**Introduction**

In the proceedings of the first EAEA conference, 1993, I mentioned our first study focused on refining endoscopic video images of a detailed architectural model and drawings. The study was based on work with 900 subjects, of which 200 were professional architects. It has led to a number of technical improvements.

In the second study we compared computer-aided design techniques with two techniques from the first study, endoscopic video recordings and coloured and black and white elevations and perspective drawings. Four different groups of 50 subjects took part in this research.

We found that computer images are invariably judged to be of moderate value, while drawings yielded consistently high scores. Endoscopic video recordings of the scale model received high scores as far as emotional response is concerned, and moderate scores when the participants were questioned on the actual content of the recordings.

Nowadays architects and clients are much interested in the application of different design and presentation techniques in an early stage of the design process.

In professional architectural practice, designs for housing and other buildings are often drawn up under pressure and presented in the form of digital recordings or as simple scale models of an initial sketch design; detailing is then carried out as an addition to the specifications. The continuing development of design and presentation techniques, though, raises the pace at which the design process proceeds; designs for housing and other buildings can be conveyed more rapidly to the client. We have noticed a demand in the market for artist’s impressions to enable users to gain an adequate impression of the buildings from the sketch designs.

Specialists in architectural simulation or rendering can easily create attractive images and
make any architectural design changes the client may wish, whatever the medium. It is the architect’s responsibility to ensure that the wishes and requirements of the end-users are adequately taken into account in the final design. If the architect does not do this himself, he or she must delegate, under close supervision, the execution of any alterations to a specialist in the use of the presentation medium.

This interaction between the creative design process and the application of modern media techniques, may be the first indications of more far-reaching changes in the design process. One thing is certain, architects are having to meet the demand for more concrete impressions of the design at an early stage in the design process, at the point when the sketch design is nearing its final form.

**Design Communication and Image Processing**

This brings us to the goals of our present research. We concentrated on the design process and the final presentation of the design. We wanted to provide more insight into the effects of using certain media techniques (sketches, endoscopic video recordings and computer animations) on the design process. It was therefore sensible to adopt presentation techniques currently used in education and professional practice. We identified two goals:

*The first goal was to obtain more insight into the effects and utility of employing endoscopic video recordings and computer images during the design period and in the presentation of the final sketch design.*

*The second goal was to test and adapt these instruments in order to facilitate better visual representations of spatial concepts.*

We formed the following hypotheses:

- **The image the client wants to project becomes altered during the exchange of information between the client and the architect, who then has a different image in mind.**
- **These alterations vary according to the type of visual information concerned.**

The design processes
Support from the professional community was necessary to observe the use of the media during the design processes we wanted to start.

Over the past year we have used interview rounds to closely follow the process of designing nine different solutions to one brief: to draw up a design for 60 homes on one particular site. Nine clients briefed nine architects on the design requirements, independently of each other, making use of photographs, the features of the site, and the protocol. In addition, they discussed progress and the final result of the design process during an interim and a final presentation, and whether the use of either endoscopic video or computer images had generated added value.

**Elements of the working method**

- Establishing architect–client pairs
- The media
- The design process in three phases
- Two interview rounds per case
- Additional facilities
- Available material
- Summary and thematic comparisons per case in table form.

Establishing architect–client pairs

After visiting different clients and architects we found eighteen participants to establish architect-client pairs. Nine architect–client pairs were formed in total.

The media

Materials common to all pairs: maps and cross-sections at scale 1:200 and a sketch of the site at scale 1:500, all on A3-size sheets.

Chosen medium: either an endoscopic video of a model at scale 1:200 taken at eye level, or computer animations or stills at eye level and on video; each visual presentation had to last from one to two minutes. Attention had to be paid to details, three-dimensional representation, information content, mood, colour, and a variety of vantage points. Five endoscopic videos and four computer animations or series of stills were planned.
The design process in three phases.

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**phase 1**

- **situation**
- **photographs of surrounding area**

**CLIENT** - **ARCHITECT**

- **communication**

**phase 2**

- **communication**
- **sketches, drawings**

**ARCHITECT** - **CLIENT**

**phase 3**

- **communication**
- **medium: computer image endoscopic image**

**ARCHITECT** - **CLIENT**

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**1st phase: client briefs the architect on the commission**

A protocol was drawn up, including a code of conduct, a site for which a design for 60 houses had to be made, a schedule of requirements, and the same set of regulations for each architect–client pair. The clients had to adopt the protocol within their own working practices. The clients delivered the commission to the architects assigned to them and discussed it with him or her. The clients recorded this meeting on tape, which they passed on to the research team directly afterwards.

**2nd phase: the architect informs the client of progress during an interim presentation**

The architects presented their preliminary designs to the clients, who assessed them against the schedule of requirements. Both participants then agreed the time of the final presentation. The discussing during that meeting has been recorded.

**3rd phase: the final presentation by the architect**

During the second presentation the clients saw the final sketch design. At this stage it was expected that the architect would make use of an endoscopic video or computer animation, possibly in combination with other presentation media. The presentations and subsequent discussions during this third phase of the commission were also recorded on audio tape.

Two interview rounds per case
The participants were interviewed by the research team on two occasions: directly after the client briefed the architect on the commission (1st phase) and after the final sketch design was presented by the architect to the client (3rd phase). The replies were also recorded on audio tape.

Additional facilities
A neutral grey block model of the adjoining buildings at scale 1:200 was available to any participant making use of an endoscopic video presentation.
A DXF file of the adjoining area with elevation points at scale 1:1500 was available for those using computer/video images.

Available material
The nine architect–client pairs produced drawings and endoscopic video or computer images of nine different designs for the same situation. The audio tapes can be used to obtain an impression of the following from each pair:
1. communication of the commission to the architect (briefing);
2. the replies to the first series of questions,
3. communication between the client and the architect during the interim presentation.
4. communication between the client and the architect during the presentation
5. the replies to the second series of questions.

Summary and thematic comparisons per case in table form
From the transcripts of the tapes a short summary and thematic comparison has been drawn up for each case in table form. A number of keywords were listed under the themes COMMISSION, MEDIUM, and MEDIA, such as: expectations and experience of computer-based visualisations, endoscope, or other media; opinion on the use of the medium in the interim presentation; opinion on the presentation of the plan; observations concerning the media used; added value to the client; added value to the architect; positive and negative impacts on detailing; three-dimensional representation; impressions; information content; colour and viewpoints. The use of these keywords also allowed clusters of relevant comments by clients and architects to be assembled. These are of considerable value when
comparing the design processes and drawing conclusions.

**Primarily results**

At first I’ll give you a summarised thematic comparison as an example of our working method. It shows the opinions of one client listed under seven keywords from one of the nine tables drawn up for the architect–client pairs. These comments concern the application in his own case of the medium “computer animations, or stills on video.

THE CLIENT

medium: computeranimation or stills on video

**expectation concerning the presentation of the design**

- open spaces and building masses as seen by an observer walking through the design.

**use of the medium during the interim presentation**

- medium not yet employed
- was being prepared according to detailed agreements

**opinion on the role of the medium on the process design**

- by the final presentation it was clear that it was a good plan.

**opinion on the role of the medium during the final presentation of the design**

- spatial characteristics of the design were conveyed primarily by the computeranimation
- complete plan came across best on the drawings

**evaluation of the medium**

- surprising, in that sense informative and an aid to visualisation
- more abstract than expected.

**positive and negative aspects of using the medium**

DETAILING  3D REPRESENT.  INFORM.  MOOD  VIEWPOINT  COLOUR
remarks concerning the medium
- direction and editing unfortunately excluded alternative viewpoints

The following summarised comparison shows the opinion of one architect listed under the same keywords as mentioned before. These recorded comments on 5 different moments during the design process concern the application of the medium endoscopic video recordings.

THE ARCHITECT
medium: endoscopic video recordings

expectation concerning the presentation of the design
- has not yet formulated the expectation
- in any case, the medium good for non professionals use of the medium during the interim presentation

use of the medium during the interim presentation
- no use of the medium.
- We made a choice between 1:500 models to know what to do in the final presentation.

opinion on the role of the medium on the design process
- It can be of great help in decision making.
- We could make our choice between two models on eye level.

opinion on the role of the medium during the final presentation of the design.
- first edited videorecording; model and drawings afterwards.
- You need them all in that order.

evaluation of the medium
- experience on eye level and movement are essential.
- Endoscope must fulfill these positive and negative aspects of using the medium.

DETAILING 3D REPRESENT. INFORM. MOOD VIEWPOINT COLOUR
± no opinion + ± movement +

remarks concerning the medium
- depth in sharpness must be better, also the movement and lightning is not perfect.

These were just two examples, drawing on a clients’ opinions of a design process in which CAD was used, and opinions of an architect from summaries of cases where an endoscope was used. Similar short summaries for each case will, together with the thematic comparisons and the visual presentations, allow us to take our research an important stage forward. The complete set of results can be used to test the hypotheses, and provide more insight into the effect and utility of endoscope and computer techniques during the design period and in communication and presentation of the design. The publication of the complete research project promises to be interesting and instructive for both the educational and professional communities. We therefore intend to pursue our second goal, the assessment and adaptation of these instruments in order to improve the representation of spatial concepts. Important decisions in that direction are already made.

28-8-97
DESIGN COMMUNICATION AND IMAGE PROCESSING

Jan van der Does and Héctor Giró
TU Delft, The Netherlands

ABSTRACT Never before have architects and principals been so interested in the application of different design presentation techniques. More and more imaging techniques are coming on the market to assist in tasks such as the production of 3D sketches, the construction of endoscopic models and the preparation of video and computer visualisations. More insight is now needed into the effect the use of media techniques, such as moving endoscopic video or computer images, has on the design process. The assistance of nine architects and an equal number of clients has made it possible to carry out comparative research to help to provide such insight.

The research had first to make clear how information is transferred between those directly involved in the communication process. To do this, a record was created of the way people actually worked. Nine two-man teams, each consisting of a client and an architect, were asked to carry out the same previously specified design task, to record a commentary on each phase of the design's development and to provide individual replies to two sets of questionnaires. Each process was considered complete when the architect presented his or her final sketch design to the client.

In summary, this research project is concerned with the design process followed when the same architectural task was approached in nine different ways. On nine occasions and in nine different ways the design requirements of the client were tested against the architect's solution as expressed in an interim and a final presentation prepared using predetermined media-techniques.

INTRODUCTION In the proceedings of the first EAEA conference, 1993, I mentioned our first study focused on refining endoscopic video images of a detailed architectural model and drawings. The study was based on work with 900 subjects, of which 200 were professional architects. It has led to a number of technical improvements.

In the second study we compared computer-aided design techniques with two techniques from the first study, endoscopic video recordings and coloured and black and white elevations and perspective drawings.
Four different groups of 50 subjects took part in this research. We found that computer images were invariably judged to be of moderate value, while drawings yielded consistently high scores. Endoscopic video recordings of the scale model received high scores as far as emotional response is concerned, and moderate scores when the participants were questioned on the actual content of the recordings.

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This interaction between the creative design process and the application of modern media techniques, may be the first indication of more far-reaching changes in the design process. One thing is certain: architects are having to meet the demand for more concrete impressions of the design at an early stage in the design process, at the point when the sketch design is nearing its final form.

DESIGN COMMUNICATION AND IMAGE PROCESSING This brings us to the goals of our present research. We concentrated on the design process and the final presentation of the design. We wanted to provide more insight into the effects of using certain media techniques (sketches, endoscopic video recordings and computer animations) on the design process. It was therefore sensible to adopt presentation techniques currently used in education and professional practice. We identified two goals:
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Over the past year we have used interview rounds to closely follow the process of designing nine different solutions to one brief; to draw up a design for 60 town houses on one particular site. Nine clients briefed nine architects on the design requirements, independently of each other, making use of photographs, the features of the site, and the protocol. In addition, they discussed progress and the final result of the design process during an interim and a final presentation, and whether the use of either endoscopic video or computer images had generated added value.

ELEMENTS OF THE WORKING METHOD
- Establishing architect-client pairs
- The media
- The design process in three phases
- Two interview rounds per case
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- Available material
- Summary and thematic comparisons per case in table form.
Establishing architect-client pairs. After visiting different clients and architects we found eighteen participants to establish architect-client pairs. Nine architect-client pairs were formed in total.

The media. Materials common to all pairs: maps and cross-sections at scale 1:200 and a sketch of the site at scale 1:500, of perspective all on A3-size sheets (fig. 9). Chosen medium: either an endoscopic video of a model at scale 1:200, taken at eye level, or computer animations or stills at eye level and on video; each visual presentation had to last from one to two minutes. Attention had to be paid to details: three-dimensional representation, information content, mood, colour, and a variety of vantage points. Five endoscopic videos and four computer animations or series of stills were planned.

The design process in three phases

<table>
<thead>
<tr>
<th>CLIENT</th>
<th>ARCHITECT</th>
<th>phase 1</th>
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<tbody>
<tr>
<td>situation</td>
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<td></td>
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ARCHITECT → CLIENT | sketches, drawings | phase 2 |

ARCHITECT → CLIENT | medium: computer image endoscopic image | phase 3 |

1st phase: client briefs the architect on the commission. A protocol was drawn up, including a code of conduct, a site for which a design for 60 houses had to be made, a schedule of requirements, and the same set of regulations for each architect-client pair. The clients had to adopt the protocol within their own working practices. The clients delivered the commission to the architects assigned to them and discussed it with him or her. The clients recorded this meeting on tape, which they passed on to the research team directly afterwards (fig. 6).

2nd phase: the architect informs the client of progress during an interim presentation. The architects presented their preliminary designs to the clients, who assessed them against the schedule of requirements. Both participants then agreed the time of the final presentation. The discussion during that meeting has been recorded (fig. 7).

3rd phase: the final presentation by the architect. During the second presentation the clients saw the final sketch design. At this stage it was expected that the architect would make use of an endoscopic video or computer animation, possibly in combination with other presentation media. The presentations and subsequent discussions during this third phase of the commission were also recorded on audio tape (fig. 8).

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application in his own case of the medium "computer animations, or
stills on video".

THE CLIENT, MEDIUM: COMPUTERANIMATION OR STILLS ON VIDEO

Expectation concerning the presentation of the design
- open spaces and buildings masses as seen by an observer walking
through the design.

Use of the medium during the interim presentation
- medium not yet employed
- was being prepared according to detailed agreements

Opinion on the role of the medium on the process design
- by the final presentation it was clear that it was a good plan

Opinion on the role of the medium during the final presentation of the design
- spatial characteristics of the design were conveyed primarily by the
computeranimation
- complete plan came across best on the drawings

Evaluation of the medium
- surprising, in that sense informative and an aid to visualisation
- more abstract than expected

Positive and negative aspects of using the medium

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Remarks concerning the medium
- direction and editing unfortunately excluded alternative viewpoints

The following summarised comparison shows the opinion of one archi-
tect listed under the same keywords as mentioned before. These
recorded comments on 5 different moments during the design process
center the application of the medium endoscopic video recordings.

THE ARCHITECT, MEDIUM: ENDOSCOPIC VIDEO RECORDINGS

Expectation concerning the presentation of the design
- has not yet formalised the expectation
- in any case, the medium good for non professionals use of the medium
during the interim presentation

Use of the medium during the interim presentation
- no use of the medium.
- We made a choice between 1500 models to know what to do in the final
presentation

Opinion on the role of the medium on the design process
- it can be of great help in decision making.
- We could make our choice between two models on eye level.

Opinion on the role of the medium during the final presentation of the design
- first edited video recording; model and drawings afterwards.
- you need them all in that order

Evaluation of the medium
- experience on eye level and movement are essential.
- Endoscope must fulfill these

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- depth in sharpness must be better, also the movement and lightning
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