AA Variations artefacts (intend to) demonstrate is that active modelling studies – physical and virtual – may be beneficial in elucidating and communicating the ways in which architectural conceptions and conventions can be orchestrated within one overall composition.

The approach here differs considerably from the methods of traditional Endoscopy, but may be considered ‘Endoscopic’ in the sense that they offer insights into the workings and effects of a particular design project under consideration.

In this case the students, who analysed the project in the context of a ‘didactic’ physical modelling exercise, did not just try to mimic the – built – end result, but focused on specific themes of the project, such as:

- The overall massing and facade characteristics and their interpretation;
- The constructive principles and organization within the composition as a whole;
- The spatial ‘puzzle’ that is the building’s central, connecting element.

All of these approaches are beginning to come together in the subsequent digital modelling analyses, in which – as in physical modelling – the artefact is as it were (re)constructed in the form

Figure 5: De Klerk casus: Series of sectional perspective views
of a model. Using standard ‘Sketch’ software – but importantly: with a conscious use of interactive ‘layering’ – one model can be used to offer a variety of compositional insights, notably:

- The constructional roles of different components, such as walls, windows, floors and roofs.
- The spatial interaction of different rooms and their connectivity with the surroundings.
- The material expression of different façade elements and specific ornamental features.
- The programmatic and spatial organisational characteristics and orientation thereof. In this context, the built-in ‘section’ option proved to be of particular benefit for the creation of insightful model views.

It is expected that such 3D ‘Sketch’ platforms, if applied in a sufficiently structural fashion, will contribute to a greater understanding of architectural themes and approaches, in education and research...

It is hoped that these in-depth case studies will contribute to furthering instrumentation, insights and knowledge concerning model-based study platforms in systematic – but imaginative – ways.

Conclusion: the aims and practices of Endoscopic study are far from dead, but they to be (and indeed should be!) moving on to new dimensions!

To be continued…
Figure 4 De Klerk casus: Series of cross-section segments, as an indication of ‘views’