Design Prepositions

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> *"Knowledge is of two kinds. We know a subject ourselves, or we know where we can find information on it."*
>
> *Samuel Johnson, quoted in a Hewlett Packard advertisement.*

Abstract

Architecture is positioned as a type of design, and design is characterized as a verb (rather than a noun), a way of acting carried out by a designer/actor, which is circular and conversational in form. The relationship between design and research is explored, particularly with an eye to doctoral study: research is seen as designed and even as a design activity, and the activity of researching is indicated as re-searching. It is argued that research in design should not be based on the import of theory from outside the subject, but should examine the design activity to construct an appropriate theory built from design: imported theories should only be used where the import can be shown to be sensitive and relevant. Although research in architecture has a long tradition, it uses, in the main, imported approaches that do not help architects do architecture. What is needed is a form of research coming out of architecture itself, producing knowledge that will help architects act. This is distinguished as "knowledge for" (action) in contrast to the academically more traditional "knowledge of" (what is). An example (from the doctoral programme at RMIT University) is recounted of a doctoral study that was turned round by the move from studying to make knowledge of to knowledge for. A brief survey locates knowledge for in an epistemological framework that reflects other research into design. The notion of unthinkability is considered in relation to doctoral research in architecture, in the light of the proposal that design research is concerned with knowledge for. The paper concludes with a refrain in which the relationship between design and research is posed as a series of questions awaiting serious examination.

Introduction: Architecture and Design

The theme of this conference concerns architecture: but almost all of the research that has been done which is in any sense relevant to the conference theme has been done under the name of design. For me, the difference between architecture and design is not significant in terms of the conference theme, and I shall use both words. This usage is further necessitated by the lack of a verb based on the word architecture for the activity architects carry out (there is no verb, to architect): the word we use is design. Where I use the word design, therefore, I use it to refer to the central activity architects undertake—unless the context or my explicit statement indicates otherwise.

However, the word design in English can be both a noun and a verb. Design, as used in this paper, is generally intended as a verb. It is the creative act at the centre of the activities,

including architecture, of design professionals. It is a circular process by which the new is brought into being, the outcome of which (a design object: design as noun) evades logical description until after the event.[1] The circularity of process typically involves making proposals, examining them (often being surprised at what is found) and then returning to remake the proposal. This process is perhaps most typically found in the act of sketching. The process is circular insofar as it rotates, complementarily, between making and criticising phases such as drawing and viewing, saying and listening; the path followed is thus a circle, but, given that there is change in what is made and what is criticised, some prefer to think of what is produced as following a spiral. The trace of its history is indeed a spiral: but the form remains a circle.

The circular activity in which we talk and listen is a "conversation." Conversation as a means of communication was studied by the great cybernetician Gordon Pask, who remarked already in 1969 that architecture is a conversational activity. Pask's studies of conversation remove us from the tyranny of coded and determined meanings, and linear causality. They allow exchanges based on the uniqueness of each participant's understanding (thus making novelty a given). Based on Pask's (1969) work, I have explained more fully on a number of occasions how the process of designing may be understood as a conversation and how this allows the creation of novelty, which can then be post-rationalised into some sort of narrative, linear, logical causality (e.g., Glanville 2003). The conversational partners may be other people or me/us alternating between figuratively talking and listening. Most of us are familiar with how we draw something and, coming back later (which may be no more than the next instant), see in it something quite other than we intended. This is conversation at work. I will not extend the argument here, other than to point our that it allows for error, rejecting work and restarting—important features of design as actually done.

There is a metaphor I have used to communicate the experience this view of design leads to. It is wandering. Design is like wandering in the countryside with some vague idea of going somewhere while not really knowing exactly where you are going, making repeated decisions over which path to follow (or cutting across the countryside, to make your own path) (Glanville 1978, 1988). This repeating action is at the heart of the circular process. After some time, you find yourself in a sunny glade, or perhaps sitting on a tree stump, and know not only that you have arrived (and, therefore, that you have achieved an end hitherto unknown), but also that you have found something that makes sense of your wanderings and from where your path begins to make sense to you even though most of the time you were rather lost—scarcely knowing where you were going. The trust involved in the wandering

[1] If something is truly new (to its creator) it cannot be, in his experience, emergent (in Hobbes' original sense of the Leviathan emerging from the depths, where it already existed). Emergence, in this original sense, concerns the revelation of the existing, previously hidden. The emergent is, thus, not new: rather, it exists obscured, but becomes revealed. The new is not of this sort, although it may be explained in this manner after it has been created. In this case, emergence is not a mechanism for making the new, but for explaining after the event (post-rationalising). The truly new is without precedent in the mind of the creator when being made. Finding precedent comes as explanation after it has been made.

(believing that you will arrive) sense of arrival (recognition), and the ability to, after arrival, make sense of the path you took all contribute to a successful wander. The experience of designing is, I believe, like this.

This view of design does not exclude purpose. In almost all design there are functional requirements that have to be satisfied. Very often, in architecture, these functional requirements can be accommodated, at a simple level, without much difficulty. Room sequences can be assembled and services provided in a sensible manner. These requirements are important to design, but are not what is central. The simple assembly of such elements is not generally what gives a project its architectural quality. Architects (and other designers) need to deal with functional requirements, of course, but need to do more: and it is in the more that the extra quality that is architecture can be found, and which quality we create through design process. Purpose is assumed.

There is one final important feature of design that I must mentioned. Design-as-verb indicates an action which must be carried out by an actor. The actor element has the two roles described above (using several alternative terms) to communicate the sense of these roles: proposing and examining, marking and viewing, saying and listening. These words are all active: the actor is doing something. The quality of the role of this actor is quite different from the role of the traditional scientific observer, who touches so lightly on what (s)he observes that his/her actions are thought to make no difference. The actor in design, in both roles, is actively involved, creating change. This involved action is one reason design has not been seen as a properly academic subject, in an age where academic has come to be synonymous with scientific.

Design as used in this paper, then, is a verb indicating a circular conversational process that leads to the creation of the new. Design is used for this activity in architecture. I take design to be the essential area of architectural activity.

Design and Research

There has long been a confusion concerning design and research. At one level, the confusion can be seen in practitioners' claims that their practice is research. I do not believe that practice, by itself, constitutes research: the words are not synonyms. That is not to say that practice cannot become research: the programme I am particularly associated with at RMIT University in Melbourne, Australia, is firmly and foundationally based in practice (Glanville and van Schaik 2003).[2] Note, however, it is based in and not solely constituted of practice. What makes the difference is the other essential component, reflection—the element that turns search into re-search.

[2] RMIT's School of Architecture + Design has other masters and doctoral programmes, some project based, others theoretical (and historical), others still crossing fields and approaches. A wide range is covered in many different areas of design. In this paper, I refer to the invitational programmes by practice van Schaik and I teach.

At another level, the confusion is seen in how research has, itself, become entwined in the scarcely convention that science and research are synonymous, which is accurate neither as a depiction of science as an approach and activity nor in the proposed synonymity. Only scientific research need be scientific. In other fields, a scientific approach may sometimes help, but different approaches will also be appropriate. Science represents one way of researching: there were ways of researching in the academic world before the modern concept of science was developed, and other scholarly approaches continue to generate good research.

It is therefore important to consider what relationship design and research might have.

Research itself is not a neutral activity. It is an activity that is undertaken by human beings with the aid of various tools (here I consider methods as tools). (Scientific) Research may have developed the approach that admits treating the observer of the behaviour observed to occur in an experiment in such a way that the observer touches what is going on so lightly that this touch can be ignored, but this is only one possibility. And the point remains that this approach did not just happen, but was created by humans. No matter how impersonal the method, it did not fall out of the skies. It was made by people. And it was refined by people: the activity of research was (and still is) designed.

Equally importantly, what is done in research is designed. Not only are (for instance) experiments, even the most straightforward experiments of classical physics, designed. Who ever just observed, rather than composing a situation in which there could be an outcome of the sort they were looking for; who ever just placed elements in this situation without adjusting them to get some desired result; and who ever did not modify and change the set up of their experiment, occasionally capitalising on an accident or unexpected outcome to explore something quite different than they had intended initially?

What is done in research (e.g. experiments) is designed.

The resulting knowledge is composed to become integral with other knowledge both at the level of public knowledge and theory, and within the mind of each of us, as we compose together our understandings. Our new understandings cannot just be bolted onto what we currently think and know: each new understanding, and each instance of understanding, changes us and changes the body of what we know, albeit usually by miniscule amounts. This is why I use the word compose (put together).[3] In this manner we make our world picture, a picture that is composed (or designed) by us. The iterative nature of this activity was recognised nearly forty years ago by Karl Popper in his grand attempt to explain how science works (Popper 1969): a means of progressing that is circular and designerly.

Thus, the activity of research itself is the outcome of a design process, it is modified by design, the experiments that it often uses are designed and the users using them work as

[3] In my usage here, composing is synonymous with designing. The choice of which word is historical (and has a quite different intention in its etymology), but, in general, current usage is much the same.

designers do. It uses methods, also designed in a vast social act. Finally the outcomes are designed to form public knowledge and theory and, by each of us individually, to compose the understandings that constitute our individual worlds.

Research is, in this analysis, thoroughly designed; it is at all levels the outcome of designing.

The reciprocal question is whether design is research. I have answered this in relation to practice, above. More generally, researching is not the same as searching. Much so called research carried out by designers is searching: re-searching indicates the activity implies more that just searching—a searching that revisits the original searching. It is this re-consideration, the reflective element that, for instance, Schön (1983) has brought to our attention as a central aspect of designing, where searching is converted into re-searching.

Thus, not all design is researched (although perhaps it should be): but all research is designed. I have argued this point at greater length and using further arguments in Glanville (1999).

How (and What) to Research

The history of design research has been liberally peppered with approaches imported from other fields, many of which have been of dubious value and some of which have been positively damaging. An important question concerns the appropriateness of approach (Glanville 2004): an approach brought in to direct our studies of designing may have little or no connection with designing as an activity, and thus be inappropriate. While it is possible to learn from other approaches and thus enrich the subject, there is always the danger that an imported approach may totally distort the subject to which it is applied. For instance, the hard science approach of early design methods totally rejected (and hid from our attention) the activity that designers perform. We were in danger of losing a significant way[4] of solving problems and creating the new as what designers did was forced into another (and essentially unsympathetic) mould. This realisation is perhaps best expressed in the radical and brave volte face performed by one of the early gurus of the design methods approach, J Christopher Jones, whose work is now based extensively in the random and the poetic.

One example may suffice. The populist architectural theorist, Charles Jencks, has brought a number of different approaches to architecture. Amongst the best-known are semiology, deconstruction, post-modernism, and, recently, chaos theory. These approaches have been enthusiastically taken on board by architects, and have strongly influenced[5] the appearance of recent designs. Jencks has used his own recent enthusiasm for chaos theory as a sort of (substitute for a) design method in creating his own garden. The result is a garden made of objects that are hardly designed at all. Rather, they constitute an assemblage of totemic icons

[4] I would argue THE significant way.

[5] Other factors have also been important, for instance the development of CAD.

formed by the most literal of projections of theoretical understandings that essentially fail to take into account any significant aspect of designing. They are literal translations of forms deduced by scientists, crude representations of a theoretical position that (to the best of my understanding) has little to do with what (landscape) architecture might be, occupying a very particular place in explaining the world we live in, as we currently understand it.

Jencks' garden of objects is scarcely designed. Instead, it consists of a collection of literal transported (and translated) objects placed within a garden.

My point here is not to attack Jencks, or indeed anyone else. It is to indicate dangers. In treating design as a subject other than itself, in investigating it through means of investigation that are less than entirely appropriate to the subject itself, we risk so distorting what design is that what we examine is barely recognisable, and we risk forcing an approach that will actually hide from us what is at the heart of design.

So what should be researched in design research?

My answer is design itself, as a subject (a way of acting) in its own right, as an undertaking that is worthy of our respect and affection, meaning that we research it in order to understand it in its own terms, not to force it into some other form.

And how should we research design?

We should not import approaches (and theories) unless we can show they are appropriate to design, that they will not badly distort, that the insights from outside that they give us are both sympathetic and appropriate. But, in order to do this, we need, already, a refined notion of what design is and might be—and to understand that is the purpose of design research. We are putting the cart before the horse when we import these approaches, for in order to try to show they are appropriate we may have already twisted our research so that the assumption of the approach, itself, prevents us from seeing the import as inappropriate.

We need to find out how to carry out research into design: and to do that, we need to recognise what it is that designers do and to find an approach and method of investigation that sustains this: in other words, that is appropriate.[6] We need to find ways of looking, either deriving from within the subject itself, or demonstrably reflecting the act of designing: that is, passing an appropriateness test.

Remembering the point that research is an expression of and framed by design, I return to the point already made. Research is a product of design. Borrowing a concept from mathematics: except in very particular circumstances, it is inappropriate to ask a set to be a subset of what is already its own subset.

[6] I accept that research is not exclusively a subset of design. There are, I recognise, aspects of research that are not in any sense contingent upon design. Nevertheless, in this debate, research is necessarily formed by design, and to invert this dependency is to distort. Research in architecture has had enough of such distortion already.

Why Architecture (Design) Research

The title of this section refers to what we might hope to gain by carrying out research into architecture.

It might appear that I believe we have only recently begun to carry out research in architecture (design). But we have carried out academic research in architecture for some time. This research has taken two main forms: historical research and research into the physics of buildings which has formed several branches of engineering as well as what has now become known as design science.[7]

I have already argued why we need a form of research into architecture (design) that makes it less subject to other, imported or externally applied approaches. The research in history and engineering/design science have both been applied to architecture, bringing with them approaches that seem to have little connection with either the medium of architecture (space) or helping architect/designers to design. With little or no respect for the subject itself, historians take architecture and, by fragmenting it into projections, details and styles, use it as fodder for history, completely missing the substance architects play with: space. In principle, by exploiting architecture they throw much light on history but, I would assert, little if any on architecture. Engineering/design science may be more helpful, but there are two shortcomings: firstly it tells us little about working with space (though civil engineers may produce structures of supreme architectural quality); and secondly, what they tell us does not help us as designers in our attempt to (improve) design.[8]

This is the crux of the mater. By doing research we hope to design better. The aim of our research is to improve our performance, to act better: not to understand more.

It is a postulate (even a tenet) of Western society that understanding is a prerequisite for better performance. The extreme statement of this is that it is necessary to understand what is, in order to be able to make changes for the better. I am unaware of any evidence to demonstrate this. It is, to my knowledge, an article of faith, a creed—although we don't, of course, admit this.

But for designers, the critical concern is not so much to understand as to act.

I take it that, in spite of this caveat, research into design is intended to produce (and is

[7] Some might wish to include other approaches, for instance philosophical research into aesthetics and utility, and sociological approaches to space.

[8] I do not deny that research in the history of architecture can be valuable and valid as historical research, benefiting architecture on occasion; ditto the engineering/design science approach as engineering and design science. I do, however, insist that there should be research in architecture that is essentially architectural.

generally successful at producing) knowledge.[9] Yet the knowledge produced by the majority of current design research practice does not significantly help designers. To give an example, carrying out a heat loss calculation for a small building by hand takes about half a day, and generally merely tells the designer (s)he are wrong (the heat loss is too great: we rarely get it right at first). What it does not tell him/her, except in the most general way, is what to do about this. The knowledge is knowledge of what will be, not knowledge for how to change it. But that knowledge for (action) is what designers need.

Design science and history, the approaches that have dominated design research until relatively recently, are based in an approach that generates knowledge of. This is the sort of knowledge science is interested in, seemingly—and very good at generating.

I propose that research in design (architecture) should forge a new type of knowledge, knowledge for, intended to help us act (better), to (more successfully) perform our activity as designers. This is one way of shaping our research so that it is based in design, sensitive to design, and designerly.[10]

Some will argue that there is a third kind of knowledge that converts knowledge of into knowledge for. I agree. It is commonly called technology, and I refer to it as transfer knowledge (or translation knowledge). But transfer knowledge is a secondary knowledge: helpful in making the unusable usable, but not itself generating usable knowledge. As we live more and more in a time where the question "How?" rivals the question "What?" it is appropriate to look beyond transfer/translation, treating knowledge for as a distinct type of knowledge worthy of construction and valuing in its own right.

While transfer knowledge may convert knowledge of into knowledge for, allowing us to move from understanding to controlling (in the cybernetic sense) the environments we design/construct, it would be better not to need an extra step. Researching to produce knowledge for enables this. The crucial question for designers and for design researchers is itself a knowledge for question: how to do this. In my view, this is perhaps the central and most critical question that design research has to answer if it is to prosper and help designers.

[9] Elsewhere I argue the word knowledge is inappropriate because it suggests something that exists without an agent, and I find it inconceivable that knowledge can exist without a knower. Therefore, I prefer the word knowing to the word knowledge. However, this position is not central to the argument presented here, and in order not to increase irritation caused by the central argument I will use the word knowledge in this paper.

[10] I have characterised the distinction between knowledge of and knowledge for in a recent paper, "A Cybernetic Musing: certain Propositions concerning Prepostions" (Glanville 2005). The paper also includes some history of the use of prepositions to indicate such subtleties in English including distinguishing modes of research and classes of knowledge.

An Example involving knowledge for[11]

In order to make my point less abstractly, let me cite (with agreement) a case.

Dominique Hes, a doctoral student I worked with, had been awarded a scholarship in the Centre for Design at the Royal Melbourne Institute of Technology University (RMIT). Dr Hes's knowledge when she started her PhD was constructed as what I now call knowledge of, whereas what she needed was knowledge for. Arriving with privileged access to a life cycle assessment software package, she believed her project was to encourage architects to design with this package. Finding major barriers in accessing designers even to discuss the project, she determined that it was her lack of understanding of design that was the major problem. We proposed she attend a one week introductory landscape architecture course run by RMIT for potential undergraduates considering applying for a place to study, to get at least a beginner's feel for design. She reported it was the best week she had ever had, and began to understand that you couldn't just force architects to use assessment software because not only was the whole style of the package alien to the way that designers think and work, but also it was unhelpful in that the resulting assessment gave scarcely a hint of how to improve the life cycle performance of the architectural design project.

Recognising this shortcoming, we decided to lease Dr Hes to architects' offices that had shown a concern for environmental considerations in a current design. Over a period of time she began to speak the language of architects and architecture, even adding to drawings. The result was that she was able to re-form what has previously been her knowledge of into knowledge for. This was not, I argue, a (technological) translation using transform knowledge from knowledge of to knowledge for: it was far too fluent and unitary for that. What Dr Hes did was to make knowledge for in place of knowledge of. And the proprietary software package was not mentioned again, for, being knowledge of, it was unusable.

An eventual outcome of this tactic was a building that was both decent architecture and energetically effective: using 73kwh/m^2 rather than the (Australian) norm of 250kwh/m^2, while also saving 72% of water used by standard buildings in the same organisation. (Hes 2004.)

Precedents and Relatives

What has been called knowledge for is not without precedent. When I first named it I was aware of subjects that are solidly based in approaches which are at least close, including (as well as design) Andragology and Praxiology. But there are also ways of trying to deal with a division in knowledge that somehow reflects this division, including (from design) Donald Schön's reflective practice (1983) and Michael Polyani's tacit knowledge (1967). It is clearly the sort of the knowledge that is at the heart of what the Masters students my colleagues Leon

[11] This example is taken from Glanville 2005.

van Schaik, Sand Helsel and I have been working with at RMIT University, recently given a more general account in van Schaik (2005), and Glanville and van Schaik (2003). There are developments in other fields: Gibbon's et al's (1994), mode 1 and mode 2 learning from management, for instance.

What I am proposing in distinguishing these two types of knowledge is a considerable research programme that would establish a research more relevant to areas such as design, which would look at strategies for creating knowledge for. At the moment the distinction between these two (complementary) types of knowledge is not properly explored. Such exploration will include considerations of the inevitable Greek contribution (eg Aristotle's Episteme, Techne and Phronesis); those cybernetic staples, Piaget's learning principles, von Glasersfeld's constructivist learning, Maturana and Varela's views on knowledge, and, of course, Pask's learning systems; as well as some relative recent philosophical considerations such as Dewey's and Heidegger's. Rescher's Command Logic also involves a similar distinction, which he distinguishes from deontic logic—itself another candidate for consideration.)

The Unthinkable Doctorate

In her keynote to this conference, Halina Dunin-Woyseth (2005, in this volume) told us the history of the doctorate as we understand it nowadays, particularly the doctorate as PhD (in the English speaking world). Within her paper, we can find some of the reasons that we might consider a doctorate in architecture (that is, design) unthinkable.

There are at least four senses in which we can understand the word unthinkable that may have a bearing on doctoral study in architecture.

unthinkability as beyond that which can be thought

> This is encapsulated in one of the aphorisms for which Wittgenstein is best known, proposition 7 of his Tractatus Logico-Philosophicus (Wittgenstein 1961)
>
> *"wovon man nicht sprechen kann, darüber muß man schweigen"*
>
> ("What we cannot speak about we must pass over in silence")
>
> We cannot assert that there is anything beyond that which can be thought (taking thought in the most general sense), for to do so requires thought. But, equally, we cannot deny it. And, while logically this leaves us with an undecidable, common experience—or at lest our explanations of it—tells us that there is something beyond the conscious world of thinking and that new ideas are born which we often assume come from somewhere.

unthinkability as excluded from thought (blindness)

It is generally taken that our senses are the senses we have.[12] Anything outside these senses would be hidden from us and thus beyond thought. If they exist they are unthinkable: they are inconceivable, and so they exist—if they do exist—outside out conception, excluded from thought. They are beyond our knowing. We often refer to this as thought blindness: our inability to conceive, credit or enact a thought—so it becomes unthinkable. We rule out certain thoughts, often by insisting "it is inconceivable that…" The way we have categorised our senses into the Five Senses for hundreds of years has also added to the inconceivable.

A familiar example from the biological world is the blind spot in the eye: an area near the centre of our field of vision where we see nothing because this is the nexus at which the optic nerve joins the retina and there are thus no light receptors. In normal everyday life we are not even aware of this spot because we are so good at the interpolation which (so our explanations go) hides from us that which we do not see.

Both these forms of exclusion lead to denial.

unthinkability as improper

Another way of making the unthinkable, similar to exclusion, is the notion of impropriety: there are those thoughts that we chose to exclude from our worlds because we consider them unacceptable. This is the realm of censorship and the politically incorrect, which rule out certain ways of thinking or certain (types of) thoughts—a way of acting much loved by those in power who wish to confirm and extend that power, although by no means exclusive to them.

It might be argued that many pre-feminist views of what women can or should do belong to this category. Equally, early feminist views that there is no difference in what women and men can (or wish) to do also belong to the category. Who knows what, of what we think nowadays, belongs here.

unthinkability as inarticulate

Finally, there is that which cannot be articulated within the chosen medium or means of expression. Most would agree that there are appropriate media for particular concepts and actions: it is difficult to say in words what is said in music, for instance. Certain thoughts belong in certain media. The moment there is a criterion concerning media, concerning means of expression, there is also an exclusion. This exclusion makes the saying of certain things impossible (or at best very difficult and clumsy), rendering us inarticulate. In the extreme, some of us simply are inarticulate, anyhow.

[12] Although this position becomes less and less obvious as we discover new sensory modalities for which we cannot find distinct organs and as sensory prosthetics become ever more a conceivable dream.

> An example is the question of what is called visual logic. Logic is essentially verbal (the root word is the Greek, logos, meaning word). There is now a long history of argument claiming logics that are not verbal, particularly visual logic. In a tradition dominated by the verbal, it can be difficult for visual logic to gain credence, and its proponents may be required to present their visual logic in verbal translation which both profoundly distorts what they wish to say and, ultimately, destroys the point of their logic.

In the past, we have been willing to accept that architecture as a subject often falls into one or more of these categories, and therefore that it belongs with the unthinkable. I hope that my keynote has shown that at least some of these ways of being unthinkable can be overcome, by showing that architecture (designing) is not beyond what can be thought; need not be excluded; is not improper; and can be articulated.

If I have succeeded, I have managed to show that, given appropriate conditions and interpretations, architecture is indeed a proper subject for a doctorate: and that that doctorate is no longer unthinkable.

In Conclusion

In 1980 I wrote a paper, "Why Design Research" (Glanville 1981). It included an expansive play on the title. Here is an abbreviated version:

why design research?
why design design research?
why design design research research?
why not design research?
why research design?

The time has come, I believe, for us to begin to consider these questions seriously. And to understand that the recursive forms they fall into are, themselves, reflections of design, designing, research and researching.

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Biography

Ranulph Glanville has, over the last decade, worked as a freelance, vagrant professor, mainly commuting between the UK and Australia. In the UK he works at the Bartlett, University College London, where he teaches cybernetics. In Australia, he has had a major part in the development of the extension of the Invitational Masters through Practice to the Doctorate through Practice at RMIT University. He also works with other universities helping them develop research, and new courses and projects, particularly the Universities of Western Australia, Canberra and Monash University, Melbourne. He has written on Design Research for over quarter of a century, early on introducing concepts such as research as design and the importance of finding appropriate theory for design within design, rather unquestioningly than importing theories from other subjects. He has a long term working relationship with Johan Verbeke and, through him, with Sint Lucas Architecture. At the moment he supervises PhD students on 4 continents. He has recently given a number of major public lectures including the von Foerster Lecture in Vienna and a Deakin Memorial Lecture in Melbourne.