

New domestic lighting technologies, consumer appeal first

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1 - SYNOPSIS

This paper describes the importance of consumer driven innovation in the field of domestic lighting technology.

2 - ABSTRACT

The market for domestic compact fluorescent lights (CFLs) in the Netherlands is stagnating. Over the years the penetration of CFLs has stabilised at 60% of Dutch households, with an average of 2.5 CFLs per household. However, a new focus group (Platform for Energy-Efficient Domestic Lighting) has now been initiated by Dutch Novem to try and improve these figures. Several sessions with important lighting stakeholders led to the conclusion that, as well as CFL campaigns in the short term, new light sources for the domestic market were also needed in the longer term. However, these light sources must meet consumer expectations. Energy efficiency is a given fact and not a selling point.

A three-year programme was initiated by the Platform in 1998 to study and develop these new lighting solutions. This programme started in 1998 with a pre-competitive pre-design project. A team of industrial designers working closely with three major light source manufacturers (Philips/Osram/Sylvania) spent several months studying new domestic lighting solutions. The team received an elaborate briefing based on workshop conclusions from experts on consumer tastes such as trend watchers, home decorators, interior designers and stylists.

In 1999 and 2000 the results of the pre-design study will be evaluated on consumer acceptance as well as technological and marketing feasibility.

This paper describes the importance of consumer driven innovation in the field of domestic lighting technology. It does so by showing the way consumer trends and design played a role in the pre-design study. The paper also shows the way Novem managed the whole process as an independent Change Agent, thus creating synergy between competing manufacturers.

3 - INTRODUCTION

3.1. CFL penetration stagnating

In the past the Netherlands has been successful in promoting CFLs. Large-scale national CFL campaigns led by the electric utilities were effective in the late 1980s and early 1990s. The penetration of CFLs in Dutch households quickly increased up to 60%, with an average of 2.5 CFLs per household, whilst a potential for up to 6 CFLs per household exists.

However the market for domestic CFLs in the Netherlands is now stagnating. This has two major reasons. First the large-scale utility campaigns have recently ceased. And second; the still existing 40% of households not using CFLs is far more harder to reach than the first 60% users.

3.2. Platform on energy-efficient domestic lighting

In order to improve this situation Novem has thought of several ways to reinforce CFL campaigns and find activities to increase the use of energy-efficient lighting technology in the domestic sector. Interviews with the main lighting stakeholders in 1997 revealed that individual parties were interested in helping to achieve this goal. However, this required co-ordination. To achieve this, a platform (Platform for Energy-Efficient Domestic Lighting) has been initiated. The stakeholders represented in this platform are:

- **NSVV:** Dutch association of lighting experts
- **Vereniging Licht:** Dutch association of luminaire manufacturers
- **BNO:** Dutch association of industrial designers
- **AEDES:** Dutch association of housing associations
- **Philips:** light source manufacturer
- **Osram:** light source manufacturer
- **Sylvania:** light source manufacturer

Several discussion sessions led to the conclusion that two kind of activities were considered essential.

- 1) Short-term CFL campaigns. In 1998 several pilot projects were implemented by housing associations in collaboration with utilities. Ownership of CFLs is still relatively low with renters compared to house-owners. The number of CFLs sold were still low (max. 100,000 in 1998) but the combination housing association/utilities has proven successful. In 1999 these projects will be replicated by other associations and utilities.
- 2) In the longer term, drastically improved energy-saving lamps will be needed, in order to attract more non-users and to increase the number of CFLs with both users and non-users.

3.3. New light sources required

The platform concluded that despite important improvements over the past few years, today's CFLs are still a technology-driven product which is well suited to the needs of a professional user, but not those of a private consumer. The current proposition (very long life, very high efficacy) is not automatically appreciated by the consumer, so a wide-ranging information campaign is needed to persuade new consumers to start using CFLs. The product does not sell itself, because the main advantages (energy efficiency and long life) are not important to consumers. Of course light source manufacturers have realised this for some time and have introduced different CFL ranges for professional and domestic use (Kollenburg 1998) (IAEEL 1998).

Eventually we may develop a new efficient light source which appeals to consumers and will sell itself, without the need for extensive promotional activities by governments and utilities.

This theory is confirmed by Boyce (1997): "In practice, meeting users' expectations at a reasonable price is the first priority for any lighting specifier, and minimising energy consumption comes a remote second".

But meeting consumer expectations is one thing – there is also a very important second target group; the luminaire designer. Consumers do not specifically choose a light source for their lighting needs, they choose a luminaire, which includes the light source.

For decades luminaire designers have been following the innovation of new light sources and using them in their luminaire designs. Zumtobel (1998) confirmed that luminaire and ballast design follows light source design, see Figure 1.

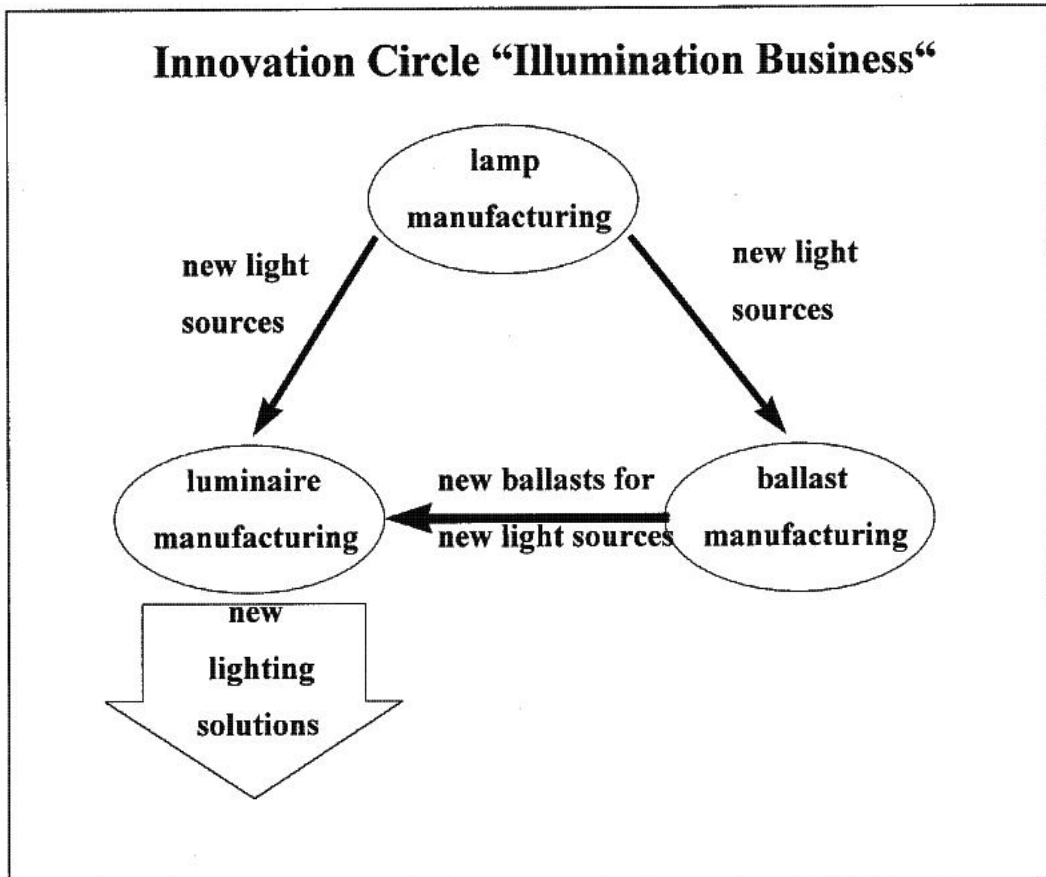


Figure 1: A new light source leads to new luminaires and ballasts, Zumtobel (1998).

There are plenty of examples of attractive luminaires specially designed for incandescent lamps and halogen. But the introduction of the CFL did not lead to a complete new family of specially designed efficient luminaires. Although many designers struggled with this difficult challenge, no one really succeeded in setting a standard. The following Figures show some typical examples of luminaires specially designed for specific light sources.

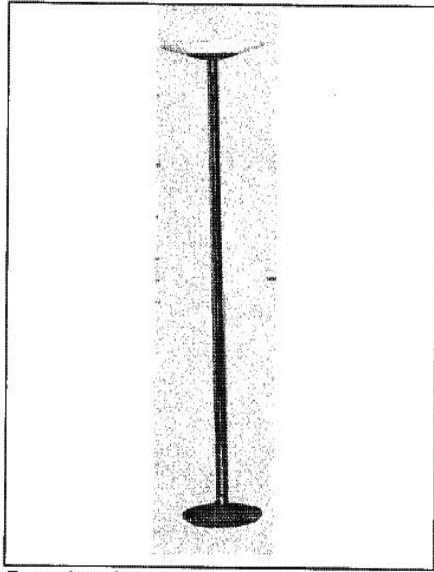


Figure 2: Halogen uplighter.

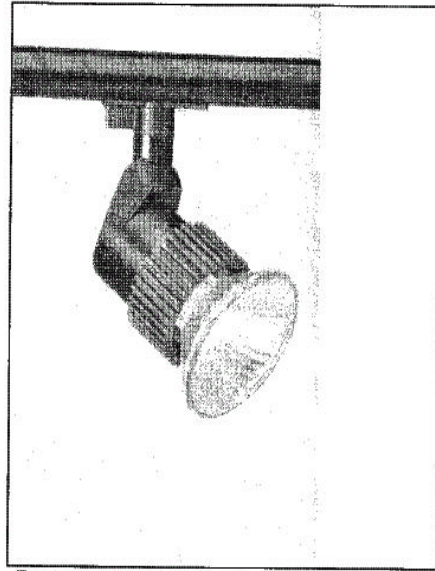


Figure 3: Halogen spotlight.

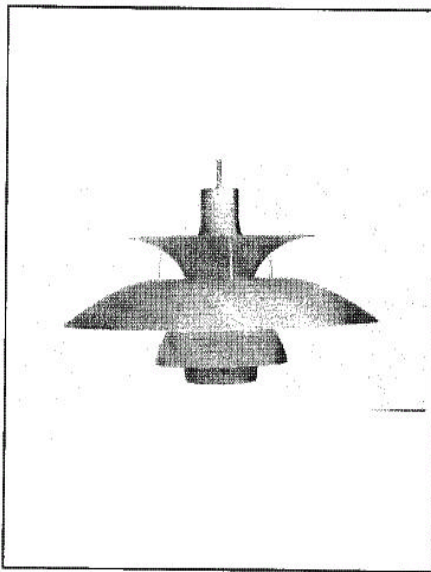


Figure 4: Incandescent luminaire.



Figure 5: Incandescent luminaire.

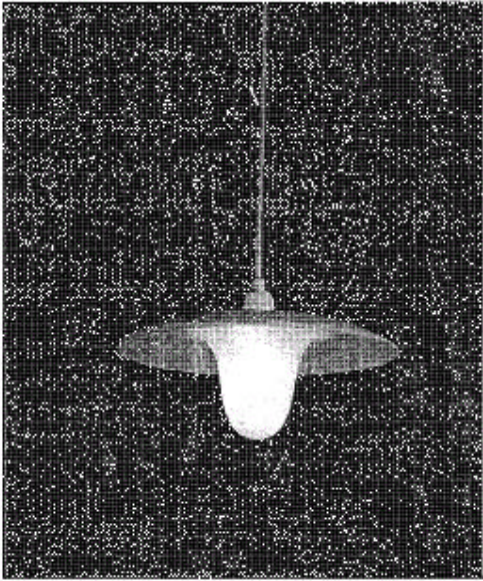


Figure 6: CFL luminaire.

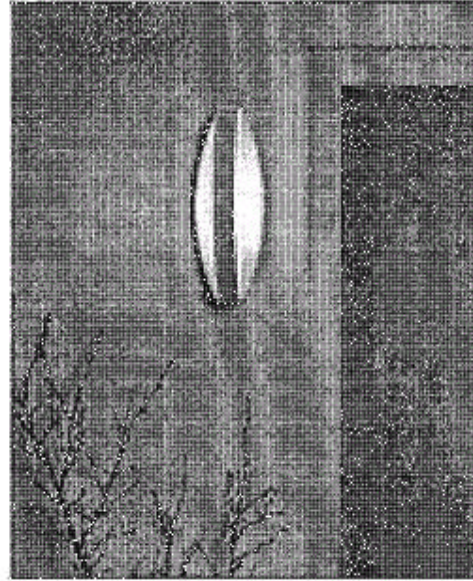


Figure 7: CFL luminaire.

Both the halogen and the incandescent luminaires use specific aspects of the light source and the last incandescent luminaire even exposes this light source. CFL luminaires usually hide the light source.

3.4. Lamp-shape progress

When looking at the progress made in light source shapes, the incandescent still seems to be the leading form. The shape of the A-lamp evolved to a solid "icon" from which new variations constantly emerge. The CFL (with integrated ballast) is still trying to imitate the A-lamp as an icon. This is shown in the following Figure.

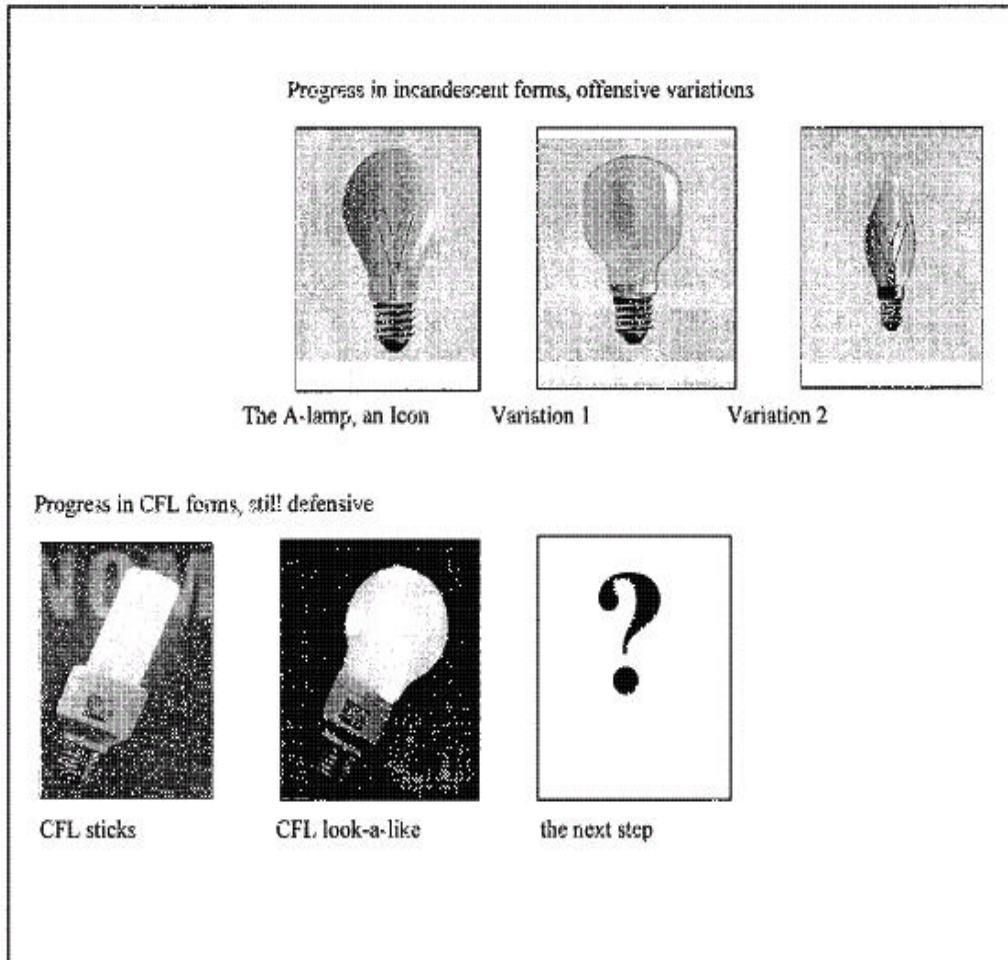


Figure 8: Progress in incandescent and CFL shapes

Conclusion: in order to break through the current barriers in energy-efficient domestic lighting, new light sources are needed which appeal to consumers and inspire consumer luminaire designers.

4 - THREE YEAR PROGRAMME TO IDENTIFY NEW FORMS OF EFFICIENT LIGHTING

To aid the search for new solutions, in 1998 the platform drew up a blueprint for developing energy-efficient lighting in households. The blueprint describes a process flow to explore and develop totally new energy-efficient solutions based on consumer values. The total lead-time for this process is three years, from 1998 to the end of 2000.

The activities are split into three phases:

- Phase 1: Orientation phase,
- Phase 2: Definition phase,
- Phase 3: Implementation phase.

As this project takes three years to complete, several milestones have been defined for input and feedback of consumer values and technologies.

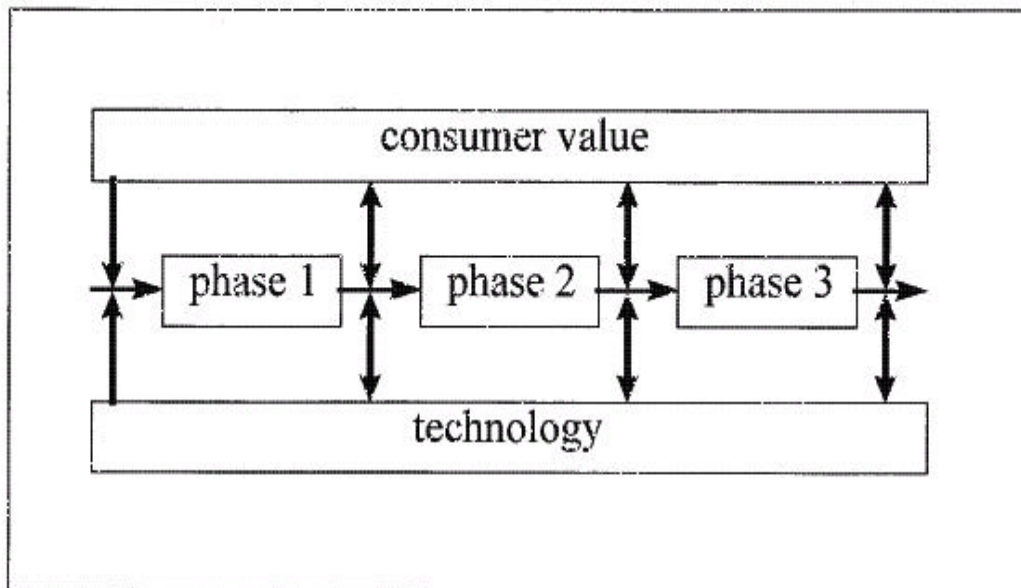


Figure 9: Process flow blueprint 1998-2000

"Development of ideal solutions for energy-efficient lighting in households".

4.1. Orientation phase (1998)

The orientation phase considers future opportunities and designs that are required to reach tomorrow's customers and persuade them to use energy-efficient solutions in their homes. Market statistics, trend watching, benchmarking, and technology search are all used in the creative process which we called the "pre-design study", which forms the core of this phase.

4.2. Definition phase (1999)

This phase focuses on evaluating the various solutions resulting from the creative process of the pre-design study. Both consumer values and technological feasibility will be tested.

Consumer value: - consumer panels and real life observations
- marketing feasibility, the 4 P's

Technological feasibility: - technical specifications; efficacy, lifetimes, light colour etc.

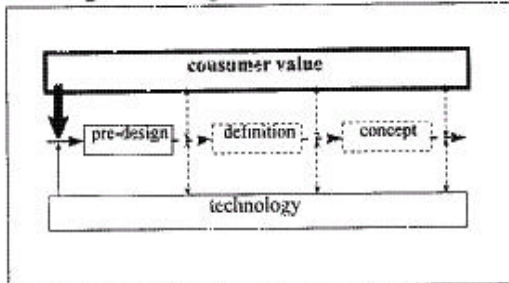
4.3. Implementation Phase (2000)

The key task in this phase is to select options from phase 2, based on consumer appreciation and technical feasibility, translate these options into products and pre-test them in the marketplace.

5 - PHASE 1: ORIENTATION PHASE

As previously explained, the core of this phase was a creative pre-design study. A team of four industrial designers received an elaborate briefing on both consumer values and technological possibilities. The design team was accompanied by representatives from Neven and the three manufacturers. These 4 parties also shared the costs.

5.1. Designers briefing on consumer values



The designers briefing was based on a desk study and a workshop with experts on major trends in the consumer market during the late 1990s.

5.2. Desk study

Novem commissioned a desk-study to investigate major contemporary consumer trends. The main trends used were signalled by trend watchers such as Faith Popcorn and Lidewij Edelkoort, the "Vision of the Future" project by Philips and several other sources. A brief description of these major trends is given below.

Fundamental new values

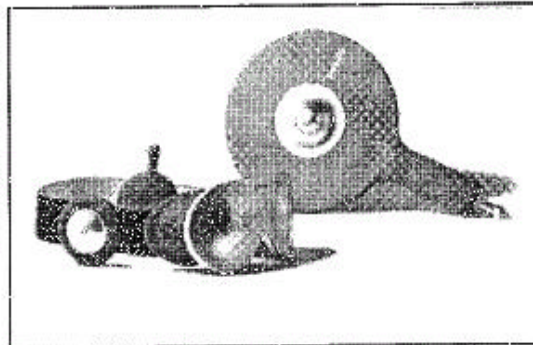
Faith Popcorn [1991] describes nine trends, of which "cocooning" has become the most popular. Other trends include: eternal youth, health awareness, and save our society.

Sustainable consumption

In a study for the Dutch Ministry of Environment, Edelkoort [1995] discovers in the "essence of the future lifestyles" many elements which are potentially sustainable and environmentally friendly. These elements can be used to transform current consumption patterns into sustainable ones. New keywords are: "Fresh", "New" and "Clean".

Products with a soul

The egocentric consumer of the future will want products with a soul. This is a reaction to changing working situations and rapid technological progress. Working at home using new technologies will lead to a certain isolation and a desire to communicate with others and with the surrounding products. Edelkoort calls this trend "soft wear". In their "Vision of the Future" project Philips explored the possibilities of modern technology to design products which meet these consumer values.



The "Gaia" principle

Edelkoort uses the Gaia principle as a basis for successful environmental policy. She believes that in future people will rediscover their mythical relationship with the earth. Signals can be seen in the strong emotional feelings for clean air and fresh water. A feeling may grow that "concern for the earth is concern for yourself".

Multifunctional and "mood-sensitive" interiors

Interest in interior design has grown enormously over the past decades. The interiors of today and tomorrow must meet very high consumer standards; spaces must be personal, flexible and warm, but also adaptive to different moods or seasons.

New business

The combination of several trends led us to believe that new business will develop in future. These trends are: "less is more", new applications instead of new technology, growing importance of retail chains, shop formulas,

strong branding and positioning, Product Plus, online information on consumer behaviour, strategic alliances and cross marketing.

The desk study also revealed some interesting marketing cases in which completely new proposals for products or materials were realised. These include the Swatch case, which saved the Swiss watch industry, and the Authentics case, which led to a complete upgrading of plastic as a material for consumer products.

5.3. Expert workshop

The results of the desk study were discussed in a workshop with leading consumer experts in the field of interior-, product-, and eco-design, styling, home magazines and branding. New ideas were added. These experts were selected by Novem and the Platform, based upon their "opinion leadership" in their branch. The workshop led to conclusions on the following five topics:

Home attachments

To be able to reach the heart of our homes, the CFL or any other efficient light source must have a strong emotional value. This also applies to the more functional spaces in our homes because they also tend to be viewed more emotionally. Design can make the CFL, or a new efficient light source more attractive to consumers as well as to luminaire designers.

Integrated solutions: lamp + luminaire = one module

It may be possible to combine the light source and luminaire into one concept, since the lifetimes of some light sources (like current CFL-I) reaches those of luminaires. This integral solution is applicable in dozens of lighting situations in homes but also offers enough possibilities for variation or lifestyle attachments.

Brand and shop concepts

It may be useful to position the new light source as a manufacturer-independent brand, and may even be possible to develop a special shop concept.

Light understanding analogies

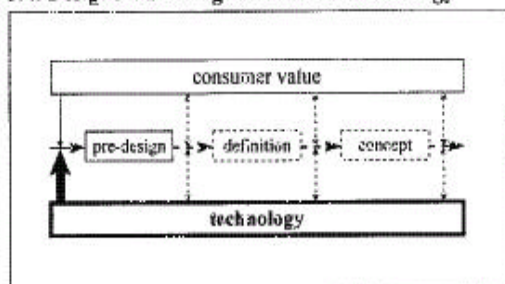
It is very difficult to talk to consumers about lamp specifications. Firstly because lighting technology is complicated and secondly because consumers are not interested. A couple of analogies might help, for instance "S, M, X, XL".

Added emotional value

Technology does not interest the consumer, but additional values may, e.g.:

Natural light; sunlight, moonlight, summer light, winter light;
Adaptable to different moods; flexible in time and space;

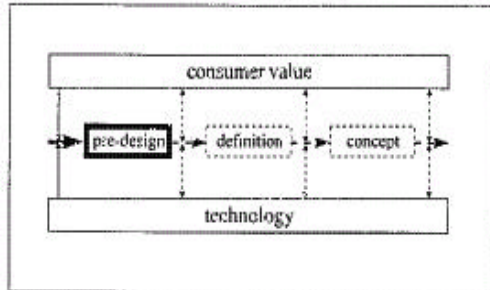
5.4. Designers briefing on available technology



The pre-design team received an elaborate briefing on current and future technologies from Novem and the three lighting manufacturers in the platform. Allocated potential technologies for the new light source are:

- fluorescent;
- improved halogen with infrared coating;
- metal-halide;
- electroluminescence / LEDs.

6 - THE PRE-DESIGN STUDY



Following the elaborate briefings on consumer values and technological possibilities the pre-design team started work using the following approach.

6.1. Mood boards

Written conclusions from the briefing on consumers values were transformed into mood boards, a technique often used by the creative team to focus their attention and stimulate the creative process. See Figure 10 for the mood board on "Cocooning".

6.2. Shape boards

As the briefing on consumer values showed that the light source and the luminaire should be viewed as a total concept (lamp + luminaire = one module), studies on existing luminaires were carried out. Luminaires were grouped into 12 categories; uplighters, table lamps, desk lights, floor lamps, ceiling lights, wall lamps, cable systems, hanging lamps, spotlights, chandeliers, outdoor lighting and party lighting.

See Figure 11 for an example of the shape board for spotlights.

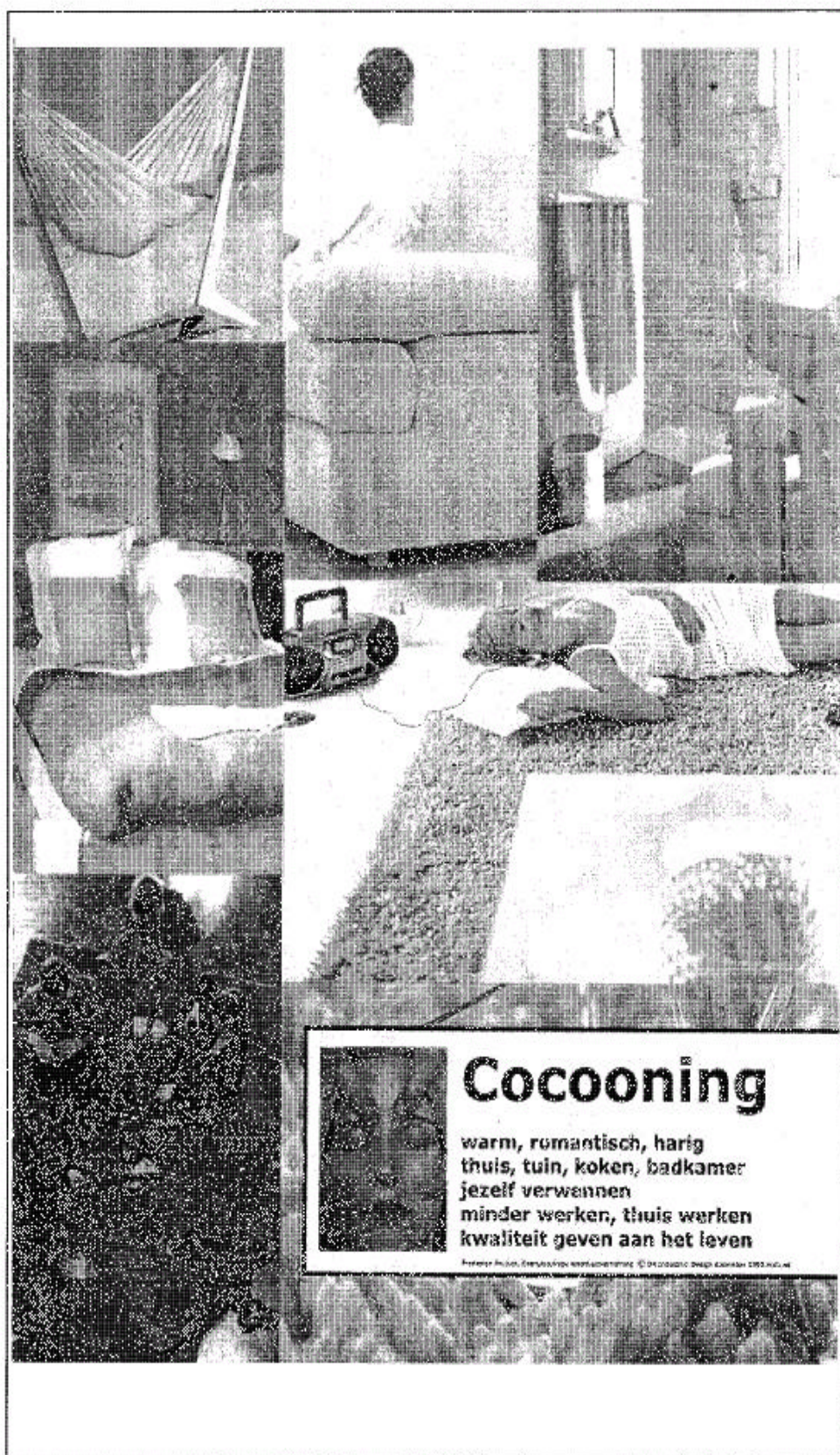


Figure 10: Cocooning.



Figure 11: Shape board for spotlights

6.3. Priorities

Calculations of energy consumption for all 12 types of luminaires led to 5 priorities: table lamps, hanging lamps, ceiling lights, floor lamps and uplighters. The design team focused on these priorities during the second phase of the pre-design study.

The design team then started designing creative solutions. They concluded that solutions for a new energy-efficient light source could be found on three system levels, which are all related:

- solutions for the light source;
- solutions for the lamp-luminaire combination;
- solutions for a complete lighting plan for spaces.

7 - RESULTS OF THE PRE-DESIGN STUDY

In March 1999 the design team presented solutions for "light source" and "lamp-luminaire combination". These solutions look very promising and show that design can add to the attractiveness of new efficient light-sources. However, these solutions cannot be presented in this paper due to confidentiality constraints. Since the three light source manufacturers are actively and financially involved time is needed to legally protect the solutions they wish to work on in phases 2 and 3. At the time this paper was written, it was not possible to predict whether design solutions can be shown at the conference presentation.

8 - THE NEXT STEPS, 1999-2000, DEFINITION AND IMPLEMENTATION PHASE

Over the next few years the most promising design solutions for the pre-design project will possibly be implemented. During 1999 the light source manufacturers will test the most promising design solutions as working prototypes in consumer panels. Prototypes will, where possible, also be tested in real life situations. The solutions will also be checked for marketing, ecological and technological feasibility. If all these tests are successful, manufacturers may start in 2000 with small-scale production and test the first batch of new products in the marketplace.

9 - CONCLUSIONS

The pre-design study project to explore new possibilities for energy efficient domestic lighting technology shows that a creative process based upon a briefing on consumer trends and technology can lead to remarkable new product-concepts beyond the CFL of today. However marketing research still has to proof the commercial feasibility of the presented solutions.

10 - ACKNOWLEDGEMENTS

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