Chapter 3

Intention and the user

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Introduction

Models have often been thought of as undifferentiated. In this chapter, they are described using a number of differentiating distinctions establishing complementarities: the ideal and abstract compared to the surrogate; the illustrative and the explorative; models (and knowledge) of (what is) and for (action); and modeller and user intentions. The notion of model as simplification, as projection and as an object in its own right is explored, along with the problems associated with simplification and transformation, of what is left out and how to re-include it.

In this chapter, I explore what models are and might be, from a rather abstract position. As well as following one important but secondary stream (simplification, and what to do about it), I shall use one major strategy to make my argument: establishing distinctions that create characterisations of models that can be thought of as complements. Progressing across these complementarities moves the argument towards the complementarity of what I call, after de Zeeuw, "models of" and "models for", each of which leads to different knowledge types: "knowledge of" and "knowledge for". I will indicate the advantages of each complementarity, how each is found when we use models, and I shall explain why (and when) we find some models unhelpful while others naturally facilitate us designing.

What is a model?

Dictionary definitions are tautological and only reflect current usage and the opinions of their compilers: but they can help us start. According to *The Oxford Dictionary of the American Language*, included in Apple's OSX:

model |ˇm d( )l|

noun

a three-dimensional representation of a person or thing or of a proposed structure, typically on a smaller scale than the original: *a model of St. Paul's Cathedral* | [as adj.] *a model airplane.*

I believe this is a good general description of what most would think of as an architectural model – even though, nowadays, these models are often virtual rather than made of physical materials (we will return to this point). The description is not exclusive to architecture (think of a model railway), and it speaks of the model as an object in its own right.

According to the same dictionary, the word *model* entered English, meaning a set of plans of a building. Determining models through their relationship with and involvement in architecture has a historical basis:

> ORIGIN late 16th cent. (denoting a set of plans of a building): from French ***modelle***, from Italian ***modello***, from an alteration of Latin ***modulus*** (see **modulus**).

The same dictionary also gives:

> a simplified description . . . of a system or process, to assist calculations and predictions: *a statistical model used for predicting the survival rates of endangered.*[1]

This introduces the important notions of simplification (or focus), and of process and performance. These notions are not exclusive to architectural models, but they are certainly relevant. Notwithstanding this, one way in which models-as-simplifications are made in architecture aims at purist ideals, reaching for "the essence": hence, the immaculate object built of white card, beech wood and silver wire is purist in aesthetic, representing an ideal.

Behind this, lies intention (Glanville, 2006), implying an agent with purpose: models do not just happen – they are made by people who have purposes in making them.

There is, however, a particular characteristic of certain architectural models constructed to present objects not yet existing, in the commonly held physical sense. The buildings they represent are yet to be built. These models are not models of objects, but models of projects: that is, objects projected in the future. The model may thus be thought of as modelled, itself, by the projected object (the project): we might consider the model as an object, while the project is a model of that object (i.e., a model of a model).[2]

(The same holds for processes: just substitute the word "process" for the word "object".) We may consider that this form of projection modelling conflicts with notions of simplification and description. This is a matter of intention and construction, for simplification is not in objects but in the way we choose to consider our understandings of them, as we bring them together. We recognise this when we remember that a model of an object is itself an object, that being a model is taking on a role imposed by the modeller and is subject to his/her intention. The process is similar to de Saussure's (1966) bringing together of two essentially separate objects through intention, so they exist temporarily in a relationship that forms a description.

It is central to my position, in this chapter, that we discuss objects, models, etc. as determined through the agency of the (human) actor and that actor's intentions. This is the determining position of second-order cybernetics and of radical constructivism: but it seems to me to be equally central to designing.

Simplification: abstractions, ideals and surrogates

(Architectural) models often involve abstraction – a type of simplification. As abstractions, models represent ideals: there is a notion of approaching the essence of what is important, rather than exploring the detail. The simplification, even distillation, of material into abstract form carries with it the implication that we should be concerned with massing and tectonic form in general, in precedence over function, construction, interior, etc. . . . Abstraction to the materials used in the model leads us towards that purist ideal.

The charm of abstractions and ideals is that they can exist outside the tiresome realm of messy reality, which they ignore to attain the purist ideal.

Models can also be understood as surrogates. Models allow us to carry out experiments (often thought experiments) through them, in the belief that the outcomes of these experiments will be translated into the reality in which they are to be built. However, all too often, what is carried through is far from what we had hoped for: the outcome is less than we believed, which, we will see, raises an important question. We can carry out experiments on our models safely and cheaply: architecture is an expensive and dangerous activity, and architects rarely get a chance to build prototypes: it is a one-shot operation. Thus, for example, we use zoning in planning, simplifying a rich mix into easily handled but impoverished zones lacking exactly that richness that we enjoyed before we established zones. We experiment on these zones, propose changes, and then translate them into the real world, all too often in a still impoverished form.

Leaving models intentionally underspecified and open (having the meta-intention of under-defining intention), we produce sketch models, intended to allow us to ask questions in a more speculative and vaguer manner: to play in a designerly way (Glanville, 2009), finding out the answers to questions we were not intending to ask, or did not know we were asking. These models are likely to be quite messy, in comparison to the pristine models produced of how buildings will be.

Time travel and the relationship between models and objects

A common confusion (resulting from the designer's apparent ability to time-travel by talking of the as yet unmade as if already built) lies in the relationship between object (or project – an object with time-travel) and model. As explored above, models are created to focus on certain aspects of some object – or object to be (project). In the case of the relationship between object and model, the object precedes the model, chronologically. But in the case of the project, the model precedes the object, frequently being in some sense an instruction to facilitate construction of the projected object. However, as we explored above, a model is simpler than the object it models (Borges, 1999; Korzybski, quoted in Bateson, 1970), so the model of a project necessarily inherently underspecifies that project. There is a necessary lack in the model, which only instructs us how to make aspects of the (projected) object. A model is also an object in its own right: thus, aspects of the model neither can nor should be part of the object under construction (Glanville, 1980b). Moving from object to model, and from model to (projected) object, reflects the difference in classical logic (and in science) between deduction and induction.

The question of precedence, and hence the question of the completeness of what is modelled in model making, is difficult and important. I developed a concept of anti-modelling in response to this difficulty, and present it in the Appendix to this chapter.

Models illustrating and exploring: intention and the user

One intention model-makers place on architectural models is that they are used. We can distinguish how they are to be used in two contrasting ways: to illustrate, and to explore (Glanville, 1993). The same distinction of intention is used by the model-maker in making the model, and reflects the degree of questioning (of curiosity).

Models may be constructed in order to illustrate an intention, with a particular intention providing a focus for what is included in and omitted from the model: or they can be constructed to allow exploration. Illustration demonstrates, even documents, and does not imply question or answer: it just is. Exploration is uncertain, questioning to better understand and act. Understandings and projects may change radically through exploration. Insofar as drawings can also be thought of as models, we can also think of illustrative and explorative (sketch) drawings.

Regardless of the model-maker's intentions in making a model, those who examine the model (including the model-maker) will interpret intention as they wish. A model made to illustrate may, under different circumstances, be used for exploration. The intention of the making need not be the intention of examination: there is no form of obligation that makes a transfer of intention enforceable. The illustrative may be read as explorative, the explorative as illustrative. The reader will also readily understand that a similar shift in intention can be applied to the "models of" and "models for", introduced in the next section.

This distinction, and the complementarity, between the model illustrating and the model exploring, echo the distinction between the model as ideal and the model as surrogate, without perhaps quite paralleling it.

Models of and models for

Prepositions, in English, make all the difference (Glanville, 2005). We can differentiate models into two groups, depending on the purpose we see in them. I will refer to the difference as the difference between

- models of, and
- models for[3]

using a prepositional difference. Although this distinction mirrors the distinction illustrate/explore, it is not identical to it.

Models of illustrate. As models of objects and processes, they report on what is. In this sense, they are typified by the models used in and developed by science, reporting on what is (albeit that scientific models often appear to be counter-intuitive and strange). White card and beech models of building proposals clearly belong in this group, being intended primarily as proof of concept.

In contrast, models for are the models that facilitate action (in terms of exploration, they facilitate questioning and trying things out). They are essentially tentative, and their strength lies in this tentativeness. They support change, the creation of novelty – which is what designers aim to accomplish. Models for are models for acting. The sketch model is clearly a model for, as is the surrogate. Exploration requires models for.

Models for are concerned with testing, proposing change, wondering, trying out. One reason for using a model is that it permits such changes, allowing us to try them out – a function of surrogacy.

Models of and models for satisfy different aims. The intention in science is to produce consistent and complete knowledge (descriptions/explanations) that is repeatable. Repeatability means no matter where or when, and no matter who is doing it, the outcome of a determined procedure will remain constant. In the traditional jargon, the observer is excluded from influencing what goes on. This aim may be interpreted as the rejection of the scientist's involvement in what (s)he does: in other words, an absolute form of objectivity. But it is also an aim, an intention, originating in human desire expressed as/in intention.

Models for are clearly of great relevance to designers, for whom design is a doing business. We are involved in acting. We are not (except when we present some project as finished) reporting. While many aspects of what we do benefit from other approaches, we have, at the heart of our activity, something which is different from science. It is based in action. It takes the form of a conversation held with ourselves through a medium (e.g., paper and pencil) – a questioning sketch – as I and others have argued (Glanville, 2009; Pask, 1969; Schön, 1985).

Difficulties with models of and for

Science and design are different activities, with different associated ways of behaving and different outcomes existing in different ethical domains operating to satisfy different aims. Broadly stated, scientists and designers have different relationships with, and different aims within their fields: for the scientist, there is at least an ideal of remaining remote (objective) and searching for the repeatable. For the designer, active involvement leading to a unique outcome in the field is crucial. Models that illustrate are different from those that explore. For the designer, illustrating the final outcome is, of course, important. But there is no outcome if there is no action, so models that support us acting to create these outcomes are crucial and have precedence: designers need models for. To construct or use the wrong sort of model hinders us. One advantage of having the ways of understanding and acting associated with design, as well as those associated with science, is precisely that it gives us these different ways of understanding and acting in the world. It is as important not to lose this richness as it is to retain our biodiversity!

Among architects and designers, a common complaint about (design) research, is that it is difficult to use the outcomes of this research. The complaint is that this research does not take a form that helps designers and so is seen as irrelevant: the research supports conclusive statements rather than tentative questioning. Often, researchers claim this reflects an ignorance on the part of designers, together with a lack of a proper research culture and, sometimes, a weakness in what design itself is (design is an impoverished and ill-formed science). We rarely consider whether researchers understand what designers do, or understand design to be.[4] It may be, for instance, that the variables selected by researchers are not those that would be chosen by designers (and/or users). In the extreme, the concept of a variable may, itself, be alien. I believe this difference in approach is well reflected in the difference between models of and models for: models of reflect traditional scientific approaches (the general approach in most design research), models for are tuned towards design understood as action.

This signals a difficulty with current computer models which, I claim, currently generally take the form of models of (rather than models for). We can ask questions of the visualisations produced on our computers, as we can question other models of, such as card and beech models and heat loss calculations. Surely, we can change these models, but in the awkward way we change card and beech models and heat loss calculations.[5] The computer modelling tools made for designers rarely, if ever, generate models for. Their intention is not to allow, let alone promote, exploration or modification: they report as well as they can what, under certain circumstances, will be.

Computer models often exclude the central (conversational) act of design. I have noticed this as a growing trend in how my students work. Many do not learn of the importance of tentative iteration, of uncertainty and questioning so important to the designer. Limitations in what computers permit is, I believe, one reason.[6]

From model to knowledge

Models are associated with knowledge: they help us develop, and embody, knowledge. We can understand knowledge (because there can be no knowledge without a knower, I prefer the word knowing) through an analogy to models: we can think of "knowledge of" and "knowledge for". Knowledge of may be thought of as the domain of descriptions of a presumed reality, such as science aims for:[7] knowledge for equally clearly involves questioning and is action-based:[8] hence its relevance to design.

Distinguishing knowledge into different types is not new, see, for instance, Aristotle's phronesis[9] and Polanyi's (1967) tacit knowledge, both of which are often referred to by design theorists. Mode 1 and mode 2 knowledge (Gibbons *et al.*, 1994) can also be related to knowledge of and knowledge for (Verbeke and Glanville, 2005).

Knowledge of and knowledge for have different dynamics, just as model of and model for are differently directed. Knowledge of is essentially static, in contrast to knowledge for. But knowledge for is the primary sort of knowledge designers need: and, although some accounts, especially those associated with a scientific approach, presume that in order to act, you need to know what is, for designers this need not be so. After all, we make new artefacts and, as many have observed, in design, what we come to think of as the solution defines what then can be considered the problem. In some sense, every design will be unique. Boden (2004) has argued for various types of creativity (novelty), including that which is new to the person involved, and that which is new, absolutely. For the designer, making the new using the conversational approach (mentioned above) will always be about personal novelty. This is our normality! Historical novelty is, it would seem, provisionally assertable, but only after the event. Just as there are different intentions relating to models of and models for, there are parallel differences in intention in knowledge of and knowledge for.

Thus, the distinction between of and for made by de Zeeuw referring to models, is reflected in knowledge, giving us a clear way of considering the appropriateness, relevance and fitness to our purpose of the models we are making and the knowledge we are using: are we illustrating and assessing, or are we making?

Conclusion

The characterisations in this chapter of how we construct models indicate the value in the tentative, and in keeping open the options and questions to be as important as the value in concluding, showing results and outcomes.

Why should this matter? A major value of making models is to ask questions and thus to develop ideas and concepts. This depends on keeping open the options and remaining tentative. This action can be understood as supporting the central act of designing, characterised as holding a conversation with oneself using paper and pencil. The danger of closing down, of wanting to show conclusory outcomes as results, can lead to very poor design: the sort of design outcome that results from the one-shot approach that designers learn is inherently inadequate, and only applicable where there is no messiness and great clarity.

Exploratory and surrogate models for, and their associated knowledge form, knowledge for, are more supportive of the processes of designing than are the more traditional and scientific models of (and associated knowledge of), as we have seen. Such models keep options open: they persist and do not merely deal with, but encourage dynamic uncertainty.

However, the use of models as models of or models for depends in the first case on the modeller. But the intention of the user can change a model of into a model for, for instance. The preposition that we choose is not controlled by the modeller, but is made both by the modeller in making the model, and by the user in using it.

Appendix: dimensioning models

I have referred to what is omitted when we simplify, for a difficulty arises out of simplifications (abstractions, ideals) and surrogates. Speaking conventionally, when we make a model of some object, our model only has certain of the qualities that the original object has: other qualities are omitted. (It also has qualities of its own, but we generally do not talk about these.) For instance, in making a zoning model, planners omit those functions that do not fit the zone. Thus, an area of a city becomes defined as "shopping" or "business" and other activities (food and drink provision, accommodation, etc.) are omitted. What then happens is that the (zoning) model is applied and the richness of what was in the original object disappears because that richness is not part of the model.

This suggested to me that we should be careful to record (model!) what was omitted from the model in question, as a "remainder": and that, when the model was reconstituted in the object world, the remainder should be re-inserted, a process I called "anti-modelling".

The simplification of the object involved in making a model is already a form of transformation. The point of surrogacy is to allow transformation. The remainder, in the case of a transformed model, may be transformed in a similar manner to the model, in a different manner, or not at all. It can also be omitted, as is common practice nowadays. All these possibilities offer different ways of transforming an object through modelling it, that add to the transformation of simplification.

These processes also suggested to me that there were dimensions to models (analogous to the method of dimensions in physics): thus, for instance, a model of a model of an object is reducible to a model of that object. To assist the precision of modelling processes, and our understanding of how "deep" these processes went and the points at which transformations were applied, I developed a method of "model dimensioning".

Although this work remains little known, I believe the implied critique of how we create and use models is valuable (I also believe the method itself has value, though the value of this may be more obscure.)[10] See Glanville (1980a) and Glanville and Jackson (1983).

Notes

1 I quote selectively and do not cover the full range of descriptions given in this dictionary.
2 Much of my understanding of models comes through a long association with cybernetics. Current cybernetics (known as second-order cybernetics) is deeply associated with exactly such thinking.

3 I owe this distinction to Gerard de Zeeuw, in personal communication around 1985. To my best knowledge (and in spite of my bullying!), he has not written explicitly about this distinction. The best reference is probably my summary of themes in his work (Glanville, 2002). On a personal note, this distinction was crucial in the development of my understanding: as an architecture student, I had never been able to understand the so-called sketch model, i.e., the model for, in architecture.

4 I have often (with agreement) reported on a doctoral student whose project was to make architects use a particular environmental package. I asked if she understood the thinking of architects and would adjust the package to what architects did. With no design experience, she attended a design taster course and was posted to local practices where her expertise became a part of the design dialogue. Rather than force architects to do it her way, she learned to bring what she offered to architects in a manner both helpful and understood as relevant and useable. She offered what I call "knowledge for", rather than "knowledge of".

5 The use of spreadsheets and optimisation routines has radically changed heat loss calculations to models for.

6 I believe another contributor is the use of multiple answer questions, suggesting the world is like a restaurant menu with certain given choices (and no novelty) as the only possibilities.

7 The question of the relationship between the description and what is described (the map and the territory, as Korzybski called it) cannot be approached here. It is what makes science an in principle impossible, albeit very powerful endeavour. See Douglas Green, http://www.the-scientist.com/news/display/57903/ (accessed 30 December 2010).

8 No definition of knowledge will satisfy everyone. The one here is essentially a somewhat traditional one.

9 See http://en.wikipedia.org/wiki/Phronesis (accessed 22 January 2011).

10 Gordon Pask developed a not dissimilar argument to validate self-reference in systems. This sort of argument can be used to help us understand what we might mean by 1:1 modelling such as developed in the Full Scale Lab at the Vienna University of Technology.

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