Towards client-focused architectural representations as a facilitator for improved design decision-making process

N. Bates-Brkljac
University of the West of England
Frencahy campus, Coldharbour Lane
Bristol, BS16 1QY
UK
E-mail: Nada.Brkljac@uwe.ac.uk

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Abstract: This paper focuses on architectural representations as a means of communicating design schemes in the process of decision-making. It reports on the study, which investigated people's responses to different forms of architectural representations. The paper starts with the discussion about participation in decision-making process and the potential benefits of using computer generated representations. Then, it describes the research study and examines results of the investigation. In the final section it is argued that client focused architectural representations are needed to support the exchange of views and discussion amongst different stakeholders in order to reduce the requirement for trained interpretation and encourage the participation in the decision making process.

1.   ARCHITECTURAL REPRESENTATIONS AND DECISION MAKING PROCESS

Throughout design decision making process peoples' understanding and assessment of design proposals are facilitated by architectural representations. They are a graphical means of information visualisation about the design scheme which convey the components, appearance of the

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urban development and its impact upon the locality. By looking at visual representations, people make apt judgements on whether a building, housing estate, a city centre design scheme, etc., is 'good', 'bad' and whether we ourselves 'like it'. Thus, the processes cannot overlook the key role visual representations play, not just in deciding the worth of design proposals but also in actually determining what gets built.

Over time, architecture developed the extensive range of representation forms which architects learn in the course of their training and use for design communication. However, professional 'jargons', including architectural, are often criticised as mystifying, whose main purpose is to exclude outsiders. Daniel and Meitner (2000) point out that "environmental visualisations may be completely accurate with respect to their portrayal of relevant and accurately projected physical conditions, but still produce perceptions, interpretations, and value judgments that are not consistent with those that would be produced by actual encounters with the environments presented". The potential consequence of such effects are poor decisions, where unworthy projects are given planning approval, good designs are turned down, and planners and the public alike get that which they did not expect (Sheppard, 1989). Thus, a comprehensive analysis and discussion between the stakeholders involved in design decision making process may offer suggestions on, and advice on, ways of representing architectural design schemes which support urban planning and design decision-making, as well as to consider how the requirements of different stakeholders can be reconciled.

This papers reports on the recently completed research study at The University of the West of England (UWE), Bristol that investigated peoples' perceptions and responses to different forms of architectural representations of urban development proposals. The findings provide an insight into understanding of the changing nature of visual communication of architectural design schemes to different communities of professionals and the public. The investigation revealed that:

a) There is an inadequate consideration of what type of architectural representation is appropriate at specific stages and its purposes within the design decision-making process

b) There are significant differences between the experts and non-experts responses to different forms of architectural representations that need to be further explored following the increased public participation in the process.

2.   PARTICIPATION IN DECISION MAKING PROCESS

One of the areas that gives rise to significant public dissatisfaction and feelings of dis-empowerment is that of urban planning. While the mechanisms differ from state to state in Europe, the problems as perceived by the public are often the same, including lack of meaningful consultation resulting in lack of influence over developments and changes, particularly those affecting the home and its immediate environment. These concerns have yet to be addressed by EC harmonisation and initiatives, such as: E-Europe 2005; and INSPIRE.

In the UK, the report published by the Office of the Deputy Prime Minister (ODPM, 2004) makes it explicit that planning must provide opportunities for people to have their say in the planning process. Statements of Community Involvement are a key component of the new planning system. The SCI sets out the standards to be achieved by the local authority in involving the community in the preparation, alteration and continuing review of all local development documents and planning applications (ibid). Tessa Jowell reinforced this further in her speech at the CABE Conference (2006) by stating "as well as consulting the experts, I want to see communities involved in the design decisions that will affect them".

There is a plethora of engagement tools that have been conceived to encourage participation in planning. However, the reality is that engagement of the public is still relatively limited. The issues that compound the complexity of the issues surrounding this engagement include a lack of understanding and trust that results in an inability to influence things at the decision making table. An equally important factor, identified by research as an obstacle, is the visual language of architecture, with its heavy reliance on technical and perspective drawings. Members of planning committees and authorities found these drawings difficult to interpret and trust and therefore ineffective at engaging the wider community (Bates-Brkljac, 2007). As long as this void continues to retain its position as a great challenge to planning authorities the search for the appropriate forms of engaging members of the public and professionals is necessary.

To be effective, the planning decision-making process must be undertaken in partnership with the professions as well as local communities. The need for effective communication with various agencies has motivated the Landscape Institute to create guidelines for the appropriate visual representations of the landscape and visual assessment (LIA, 2002) that "must be carefully chosen and rigorously applied". Similarly, in 2007,

Graphics for urban design guide (Meeda et. al., 2007) was published. It aims "to strengthen the importance of communication" between the professions involved in achieving sustainable development. Both publications use good practice examples to identify the most appropriate styles and techniques of representations for different purposes. In contrast, there are no guidelines for the appropriate forms of architectural representations.

3.   ARCHITECTURAL REPRESENTATIONS AND COMPUTER TECHNOLOGY

Recent times have seen significant changes in the architectural representation methods. While traditional representation are still in use, advances in computer technology and simulation software have fostered the use of computer generated representations. There use has grown dramatically (Building Design, 2000). Many of the arguments used in promoting computer visualization methods are based on the understanding that they make it easier for the professionals from built environment disciplines and the public to assess the visual and spatial impact of development proposals.

However, within the research there is no agreement on which form of representation is appropriate for use in the design decision making process. As early as 1977 Donald Appleyard stated "we are not sure which qualities (of representations) are considered as more important by various population groups." Sheppard (2005) believes that comprehension of architectural representations is a prerequisite for lay people's participation in the decision-making process According to some researchers, as public involvement in development increases, so does the need for a better medium of communication (Pietsch, 2001). Often, to avoid architectural 'visual jargon' (Wyatt, 2004), "artist impressions" and three-dimensional miniature models are made. These techniques however have their limitations. When the Arndale Centre was opened, the Mayor of Manchester, Dame Kathleen Ollerenshaw, who had done most to push the project forward, commented "I didn't think it would look like that when I saw the balsa wood model." As a solution Pietsch (2001) suggests three-dimensional computer models as better means of translating drawings into a format more readily understood by lay people. However, this view is not accepted by all researchers. Alan Day (2001) advocates that the new technologies should be a complementary to traditional tools. He suggests that presently, computer technology can not satisfy all the requirements needed for appropriate presentation. Recently Mahdjoubi and Wiltshire (2001) asserted that this gap in our knowledge has persists. It would appear that intuition, prior practice and trial-and-error

approaches have informed the use of visual presentation to date. A systematic effort to bring together the results of research in this field IS NEEDED.

4.   THE ESRC STUDY

This paper reports the findings from an Economic and Social science Research Council (ESRC) funded study which investigated whether computer generated representations are perceived as a more credible means of communicating design than traditional forms of representations and if so, in what way and why.

The analysis focused on two key aspects. First, the perceived credibility of architectural representations was assessed through the semantic differential questionnaire. Second, the way in which people perceptive and respond to representations was explored using focus group meetings and semi-structured interviews.

The study employed one particular genre of architectural representations, artistic representations. More precisely, the focus was on static artistic representations that provide an understanding of the three-dimensionality of design schemes. Architectural representations can be generally divided into two diverging modes of representation, design and artistic representations. Design representations are prepared as a matter of course during the design processes and contain technical information about design. The other group, the subject of this investigation, are artistic representations.

4.1   The analytical framework

The work by Appleyard (1977), Radford (1995; 1997), Sheppard (1989; 2000; 2001) and Pietsch (2000) identified several criteria (*Table 1*) that influence the perception of the credibility of visual representations. These, they suggest, are helping to frame the way that issues surrounding the loss in credibility of representations are conceptualised and theoretical frameworks are created to guide research and practice in this field.

Within research, current debate in concerned with the way in which those criteria blend and are allied with purpose and audience.

Table 1. The criteria for the assessment of visual representations proposed by different authors

Appleyard	Sheppard	Pietsch	Radford
realism	accuracy	abstraction	abstraction
accuracy	representativeness	accuracy	accuracy
comprehensibility	visual clarity	realism	realism
evaluability	interest		
engagement	legitimacy		

Based on this, an analytical framework has been designed for this study that includes three concepts, *accuracy, realism* and *abstraction*. These concepts acted as a filter because they determine, in a coarse but fundamental way, criteria for the assessment of the perceived credibility of architectural representations.

Twenty-nine participants took part in the investigation. They were divided into four groups: architects with not more than five years of experience and architects with more than fifteen years of experience. The third group were professionals in the built environment disciplines, such as planners and surveyors. The fourth group, were the Bristol city councillors, elected members of development control and planning committees.

4.2   Architectural representations

This investigation involved two computer generated and two hand drawn forms of representation created for major commercial developments in the UK, two computer generated and two hand drawn. The selection was based on a survey of selected UK-registered architectural practices' portfolios published on the Internet.

a) Rendered 3D computer model (Princesshay development in Exeter) *(Figure 1)*

b)   Artistic impressions (Broadmead development in Bristol)

c) Computer generated photomontage (Paradise Street in Liverpool)

d)   Perspective drawings (New Swindon development in Swindon)

5.   THE PERCEIVED CREDIBILITY OF ARCHITECTURAL REPRESENTATIONS

The association and interrelation of the concepts of *accuracy, abstraction and realism* to the method and style of representation has been examined using 18 bipolar Likert-like semantic differential questions. Responses to each question are obtained on a seven-point scale Adjective pairs were selected in a several ways: from thesaurus, from the literature in this field and from the spontaneous comments of the participants in the pilot testing.

Figure 1. Rendered 3D computer model

The bipolar pairs used were: for accuracy: (vague-precise), (incorrect-correct), (dishonest-honest), (deceptive-truthful), (ambiguous-clear), (arbitrary-well considered); for realism: (imitation-authentic), (looking artificial-looking natural), (illusion-lifelike), (not convincing-plausible), (dull-vivid), (intuitive-rational); for abstraction: (symbolic-descriptive), (abbreviated-extended), (simple-ornate), (expanded-dense), (loose-compact), (ordered-chaotic). The questionnaire based semantic analysis asked the participants to rate their evaluative responses to representations in a similar manner as conducted by Hershberger (1988) for architecture. The data analyses followed procedures described by Osgood et al (1957) and Palmer (2000).

The results of this analysis show that:
- Computer generated representations were perceived as more accurate and realistic than hand drawn forms of representations.
- Computer generated photomontage (*Figure 2*) was perceived as the most accurate and realistic form of representations while perspective

drawings were perceived as the least accurate and realistic form of representation.
- Abstraction was a challenging and difficult concept to understand and assess. In general, hand drawn representations were regarded as less descriptive and more chaotic than computer generated forms.
- The findings show a remarkable similarity between professionals and councillors' responses. However, clear differences emerged between these two groups and architects when they assessed the most traditional form of representation – perspective drawings.

Figure 2. Computer generated photomontage

A substantial disagreement between groups surfaced when assessing perspective drawings. For architects, this form was more credible than for councillors and professionals. While the two latter groups perceived perspective drawings as the least credible and the most difficult to interpret,, experienced architects, regarded this form nearly as credible as computer generated representations. In contrast, councillors and professionals rated artistic impressions significantly higher than architects' groups. More precisely, councillors found this form of representation nearly as accurate and realistic as the rendered 3D model and gave it higher ratings than all other groups. The ratings of artistic impressions (*Figure 3*) illustrate significance discrepancy between councillors' and architects' perceptions.

The analysis also provides evidence of a considerable difference between architects' and other professionals' perceptual responses. This disparity became even more noticeable when drawings were assessed. Both architects' groups rated perspective drawings considerably higher than professionals. For the former, perspective drawings (*Figure 4*) are almost as realistic as a rendered 3D computer model.

Figure 3. Hand drawn artistic impression

In contrast, professionals appear to have a clear preference for computer generated representations. In contrast, architects, who gain familiarity with perspective drawing techniques through education and later develop it through the practice, have more trust in this particular form of representations than other professionals.

Figure 4. Perspective hand drawing

The findings also suggest that while computer photomontage and rendered 3D computer models are generally regarded as more accurate and realistic then perspective drawings. For councillors, the realism of artistic impressions had more appeal. Thus, councillors gave to them very similar ratings as to rendered 3D computer model. Conversely, for young architects, artistic impressions appear to be the least realistic among the four representation forms assessed.

The realism of perspective drawings received the lowest ratings by professionals and councillors. Here, the mean scores for professionals and

councillors were low in an absolute sense and relatively low when compared with the corresponding means for the other groups (*Figure 5*).
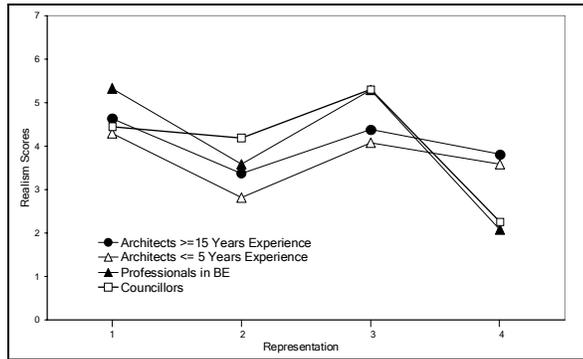

Figure 5. Participants' ratings of the realism of representations

Abstraction was a complex and difficult concept to assess. The results were chaotic and illustrated highly polarized reactions to abstract representations that collapsed the semantic space about a dominant single dimension.
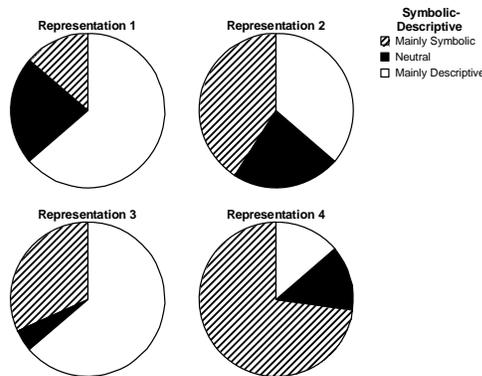

Figure 6. Comparative pie chart of abstraction ratings to symbolic-descriptive adjective pair

The results show *(Figure 6)* that computer generated forms of representation were regarded as more descriptive (63.6% both) than hand drawn artistic representations (36.4%) and significantly more descriptive than perspective drawings (13.6%). Other responses to semiotic pairs relating to abstraction followed the same pattern; computer generated representations were rated more towards the positive end of the scales. The

findings that hand drawn forms of representation are perceived as 'symbolic' and 'abbreviated' suggest that this form lacked sufficient details the majority of lay participants would expect to see in final representations. It can also be speculated that this group of observers could not adjust to, nor trust, the 'limited' amount of information perspective drawings provided.

6.   PEOPLE'S PERCEPTUAL RESPONSES

The purpose of focus groups meetings and interviews was to generate information on views and the meanings that lie behind peoples' assessments. The analysis focused on two key aspects. Firstly, to understand which factors affect people's perception of credibility of visual representations and secondly, to explain how people perceive and respond to different forms of representation. Although the research questions posed imply a division between the factors deriving from the medium of representation and those deriving from the nature of visuals perception this stage of analysis showed that they are not clearly separable. Rather, both were modifying factors that apply across the board whenever people observe architectural representations (Arnheim, 1986).

What follows is an interpretation of the findings that explains how observers relate concepts of accuracy, realism and abstraction and other factors to their perception of credibility.

6.1   Accuracy

One of the most striking themes to emerge was the sense of trust individuals have in computer technology. This was the fundamental reason why people regarded computer generated representations as more accurate then hand drawn ones. For some young architects, computer generated representations were implicitly accurate because "they are calculated, based on natural principles and mathematics". But, for experienced architects, artistic flair was essential in constructing an accurate image of the development. The city councillors judged accuracy mainly on the number of views and shadowing that would indicate the size and scale of development and its context. For them, such elements add clarity to representations and their presence is a contributing factor to the perceived accuracy.

Professionals expressed a need for representations that are accurate and based on information about the design. This included a clear display of the building's structure but also, materials and detailing.

6.2   Realism

The drive for information also permeates the notion of realism and whether a design scheme is depicted as it really is going to be. Architects did not consider realism as a crucial factor. An experienced architect pointed out that "it is the information that makes the reality; in a way if you are reading these drawings you are reading for information that tells you what bits are".

In contrast, for councillors, realism was crucial factor. In particular, they would like to see a realistic representation of the context of the development. Some councillors were 'sceptical' of computer generated realism; others wanted images to be edited and 'not too realistic'.

For the professionals the 'prettying up' of the images (for example adding a blue sky) made it less convincing, not more. However, the majority considered computer generated representations as more realistic than hand drawn representation, and as such more credible.

6.3   Abstraction

There were clear disparities between individuals' views on the positive and negative consequences of the level of abstraction presented. Even among architects there were disagreements as to the level of abstraction required. Architects uphold that there is a benefit from having less detail in that it allows the viewers to 'fill in' the picture themselves.

Some councillors and professionals held that too much abstraction was a negative attribute. Having an abstract representation that contains a low level of detail made it 'extremely hard' for councillors to understand the design represented and generated strong emotional responses. Some, simply stated that they 'don't like' perspective drawings. Although they recognised that perspective drawings provide 'the experience and space that the development aims to create', they fail to establish an emotional connection between this audience and design represented. credibility.

6.3.1   Group differences

For the majority of architects, the differences between computer generated images and traditional forms were 'obvious' and these serve to justify the perceived credibility for one over another. Several architects highlighted the key benefit of computer graphics is their ability to create an image as a photograph. In this way an image is said to have 'photo realism' and adds more to the construct of 'actual realism' (Appleyard, 1977).

Professionals' perceptions of credibility primarily rely on the representation's capacity to provide information about the design scheme. They expected information in the form of various perspective views showing the elements of the scheme, its buildability, scale and structure as well as the relationship between these elements. The style and technique of representation was of secondary importance.

Councillors strongly felt that computer representations used at planning committees' meetings show the proposed development in the best light possible because the aim is to sell the design. They were also conscious that occasionally the developments 'look nothing like what they thought' when they gave planning permission for them and when they were built.

7.   CONCLUSIONS

The findings from the ESRC study suggest that there is no one explicit way to ensure that representations were considered credible and no unconditionally credible architectural representation. Instead, it is evident that representations' qualities enter people's perceptions through a complex interaction of choice, constraint, and visual literacy.

The implications of the findings from this study are important for architectural design assessment, public consultation process and planning decision-making practice. Many experts on architecture (critics and curators as well as practising architects) have expressed the view that if the public were better informed and more articulate about architectural matters, the quality of the built environment could only improve (Marcus and Cameron, 2002). If a wider section of the population is to engage in the intelligent criticism of urban development, they will need a critical understanding of the means of communication that corresponds – intelligently and intelligibly–to their concerns. Architectural representations should support serious, extended discussion of the merits of the developments yet to be built.

This study offers considerable support for the arguments that computer generated representations are regarded as a more credible way of communicating architectural design schemes then traditional representations. All four groups involved in the study agreed that computer generated photomontage was the most credible form of representations. However, choosing the right mix of representation techniques and forms to suit the job in hand is an important part of the job that can only improve communication, people's understanding and the decision-making process itself.

This research highlighted how the form and style of representation might impact on the ability of a representation to communicate design. While some are able to this better than others, the success of the communication of architectural design also depends on who is viewing the representation. This corresponds to professionals' accounts that suggest an acute awareness of the need to match up a style of representation a specific audience. More precisely, the findings suggest that client-focused representations might be a solution that will facilitate better already complex process of design decision making. Two questions should guide the creation and use of these architectural representations:

Which media, styles and techniques provide appropriate form of visualisation and offer scope for substantial discussion of design proposals? Which forms of architectural representations are appropriate for which population groups?

One of the crucial issues is that a client-focused representation should bear some resemblance to a photograph – that is, it should be part of an accepted tradition of what is regarded as true, i.e. real. But, if the resemblance is too close or if it results in mere beautification of the environment, it may no longer be regarded as credible representation. Computer generated photomontage, perceived as the most credible form of representation by participants in this study, exemplifies this principle; we see the comparison strategy applied in reverse. One of the factors on this representation judged to be credible and accurate is its lack of embellishment of the environment.

Another issue is that client-focused representations at a high level of abstraction would have to be approached with caution. The conflicting findings about abstraction or alleged level of detail, correspond to Killeen and Buhyoff's work (1983), and more recent Oh's study (1994) which investigated the perceptual responses to photographs of the same building presented as wire frame, surface model, combination of surface model and photographs and image processing. In Oh's study, the wire frame representations received considerably (2.301) lower confidence ratings then image processing techniques (4.3229). Another study of the validity of landscape visualisations of digitally processed photographs, by Daniel and Meitner (2001), shows similar results. The black and white sketch representations were rated at zero validity of the four visualisations assessed. Given these results it is not surprising that black and white perspective drawings used in this investigation received the lowest ratings.

The findings also suggest that one way to make the interaction between architects, other professionals and lay people in the process of decision-making effective and more equal is to create and use client-focused representations that are assumed to be easy to understand and avoid

architectural 'visual jargon' (Wyatt, 2004). Architectural representations in their traditional forms are the one impediment that most architects are consciously aware of. It is unfamiliarity with technical drawings that can make an architectural representation difficult for the two other groups to interpret and understand. The analysis shows that perspective drawings failed to elicit much useful comment from the public because the graphics were 'difficult' for the average untrained observer. To an architect, a person familiar with the visual conventions and representations employed, much could be inferred that was not directly communicated. In contrast, the professionals and the public whose views were allegedly sought did not have access to the relevant codes. 'Non expert' observers were thus compelled to fall back on impressionistic judgments of the display boards. It can be concluded that these representations are more appropriate for the preliminary stage of the process when deciding the function of the area to be redeveloped than when evaluating designs for a large and significant piece of architecture which will permanently change its surrounding environment.

The findings are also relevant to the identification of clients in the decision making process. The study shows that the commonly used division of participants in the design decision making process into 'non-experts' (i.e. the public), and 'experts' groups (Barker, 1974) which usually puts together architects and other professionals, may not take into account all variations within and between these two groups. In particular, this investigation reinforced suggestions (Valdez, 1984, Wyatt, 2004) that perceptual orientations of architects are considerably different from other professionals as well as from the members of the public. Thus, the so called 'expert' group is not a cohesive group and within this group there is an evident fracture of shared understanding that needs to be investigated further.

Overall, results of this study suggest that considerably more work is needed to establish clear guidance for when in the design decision making process a particular form is to be used so that it is perceived as credible and reliable form of representation.

8.   ACKNOWLEDGEMENTS

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