

---

# Games and Learning about Form in Architecture

---

Antony Radford  
School of Architecture, Landscape Architecture and Urban Design  
The University of Adelaide  
SA 5005 Australia  
email [aradford@arch.adelaide.edu.au](mailto:aradford@arch.adelaide.edu.au)

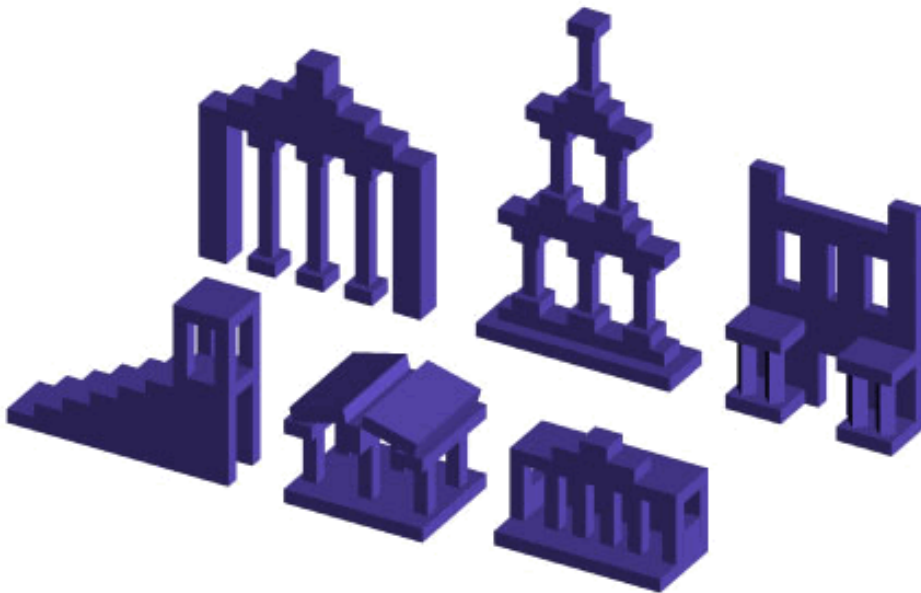
*Keywords: Architecture, Games, Play, CAD, Modelling, Education, Design*

**"The Purpose of the Universe is Play. The artists know that. They know that Play and Art and Creation are different names for the same thing— a thing that is sweet and agonies and ecstasies."**

(Don Marquis: *The Almost Perfect State*, quoted in: Hussey, Christopher (1950) *The Life of Sir Edwin Lutyens*, Country Life Ltd. on the title page of Part I.)

## Abstract

The paper outlines metaphors of play and games in the use of digital media in architectural education as a means of developing student confidence and abilities in spatial modelling, design composition, and form creation.



*Figure 1: The tradition of childhood play. Models from 'Forms of Life' using a Form•Z version of Gift 6 of the Froebel Gifts. "Try to use all the blocks to build an object, although some pieces may be used as accessories to the main object. Trying to change one form into another by moving only some of the blocks is difficult with this Gift. Therefore, it may be necessary for the child to often begin new forms." (Korver and Thorpe, 1983).*

## Introduction: Play and Games

The objective of the paper is to promote a relaxed and experimental approach to the beginning use of computer-aided design systems in architectural design education, encouraging in students a sense of play in structured games.

I first began to be interested in finding ways to use computer graphics and modelling as a means for architecture students to learn about form and composition in 1987. I was then teaching at the University of Sydney, when Professor Robert Oxman and Dr. Rivka Oxman were visiting from the Technion, Israel. Towards the end of a year's visit, Robert suggested offering a small intense design studio for ten students over two weeks of what would normally be student holiday, in which each student worked entirely with MacDraw software on a Macintosh computer. During this period, the students progressed rapidly through a series of highly structured exercises on the making of building plans, following themes such as order, composition, enclosure and precedent. The work and the theory around it resulted in the publication of a small book, *The Language of Architectural Plans*, (Oxman, Radford and Oxman, 1987) and a paper at a meeting of Australian architectural design instructors. The book was republished as one of the first working papers by ECAADE and presented at the annual conference of the equivalent American association, ACADIA. Since that time we have continued to build on those ideas (see, for example, Radford 1992 for a description of some later exercises) and others have picked them up and taken them in various directions. In retrospect, the kinds of 'exercises' which were developed can be more productively reframed as *games*.

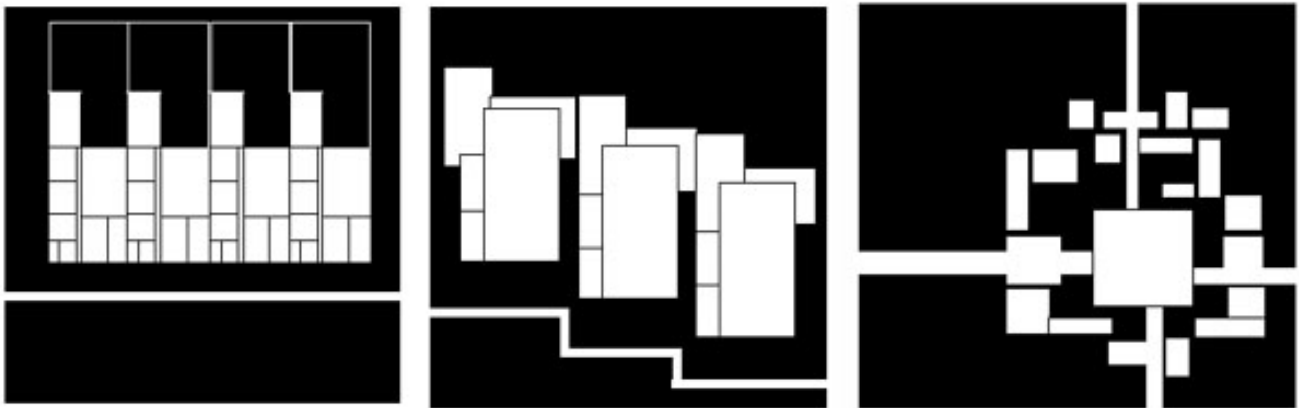


Figure 2: 'Morphology: House, Laboratory and Centre' from 'The Language of Architectural Plans' (Rebecca Cleaves, University of Sydney).

The essence of 'games' lies in a person's *immersion* in *play* subject to *rules*. Immersion implies a complete absorption in the activity: "...in this intensity, this absorption, this power of maddening, lies the very essence, the primordial quality of play" (Huizinga, 1970, p21). This absorption must be willing: "First and foremost ... all play is a voluntary activity. Play to order is no longer play: it could at best be a forcible imitation of it ... Play is not 'ordinary' or 'real' life. It is rather a stepping out of 'real' life into a temporary sphere of activity with a disposition all of its own" (Huizinga, 1970, p26). The difference between 'play' and 'playing *games*' is the presence of rules. All games have rules; even the 'free play' of childhood is subject to implied and agreed rules which are interpreted by the players. Gadamer has written on "the way in which the rules of a game relate to its playing. ... The rules provide a framework for the playing of the game and determine the range of appropriate actions the players can take, but they do not account for the way the game is played or the way it turns out each time it is played" (Snodgrass 1991 p5). Indeed, the rules may change many times in the course of the play. In *Philosophical Investigations* Wittgenstein writes:

"We can easily imagine people amusing themselves in a field by playing with a ball so as to start various existing games, but playing many without finishing them and in between throwing the ball aimlessly into the air, chasing one another with the ball and bombarding one another for a joke and so on. And now someone says: The whole time they are playing a ball-game and following definite rules at every throw.

And is there not also the case where we play and — make up the rules as we go along? And there is even one where we alter them — as we go along.

(Wittgenstein 1953, remark 83)

According to Huizinga (1949), "all manifestations of civilisation — religious ritual, language, law, war, science, poetry, philosophy and art — are essentially forms of play. Play, for him, is not a 'silly pastime' but a significant function which 'goes beyond the confines of purely physical or purely biological activity' and 'transcends the immediate needs of life and imparts meaning to the action'" (Padovan, 1994, with quotation from Huizinga, 1949, p19)[#1](#). Berne (1964) has written in *Games People Play* on the way people act as if they are playing games in the various circumstances of life.

## Games, Language and Architecture

**"When my old friend Yrjö Hirn, Professor of Aesthetics and the History of Literature, says that one of the fundamental elements of art is play, I agree with him wholeheartedly."**

(Alvar Aalto in an interview with Göran Schildt, July 1972, included in *Alvar Aalto Volume III: Projects and Final Buildings*, ed. Elissa Aalto & Karl Fleig, Verlag für Architektur Artemis Zürich, Zürich, 1978, p232)

Wittgenstein makes much of the analogy between language and games, and also refers to building; he uses building with blocks as illustration at the beginning of *Philosophical Investigations*. In both language and games, rules exist but do not fully prescribe the way either texts or games proceed:

"Consider for example the proceedings that we call "games". I mean board-games, card-games, ball-games, Olympic games, and so on. What is common to them all? .... For if you look at them you will not see something that is common to *all*, but similarities, relationships, and a whole series of them at that." If we compare two games, and then one of these with another, and so on, we find some similarities drop out and others appear. (remark 66) "I can think of no better expression to characterise these similarities than "family resemblances";... (remark 67) (Wittgenstein, 1953).

The analogy between language and architecture is also commonly made; indeed, language is a rich and established metaphor in many creative fields (there are books on 'The Language of' Art, Images, Music, Form, Vision, and Advertising as well as Architecture). Languages deal in vocabularies and syntax, making expressions which suggest ideas. The use of the metaphor does not imply architecture is the same kind of language as a written/spoken language; buildings may indeed suggest ideas, but one would not use a form-language to convey a message in the same way as in a sentence. Yet there are similarities; the great English architect Edwin Lutyens wrote:

"I require of a building, as of an individual, that a statement should be made gracefully, perhaps with distinction and humour. Many modern buildings, to me, are just shouting very loud and quite unintelligibly. I catch a phrase here and there, recognising a scrap of English or Italian, may be. There is vitality, heaps of it. But there seems to me no grammar and little sincere effort at style.

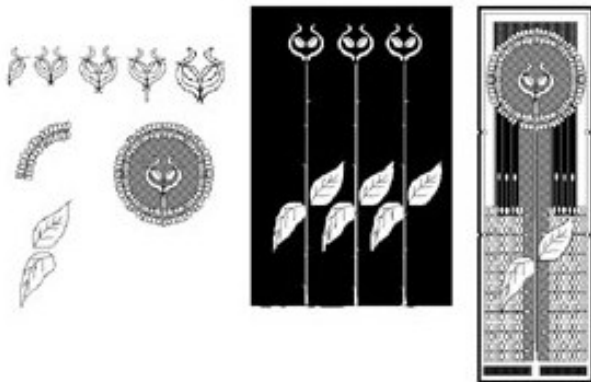
I feel about the new mode of building that it is easy to design because there is, as yet, no grammar." (Lutyens, observation made to students at the Royal Academy, London, c1940 as President of the Royal Academy. Quoted in Hussey 1950 p558).

By 'grammar', Lutyens refers to building elements and ways in which those elements fit together as buildings. A developed sense of 'grammar' and associated ideas of 'rules' and 'derivation' is fundamental in learning about and understanding design. This does not imply a need to embrace a *particular* grammar. We can admire good players of games (like chess, cricket, golf), if we understand the rules of the games they are playing, without denying that we enjoy and get excited about some games much more than others. We can similarly admire eloquent writers in English and Italian and other languages, and their use of the grammar of those languages. The same applies in architecture; working within a style is working with a certain set of

rules for the grammar of that style. We enjoy that style if we can understand those rules. When Davies writes (Davies, 1993 p17) of a 20th Century English architect that "the cornerstone" of Hopkins' philosophy is "truth to materials", and that "The honest expression of structure and construction has been an important theme in the development of modern architecture since the mid-19th century", this does not mean that we must reject and dislike the imitation painted marble and wood grain of two 18th Century English architects, John Wood the Younger and Elder, in their magnificent houses in Bath. We can recognise that both Michael Hopkins and the Woods play their 'games' supremely well within the rules of their games, that the rules of a game are interrelated, and that we rarely get good playing of a game by applying rules from another game (imitation painted marble in a modernist building). That does not mean that we can fully define the rules for any style, and we are often surprised by the way rules are interpreted.

## Games, Grammar and CAD

CAD systems have always concentrated on the representation of form and the provision of tools for changing and assembling form. Like word processors, they facilitate the description of basic elements (building elements/words) and allow the construction of complex assemblies of those elements (texts/building designs). With a word processor we play with words, stringing them along to see how they read (as I am doing now) with some idea in mind about the kind of text that is being created. With CAD systems we play with shapes: making, changing and assembling them with some idea in mind about the kinds of forms that are being made. In both cases the computer system is facilitating the *making* of text/form; whether the text/form is beautiful, meaningful, functional or cliché-ridden is outside its domain.



*Figure 3. A composition game exploiting a computer 2D drawing system's capabilities in making, changing and building up shapes. The context is the design of a window (Glenn Brown, University of Sydney)*

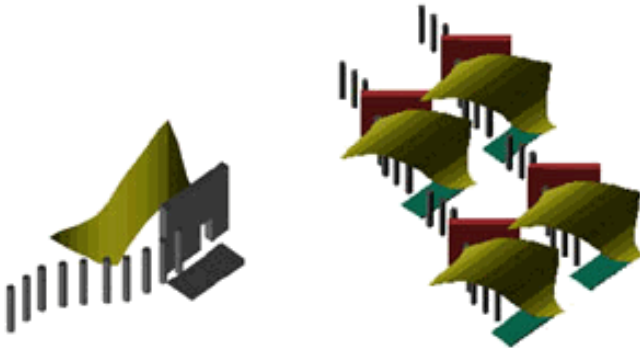
The rules used by artists and architects are often speculations: 'what happens if all the masses must be aligned about an axis', or 'what happens if all the columns must miss the walls.' The drawing or model poses a question: Given this, what next? What happens if...? With the guidance of the rules, the "knowing search can become an 'investigation'" (Heidegger 1927 p45). There is an important difference between the rules in the 'grammars' of 'word-language' and 'form-language'. Writers rarely try variations in the rules of grammar when composing a text, whereas designers continually try variations in the rules of the form-grammars that they adopt and develop. These changes are a part of the game.

## Learning and Games

Students bring to architectural education many years of experience during and since childhood of playing with form and space and living in the built environment. Nevertheless, in a beginning class there is a need to refine and heighten perception and awareness of the built environment and of give students an opportunity to gain confidence in manipulating form and space. They typically face challenges in visualising and manipulating three-dimensional objects and arrangements, in linking theoretical concepts such as "composition" and "language" with their creative work, in making effective presentations of their ideas, in

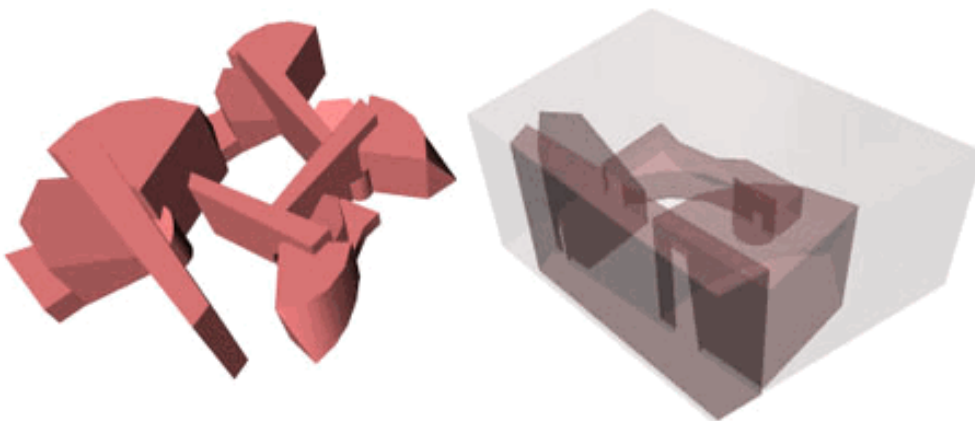
seeing forms metaphorically and abstractly, in using computers for modelling form, and in putting their knowledge and skills together into effective ways of designing. Games can address such issues directly. They also provide a vehicle for pointing out and discussing metaphors of design, such as design as conversation between designer and medium, and metaphors for the designer, such as the reflective practitioner.

I have used games/exercises with fixed and player-created vocabularies, with two and three dimensional models, about plan form, building elements, configuration, composition, spaces, and sequences of spaces. They highlight self-reflection and self-judgement, the hermeneutic nature of design, the use and development of prototypes, and relations between form and function. They are essentially 'free play' games with a simple set of rules. The interpretation, stretching and even breaking of rules is as important in the play as the following of rules. "Gadamer's concepts of application indicate that design education involves more than the teaching of design rules; it also comprises a fostering of skills in the interpretation, understanding and application of rules" (Snodgrass 1991 p7).



*Figure 4. A game where a student creates a vocabulary of five elements and uses them in composition, looking at possible interpretations of those compositions as parts of the built environment. Physical as well as computer models are made. (Peter Schumacher, University of Adelaide; see Schumacher and Radford 1997)*

The games encourage learning about abstraction and representation, the relations between form and meaning, the manipulation and ordering of space and form, and the sense of grammar in design. They emphasise architecture as a dynamic (via the idea of people moving through and between elements) rather than static experience. They operate at the edge between abstract forms and compositions that can be recognised as possible elements in a built environment; part of the games is the imagination of looking through windows, walking past building masses, or being inside spaces.



*Figure 5. A game where a student defines a vocabulary of spaces and considers movement through and between those spaces. In the left hand image, the original five different elements are overlapped, scaled and assembled. In the right hand image, they are linked by openings as 'caves' in a solid mass. (Peter Schumacher, University of Adelaide)*

## CAD System Characteristics for Games

We can play games with any available tools and media, and these games have been played with existing CAD and drawing systems. The software used over the years has included MacDraw, Autosketch, Modelshop and Form•Z. But playing with *grammars* implies more than playing with *vocabularies*; we need a 'play space' in which we can define relationships between vocabulary elements as well as the elements themselves, so that we can explore how those relationships affect designs. DiscoverForm (Carlson and Woodbury 1994) allows this kind of definition in a 2D world, but only with one recursively operating relationship rule at a time. Tartan Worlds (Woodbury et al 1992) allows the definition of a multiple rules about the spatial relationships between 2D symbols, but (as the name implies) restricts them to locations on a tartan grid. The various shape grammar implementations lack the high degree of interactivity necessary in a game.

High interactivity is fundamental to any such endeavour. Steuer (1992, p86) enumerates three factors in degree of interactivity: speed, range (of choices), and mapping (between action and effect in a natural and predictable way). This provides a stage for a drama in which the designer enacts the story of deriving a design, as in a flight simulator the user "enacts the storey of one particular flight." (Ryan, M-L. 1994, para 25)). Any need to transfer attention from the game and the unfolding story of its progress to the means of playing the game (from manipulating form to thinking about commands and interfaces) intrudes on this sense of involvement and immersion. We also need a sense of security to enjoy play, with the ability to take 'risks' while knowing that nothing too serious will go wrong. We get this now through the 'infinite undo' facilities that many systems offer, but too often the 'player' can get lost somewhere in the virtual world, unsure of what has happened to the design or how to re-find a solid footing. Computer games frequently ask their players to nominate a 'skill level' at which the seek to play, and a similar facility in this design play space would be useful. Conversely, play also needs the sense of giving the players power in the game, to leverage their actions to produce more extensive and perhaps dramatic results than would easily be imagined.[#2](#) Above all, what is required is a repositioning of the player within the game rather than outside it. The generation of true 'virtual reality' CAD will have the designer in there, in a 3D world amongst her or his designs, not looking from the outside through a computer screen. Making designs will be like making objects, with the workshop inhabited by the designer. Realism may not be needed: indeed, "faithfulness and realism are terms to be used with caution because a bona fide likeness may fail to present the beholder with the essential features of the objects being represented" (Arnheim 1969 p140)[#3](#).

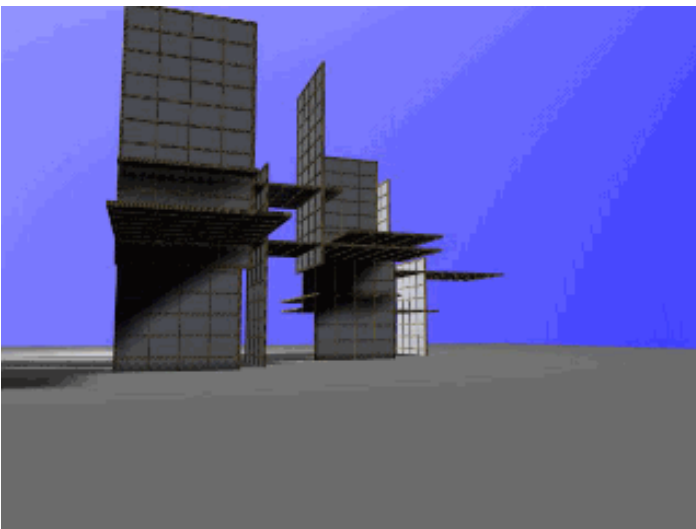


Figure 6. Free play with intersecting screens of common size (Kim Daldy, University of Adelaide)

## Conclusion

Learning about form in Architecture through playing games with grammar appears to benefit both able and less able students. Such games are not (and are not intended to be) a complete education in the handling of form and space in architecture; such an education continues through the degree. In particular, students often have difficulty in handling form in buildings when they are simultaneously trying to handle a multitude of more rigorously stated environmental, functional and constructional issues. Nevertheless, perhaps predictably students who have worked well in these exercises have also tended to do well in later design work.

## References

- Aalto, E., and Fleig, K. (eds) (1978). *Alvar Aalto Volume III: Projects and Final Buildings*, Verlag für Architektur Artemis Zürich, Zürich, 1978
- Arnheim, R. (1969). *Visual Thinking*, University of California Press, Berkeley.
- Berne, E. (1964). *Games People Play*, Penguin, Harmondsworth
- Carlson, C. and Woodbury, R.F. (1994). Hands-on Exploration of Recursive Patterns, *Languages of Design*, Vol.2 pp110-132.
- Davies, Colin (1993). *Hopkins*, Phaidon, London
- Huizinga, J. (1949). *Homo Ludens*, Routledge & Kegan Paul (Republished by Paladin, 1970).
- Hussey, C. (1950). *The Life of Sir Edwin Lutyens*, Country Life Ltd.
- Korver, J., and Thorpe, T (1983). *The Froebel Gifts. A Guide to Gifts Two through Six*. Korver/Thorpe Ltd, Boulder, Colorado.
- Oxman, R., Radford, A.D., and Oxman, R. (1987). *The Language of Architectural Plans*, RAlA Education Division, Canberra.
- Padovan, R. (1994). *Outline of theory seminar in Bachelor of Architecture Course - Whole Course Syllabus* (ed. P. Hodgkinson) Department of Architecture and Building Engineering, University of Bath, Bath.
- Radford, A.D. (1992). Architecture as Space and Matter: Exercises in Architectural Composition and Interpretation, *Computers in Architecture: Tools for Design*, ed. by Françoise Penz, Longman, London, pp33-40.
- Radford, A.D. (1995). Paradigms of Interactive Computer-Aided Design, *Advances in Computer Cybernetics*, Vol.III, ed. G E Lasker, The International Institute for Advanced Studies in Systems Research and Cybernetics, Baden-Baden, pp75-79.
- Ryan, M-L. (1994). Immersion vs. Interactivity: Virtual Reality and Literary Theory, *Postmodern Culture* vol.5 no.1 (Electronic journal, September, 1994)
- Schumacher, P., and Radford, A.D. (1997). Games in Virtual Blockland, *CAADRIA '97*, ed. by Yu-Tung Liu, Jin-Yen Tsou and June-Hao Hou, Hu's Publisher INC., Taipei, pp277-286.
- Snodgrass, A. (1991). Hermeneutics and the Application of Design Rules, *Gadamer, Action & Reason*, Department of Architecture and Design Science, University of Sydney (pp1-11).
- Steuer, J. (1992). Defining Virtual Reality: Dimensions Determining Telepresence, *Journal of Communications*, 42.4 (pp73-93).
- Wittgenstein, Ludwig (1953). *Philosophical Investigations*, translated by G.E.M. Anscombe, Blackwell (Third edition, 1976).

1 Interestingly, Huizinga exempted art from this general claim:

"To derive art wholly from some hypothetical 'play-instinct' obliges us to do the same for architecture and painting... As to architecture the hypothesis is frankly absurd, because there the aesthetic impulse is far from being the dominant one, as the constructions of bees and beavers clearly prove. Though the primary importance of play as a cultural factor is the main thesis of this book, we still maintain that the origin of art is not explained by a reference to a 'play-instinct', however innate." (Huizinga, 1949, p193).

2 Rule-based grammar systems can do this, generating rich and often unforeseen designs by applying grammatical rules concurrently to many parts of a design.

3 This discussion of CAD as an 'immersive' medium is taken further in Radford 1995.