

Not Aping the Past: Mirror Men

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Then We'll Begin

To collaborate is to work together. To work, in my thinking, together presumes participation. When I talk of collaboration, I talk with the notion of participation in mind. I shall often write of participation as an alternative term to collaboration, in this paper.

I am interested in anything that may enhance our creativity (as designers). There are those whose interest in collaboration is different, and equally justifiable.

The main part of the title is from a quote by the composer Harrison Birtwistle, who said: "Tradition is not aping the past but making the future."

*The intention in what I write is to suggest ways in which Information and Communication Technology can be used, not to ape the past, but to make the future, especially by enhancing our potential to act creatively. I do this by introducing facets of ideas in fragments, so they can interact with each other, rather than forming the great, separate arches of traditional arguments, one after the other. For me, collaboration is more than co-operation or co-ordination *. It must involve novelty, the creation of something beyond the expected and more than an improvement—a quantum step.*

Introduction

Participation, in architecture, is like Virtuality. It has always been there. Although we have come to think that Virtual Reality is new, it is, in fact, at least as old as the art of the architect: what architects do and have always done precisely matches what Virtual Reality claims to give us.

Similarly, participation. The moment the architect separated from the client and from the builder, there was co-operation, participation (even if not always very effective). And the moment any one of those processes needed more than one person to carry it out, there was participation. Some would even claim that there is participation the moment we start revolving ideas around in our heads, thinking

*** Henri Achten reported and summarised the differentiation between collaboration and co-operation, made by Thomas Kvan, at the ACCOLADE conference in Brussels, August/September 2000. I refer to his summarising. Tom Maver added the concept co-ordination. Their interests were in reminding us of the importance of co-operation and co-ordination. Mine is in differentiating and giving special value to collaboration. See Kvan 2000.**

about them, and criticising *. There is participation when there is collaboration and there is collaboration when we work together. There is participation when we separate ourselves into different factions and allow the factions to talk to each other.

Computing

Nowadays, it is normal to consider how computing (which term I use to include information technology in general) can improve human performance in virtually all fields. I will consider the connection between computing and participation in the next section. Before that, I want to consider aspects of how we can use and think of computing.

I have argued over the years that we could beneficially think of computing not as a tool, but as a medium (Glanville 1992). The difference I make is between something which simply amplifies some ability we have (a tool) and something which “kicks back”, that is, something which surprises us by offering us alternatives we had not thought of, outside the range of the paucity of our imaginings. Thus, a medium helps form the outcome of our actions: it is not simply an amplifier because it brings with it its own, unique contribution.

For the purposes of the discussion in this paper, I wish to modify/extend this differentiation. For present purposes, I would like to maintain that we can talk of the computer as:

- an extension of ourselves: doing what we can do, but more so;
- a partner for us: joining in and offering its “own” insights;
- a location or milieu: in which we can act.

(The first of the above is essentially the “tool” approach and relates to communication as coding; the second, the “medium” approach, relating to communication as conversational; and the third is additional, providing the space between that I have more recently argued we need for true interaction (Glanville 1997).)

While most who discuss computers and collaborative endeavours are talking of collaboration with other humans, improved by working through the computer, my contention is that the more interesting interpretation is to collaborate with and/or in the computer, as an active partner.

Participation

We live in, accommodate and sustain a culture in which we talk of collaboration and participation. The notion that we may work together (collaborate) effectively is appealing, because we have come to believe, for instance, that we may be able to

* The notion that is central in this understanding is of the design process as a conversation with the self (and/or others) using a paper and pencil: in which the marks drawn, for instance, are later seen as containing potential and ideas never (knowingly) present in the making of the original mark. Although I thought I originated this description (Glanville 1980, 1994) later research shows me that my cybernetics professor, Gordon Pask (1969), beat me to it by a good 10 years. I had probably come across his characterisation and forgotten it.

amplify the ability any one of us has, or incorporate a wider range of resources than each of us has developed individually. Thus, participation and collaboration may be seen as being at the root of society, a point of origination of an account of our behaviour as social animals.

Indeed, part of the sales pitch of our ever more computerised society, is that we will be able to collaborate and participate better because we will be able to communicate both faster and more (which we call “better”), through our computational media.

This notion of participation is essentially tied in to the notion of having a voice—rather than of being heard, in the way that politicians talk of participation as giving the people a voice *. That is, it, and our computing technology in general, is fired by an interest in the transmission of signals (and coded information processing in that Shannonesque “Mathematical Theory of Communication” sense (Shannon and Weaver 1949)), rather than by a model in which individual understandings are developed by each participant as a result of listening. Coded information carries with it the notion that it will be decoded (unambiguously): that is, that there’s no problem with listening because listening is an automatic action; and there’s no problem with understanding, since the meaning is encoded into the message. We have become more interested in being heard (ie, speaking) than in hearing, ourselves. No wonder we suffer a vast proliferation of messages, which we can only really handle through the crude mechanisms of ignoring and filtering!

Participation and Communication

Participation and collaboration (and, for that matter, co-operation and co-ordination), certainly depend on communication, but not the form communication that depends on encodement, on the notion of a message being transmitted without understanding the importance of and creativity involved in listening *.

The alternative model is conversational. What is important in the conversation, from our point of view, is that it is based on “Mutual Reciprocity”. That is to say, when we assume a quality for ourselves, we must also assume that it is at least an in principle possibility for those others we distinguish ourselves from (see Glanville 1990, von Foerster 1991). The consequence is that, if I (for instance) understand in my own way, then you may also do so. Thus, under these conditions communication must involve the notion that meaning is constructed by listeners (as well as speakers), which is precisely the central tenet of Pask’s Conversation Theory (see later). Participation and collaboration depend on communication and on each participant having their own meaning. That is why listening is so crucial. For an extended argument, see Glanville 1996a).

But it is only relatively recently that we have come to understand communication,

* By an amazing co-incidence, while I was revising this paper in the light of refereeing responses, the British registration of voters form arrived through my letter-box. In it is the quote “No Vote, No Voice”.

* Listening is a skill in which we have become very poor. Of course, there are outstanding listeners. But generally, as Nichols (1995) shows, we have lost this art. It is an art that not only lets us understand and share (and is therefore control to collaboration), it allows us to step outside ourselves. Anthony Clare makes a similar point in his recent book on the crisis in masculinity (Clare 2000).

within the arena of computation in this manner, and implementation is still in crude and early stages.

Computing and Participation

How do or might we think of computing and participation, especially in the field of CAAD* ?

I see three themes:

a) improving current practice

This is the theme that has been developed most by workers in the field. Just as most of the work developing CAAD systems (at least until recently) may be interpreted as providing tools that match the ways humans tackle tasks associated with aspects of designing, so most of the design applications developing participation have been extensions of practices we already have. The approach is based in our current understandings of our needs we see now and our solutions we can imagine.

b) augmentation (allowing the computer to exert itself)

If improving current practice is a form of extension, the theme of augmentation is one of finding what the computer might offer other than what we can already think of and demand. In other words, it is the opposite and potential complement of extension. It treats the computer as a medium rather than as a tool. It assumes that computers are not just mirrors of humans, but have qualities and characteristics of their own (Glanville 1996b). While we mostly attempt to hide these qualities by demanding that computers do what we want (in a human friendly manner), we cannot altogether avoid them. What we call an error can equally be seen as the computer asserting itself, rather than doing what we instruct (and want) it to (I do not mean to raise those philosophical questions that have traditionally confronted us concerning the role of the programmer, etc: this is not the place and, anyhow, Turing effectively dealt with the matter 50 years ago)*. I believe we often see this more clearly when we use more primitive machines and programs, ie machines that do not have the computing power to be easily subverted into what Gregory Bateson and his daughter Mary Catherine referred to as "our own metaphor" (Bateson 1979). And I am aware of the danger, and even the contradiction, of talking in this manner, which may seem anthropocentric.

* The area of Computer Supported Co-operative Working (CSCW) occasionally goes beyond these headings. While it is essentially concerned with traditional information transmission, some workers in the area are aware that certain forms of transmission and particular models of communication are more effective than others. There is little doubt in my mind that a serious consideration of work in CSCW might enhance our attempts to create an information technology for participation in architectural design—if only we chose our sources carefully to be those that show sensitivity to the issues raised here.

* This is my summary. Turing's argument is based on the notion that we recognise qualities such as intelligence, and so if we would give the quality of intelligence to something we are operating with, were it to turn out to be human, if it turns out to be a computer we must, equally, give the computer the same quality. We should not discriminate against the computer because it is not human. See Turing 1950.

Nevertheless, I have argued extensively and continue to maintain that it is through admitting ideas other than our own in to our worlds that we can increase the potential for us to be creative*, and I will not repeat the argument here, except to say that computers are, in this view, much more interesting when they do not fit our models too conveniently or too compliantly!

The augmentation approach is the approach I favour in our use of computing for collaboration (just as I favour it in CAAD). As another radical composer, the Austrian “inventor” of 12-tone (dodecaphonic, serial) music, Arnold Schoenberg said, “There is much good music to be written in G Major. But not by me.” There are many outstanding people working in the tradition of theme a) above (in both participation and CAAD). But what I am interested in is something else.

c) a complete change

It is a consequence of the thinking that typifies b) above that we may find the previously quite unimaginable. I do not mean augmentation, but something far beyond that, which we cannot even suggest a name for at this stage. There is a danger in categorisations (such as the headings used here are), that they leave no room for that we have not (yet) thought of. Heading c) is included in this text because I am convinced it is essential that we keep our minds open and do not deceive ourselves into thinking we can predict or predetermine what the future will bring us (except in extreme cases where we can limit what the future holds for relatively short periods—see footnote 7). Even in science, where the idea was strongly held that the strength of scientific investigation and formulation lay in its ability to predict, following Popper we now accept as our ideal that the value of a scientific concept (indeed, its definition) is that it is falsifiable: that is, the expectation, and even the intention, is that it will not found to hold indefinitely. This is one of the weaknesses of most of our predictive technologies—for instance probability theory, where possible outcomes are determined by what has already happened and there is no space for that which has not previously occurred. What I propose is more akin to von Foerster’s measure of Diversity (von Foerster 1973), allow the range of solutions in a probabilistic situation to extend beyond the range - 1 to 0.

The wisely constructed categorisation system will, in my view, take this into account by allowing for the so far unknown and unforeseen. Which is the purpose of including heading c).

I refer to the notion that, when faced with an uncontrollable system with greater variety than we can ever muster, we may (according to Ashby’s Law of Requisite Variety (Ashby 1956) either limit the system so its variety (and hence the range of its performance) is reduced, or we can accept that the system will surprise us, presenting us with (what is to us) novelty and thus increasing the range of possibilities available to us beyond our imaginings. This I take to be an enhancement of potential creativity. See Glanville 1994, 1998.

For Instance

a) improving current practice

Participatory examples that belong under this heading include the various experiments with virtual design studios (eg Wojtowicz 1995), remote juries/crits, shared white boards, and even the programmed (forced) exchange of work so that authorship rotates as work progresses, stage by stage, from one author to another (eg Hirschberg et al 1999)*. The computer facilitates us doing (extended versions of) what we do anyhow, and speeds up our performance of what we already do. It enables other (human) participants, we say, to take part better. Other examples include such immensely valuable, but essentially mechanical, examples as anti-clash routines.

There has been extensive, imaginative and effective work in these areas by many good workers in the field. They are not, however, the concern of this paper

b) augmentation (allowing the computer to exert itself)

As far as I am aware, there are essentially two ways in which we might envisage the computer being used to facilitate collaboration.

The first, and, I believe, probably the more important, is as a participant itself. That is, not to enable other (human) participants to take part better, but to be a participant in its own right. This, of course, assumes that the computing device will be recognised to have a right in its own right: ie, that as a participant it will not be formed to be pseudo-human; it may not be cast in our own image*.

The second is as a milieu of participation. At the moment, many of the collaborative schemes based in computing might be thought to approach this form of participation, for facilitation may be seen as part of the milieu. However, I intend something rather more than this. My intention in choosing the word "milieu" is to emphasise again the notion of the computer as medium, this time in the context of location. There are, I believe, ways (as well as those so far found) in which the computer can actually be the site of collaboration, and may, through its abilities to model and to compute connections, do much more than act as a fast switchboard connecting human participants and collaborators, or scheduling them to work in sequence, etc.

c) a complete change

If I could give examples of c), it would not be c) any more. The moment something appears under this heading, it inevitably moves itself out to the heading, in all likelihood to either heading a) or heading b). This is the difficulty inherent in the concept of emergence, at least in its earlier interpretation (nowadays it is synonymous with the unpredictable whereas it used to mean automatic appearance).

* It is perhaps important to point out that several of these approaches have been developed and extensively used long before the age of generally available computation. Roy Ascott, for instance, was working on remote, jointly authored art (telematic art) using fax technology during the 1960's. Psychologists working with George Kelly's Repertory Grid Techniques have used forced exchange of concepts (see, for instance, Shaw 1981), and I have experimented with similar techniques in architectural education since the early 1970s. The use of computation in these areas is thus an extension of what we already do, rather than anything truly new.

* This is not intended as an anthromorphication. When qualities are seen as attributes of an observer to an observed (in line with the summary of Turing's argument re Artificial intelligence, see footnote 6, the question of anthromorphisation disappears.

Achieving Alternative Forms of Participation

In the previous section I suggested there were at least two ways in which the computer can be considered as augmenting participation. I will explore aspects of the first of these in this section and comment briefly on the second.

The reader may wonder why there are no illustrations in the text. Amongst the reasons, the most relevant is that, by not including illustrations, the reader is encouraged to imagine the outcome. This is a form of participation. It is reminiscent of McLuhan's interpretation of tv as a medium that, providing extensive information, is "hot", whereas the "cold" medium of radio, not giving us so much information, requires us to join in imagining what is going on (McLuhan 1964).

a) the computer as a participant (an active partner)

Consider, for a moment, the function of a computer based automatic text summariser*.

This gives a summary of a written document, using some of the words of the author (a precis, really), but also often stitching together parts of different sentences, omitting phrases etc. In the end it produces a summary of a document in say 10% of its original length. (See appendix 1 for a minimal (ie, self-re-generating) summary of this paper produced by the Apple Mac system software.)

What does such a summary offer?

As the author, I have cannot predict what the summary will be (I doubt that the programmer would have much idea, either), but experience shows me it is not usually a summary I would have written. But to hope for this is to miss the point. The summary gives me the opportunity to consider what I wrote in a what may be a completely new light.

What the summariser has done is "listened to" my text, "thought" about it, and "told" me what it thinks I meant—in its own terms. (This is what a conversational partner does.) The summariser has mimicked a human listener, but with its own personality which I still have not understood (I now use these summaries extensively, and yet I still cannot characterise or predict them). It matters not to me the mechanism by which the summarising has been done—what matters is that I can find sense in the response offered back to me*.

I have argued for years about the crucial nature of the understandings behind Gordon Pask's quasi "Mirror Man" proposal of a conversational model of communication*. I will not repeat that here. What is central to the discussion in this paper is the notion of participation that is implicit in his Conversation Theory (CT). You cannot be in a conversation unless you are part of it: participation (collaboration) is of the essence. Further, conversation (in the colloquial

* I have, earlier, used the example of the automatic correction of randomly typed text by a spelling checker as a source of poetry, and the outcome of an autotrace routine as a source of (complex and non-linear) forms with which to design. Recently, I have extended my use of these techniques working with automatic summarising, computer generated voice, sound stretch and vocoding/harmonizing as a way of making music. I recognise that these may be very poor ways of accepting the computer as a partner in a collaborative work.

* This is similar to the technique used in Wiesenbaum's ELIZA. But there is an important difference. The summariser involves more than the selective mirroring of ELIZA. It gives a new slant.

* Unfortunately, Pask's work is difficult to access in all senses of the word. But Pask and Cullen (1982) gives a good general flavour and is probably more useful as a reference in the first place than any of the more technical papers.

understanding that I trust the reader will share) leads to “emergent” behaviours: that is, conversations have a life of their own, and move in directions none of the participants foresee. So CT provides an ideal model for collaboration as a source of potentially enhanced creativity, regardless of any computational participation.

What is essential to that participation is not so much the ability to “speak” (for instance to utter your response to what I have said), as the ability to “listen” and, from listening, to make meaning. In a crude manner, that is exactly what a summariser program does.

This ability to listen is at the base of all participation. It is the requirement placed at the beginning of this paper. Therefore, if we wish to have the computer as a participant, an active partner, we must allow and encourage it to “listen” in such a manner that it creates its own meaning. While if we use a conversational model, we require participation. In conversation, we treat each as an individual with its own understanding and world view: that is what CT is all about.

The example of the summariser indicates that this is no longer beyond the realm of the possible. Our task is to find ways of extending this explicitly into design—to give each of us designers a meaningful collaborator on our desktop.

b) the computer as milieu of participation

I am planning to conduct an interactive art project in which the computer is the milieu of participation. All the art happens through participation within the literal and metaphorical milieu of the computer. In this case, this might really be called a cyberspace, in the meaning of William Gibson (Gibson 1986).

I can say no more about this here. The project is currently under negotiation, and funding is still not at all certain. I am sorry to appear a tease. The point of including this section is to indicate that such work is being actively considered and developed.

Commentary and Criticism

A critical comment that is often made about the approach I espouse is to ask what the difference is between this approach and the use of such randomising elements as arbitrary ink blots, etc.

Although there are, I believe, good arguments that support the use of randomness and chance/accident in the creative process (for instance, Kandinsky is reported to have invented abstract art when, seeing a canvas at the far end of his studio, he did not recognise it either as his or as depicting something, because it had been placed the wrong way up), what I am proposing is not random. I am attempting to find ways to allow the computer a place in a conversation, not as a mimic, but as an active participant that can respond with ideas, interpretations and suggestions of its own. I think of this as allowing the computer to express its nature and to be a participant.

This is worlds away from randomness, and such related notions as automatism and the surrealist’s attempts to free the subconscious to express itself unfettered. It is an attempt at collaboration, not through but in and with the computer.

If we do not accept that the computer is capable of offering us something different than we can offer ourselves, I believe we are missing an amazing opportunity (Glanville 1995).

Conclusions

I have argued against our recent approach to collaboration because it is based in speaking rather than in learning to listen. This is not unique to our involvement with digital systems*.

I also claim that we are limited by the paucity of our imaginings. We can only imagine what we can imagine. To compensate, we should allow room for the computer to go beyond what we can imagine for it, both as a participant and as a milieu in which participation may occur, as we allow other humans to do, through conversational interaction.

Our task, in my view, is to facilitate us in being surprised. Finding the new. If we want to collaborate using the new technologies available to us nowadays, we should at least allow that how and with what we might participate is open to question and to new findings.

This is not an argument against the useful. It is an argument against allowing ourselves to be trapped, as is common today, in the world of the merely useful. There are qualities other than usefulness that are of value—are of greater value. One is creativity and novelty. To be trapped by the useful is to be trapped by the banal. This is an argument for the other than useful, rather than against the useful.

Appendix 1

This appendix was extracted from the body of this paper by the Apple Mac system software. It is a summary of the paper, re-summarised until the summary produced is the identical to the summary before. I have tidied up the English and the punctuation slightly.

For present purposes, I would like to maintain that we can talk of the computer as an extension of ourselves, doing what we can do; but more so as a partner for us: joining in and offering its “own” insights; and as a location or milieu in which we can act . (The first is essentially the “tool” approach and relates to communication as coding; the second, the “medium” approach, relating to communication as conversational; and the third is additional, providing the space between that I have more recently argued we need for true interaction (Glanville 1997).) While most who discuss computers and collaborative endeavours are talking of collaboration with other humans, improved by working through the computer, my contention is that the more interesting interpretation is to collaborate with and/or in the computer, as an active partner...

* There is a growing market in psychological and self help books based in regaining the skill of listening.

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Afterthought

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Why are we so obsessed by efficiency?

Collaboration, regardless of whether or not it is through, with, or facilitated by a computer, involves us working together.

At the {ACCOLADE} workshop conference we thought about collaboration, and much of the time, presentations and consequential discussions were concerned with collaboration in order to improve efficiency.

Generalizing wildly, efficiency (within architecture and related areas) is normally taken to mean one of the following.

- 1) Reducing time spent on achieving a result, in total man-hours
- 2) Reducing the time from start to finish of a project
- 3) Removing misunderstandings (including clashes and confusion deriving from a lack of co-ordination such as when team members are not working on the most up to date drawings)—and thus wasted time and effort.

I do not want to suggest that these are unworthwhile or unworthy aims. To achieve them is often to improve the value of some undertaking, in certain respects. These respects are, however, essentially financially driven.

So I repeat my question:

Why are we so obsessed by efficiency?

I want to propose that there is another way of thinking about collaboration where efficiency, if it is in any way an appropriate measure, is assessed in terms of less easily determined and measured criteria.

We can, indeed, (and we do) work together so that we share burdens. This makes it possible for us to achieve the previously unachievable. No single human could, in a lifetime, build a cathedral, but many working together can. No one human can master the various skills needed to build such a building, let alone the ancillary skills that make it possible for those who will do the building to do it

(accommodation and catering, supply of materials, healthcare and so on). Perhaps no one human can generate the motivation that gives rise to a building such as a cathedral: to create the belief system that would make building a cathedral something we might consider. (Usually we rely on God to provide that motivation.) I do not for a moment deny this. And insofar as this involves an improvement of or in efficiency, the improvement of efficiency that results from collaboration is excellent (as is the extension of the possible, which might be taken as an extreme form of efficiency).

Collaboration makes the “it” possible. The “it” then makes it easier and possible to do “it” more effectively and faster/cheaper. We study how to work together, develop techniques and technologies, and apply them. The result is that the impossible may become, firstly, possible, and secondly, easier.

But the “it” is not everything. And this is the lesson I think we should take away from the meeting. There are, after all, many throughout the building industry who are concerned with efficiency and with the development of means to improve efficiency. So what can a group of imaginative workers, operating within the openness of an academic workshop conference offer that is distinctive? What they can do which members of the building industry cannot, is explore alternatives and expand our notion of what might constitute collaboration.

It is the idea that we should expand our notions of collaboration that is, I believe, crucial: and is the special understanding we can offer and then develop. I offer it here as my concluding comment and afterthought following the conference.

The question is, then, are there other ways we can collaborate valuably, to different ends?

We can collaborate in order to increase the range of what is possible. By sharing ideas in a collaborative, that is a constructive (conversational) manner, we can place on offer more ideas than we had separately and/or when simply added together. Because each of us understands the world differently we are able to supplement each other by adding possibilities we had not thought of, and by amplifying what has been thought of in terms of both effectiveness and consequentiality.

It is my view that we might well try to redress the balance in our studies of collaboration to concentrate on increasing range. That is, to improve the quality of what we do not in terms of getting it done faster for the same money, or cheaper in the same time (or some combination of the two), but in terms of the quality and transcendence of what we offer—which should, in my view, include the quality of the experience of working on it.

There is not, necessarily, a conflict between these two attitudes to collaboration. But, for the moment, we seem to live in a world obsessed with financial efficiency, and so it is not surprising that we see collaboration as a means to improve our performance in the great hunt ever to increase that efficiency. While not decrying efficiency, I do believe there is more to life than the lust for it. I think of, for instance, joy in involvement as being something that it is worth pushing for, no matter whether or not this improves efficiency. Delight (one aspect of what architects are supposed to provide) is both in the object and in the processes associated with the object: the processes of living in/with it, and the processes of making it. When (in our rush to get it made faster and/or cheaper) we forget this, we deny a primary human function (delight) as well as, I believe, a fundamental human need.

I repeat that I do not mean to decry the value of collaboration as a means to gain efficiency. My purpose is, rather, to remind us of other reasons to collaborate, and to remind us, too, of their value.

What I do decry is the valuing of collaboration exclusively for the benefit of efficiency: unless we so define efficiency that it includes joy, imagination, variety and delight, efficiency is a poor criterion, a poor single aim.

And what I mean to argue is that the purpose in getting together such a group as met at the {ACCOLADE} workshop in Brussels in August/September 2000 is to go beyond the normal and to look outside what others automatically presume and restrict themselves to doing (even if they do it well). Our role is to take on the mantle of the true critic: to question limits and to look beyond.

In some ways, during the workshop we did begin to collaborate on extending the range of what might be considered the point of {ACCOLADE}; Architectural Collaborative Design. We did it both as subject matter (considering and debating collaboration in architectural design), and as a way of working together (we found and developed ways to collaborate). Atypically, we did what we said and we practised what we preached, at least to some degree. Let us, then, think of collaboration as a means of bringing joy and of increasing our range, not just as a way to produce more, faster, for less.

The Miesian aesthetic, invented by Philip Johnson, does not provide the only possible criterion. In its original form, as Occam's Razor (roughly, don't complicate more than is necessary), this promotes parsimony, but this is an elegant efficiency, the efficiency that gives up the subtle and multi-valent architecture that we get in the architecture of Mies van der Rohe, that Johnson tried to capture, which is far removed from the mean efficiency of finance.

Future Scenario

Ranulph Glanville

- 1) We will stop trying merely to imitate what we do, allowing computers to offer us new opportunities literally beyond our imagining.
- 2) Collaboration will redefine concepts of here and now.
- 3) The computer will become an active and creative participant.
- 4) We will learn that we do not own ideas, although they may originate through us.
- 5) Collaboration will become more important when it is seen to be conversational, and when we learn the value of conversation as supposed to coding.
- 6) We will come to love collaboration, and to find (some of) our meaning in it.