

The development and implementation of STRETCH

(Selection of sTRategic EnvironmenTal CHallenges)

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1. INTRODUCTION

The need to achieve sustainable development represents an enormous challenge to society. It means that within just a few decades we must learn to deal much more efficiently with energy and raw materials [1]. According to some estimates, within the next 50 years the burden on the environment will have to be reduced to an average of one-tenth of the current levels (this means an increase in eco-efficiency by a factor of ten) in the highly industrialized, Western countries [2], [3]. As a first step into this direction Von Weizsäcker, Lovins and Lovins promote an increase in eco-efficiency by a factor of four (this means one quarter of current levels) [4].

Steps have already been taken within industry to increase the average eco-efficiency of products. Most of these efforts focus on *step-by-step*, cost-effective environmental improvements of existing working methods, products and services within a time scale of 1 -3 years. Various techniques and methodologies have been developed to analyze and assess the environmental merits of such product improvements. Incremental improvements provide significant progress in the early stages by capitalising on 'low-hanging fruit' (the easy improvements). After that first period, incremental changes become less profitable in terms of both economic and ecological efficiency. Then more far-reaching environmental improvements begin to deliver a higher reduction in environmental impact

at relatively lower costs [5].

If one wishes to reach the target of a tenfold increase in the average eco-efficiency mentioned above, *more far-reaching* improvements are therefore necessary. Contrary to incremental improvements, relatively little experience has been gained within industry with the implementation of such product improvements. Within Philips Sound & Vision more and more attention is being paid to these more far-reaching improvements. This paper describes the way in which Philips Sound & Vision has set up this approach and how involvement has been created across the organization.

2. ENVIRONMENTAL POLICY WITHIN PHILIPS SOUND & VISION

Philips Sound & Vision is part of the Philips Sound & Vision/Business Electronics division. This division is one of the eight divisions of Philips Electronics. Philips Sound & Vision consists of three business groups: BG TV, BG Audio and BG IR3 (=VCR). Every BG has its own environmental coordinator and most industrial facilities have also appointed an environmental coordinator. The Environmental Competence Center (ECC) was established in the early 1990's to coordinate environmental activities within the whole Sound & Vision/Business Electronics division.

Every Philips' division, including Philips Sound & Vision/Business Electronics, has built up experience in the environmental field since the 1970's. In the 1970's and 1980's, the emphasis in the environmental policy of Philips Sound & Vision was on incremental improvements, especially in its production *processes*. One of the major driving forces behind this was legislation and regulation, and the associated rules concerning licensing. Since the early 1990's, the focus has widened to encompass improvements in the consumer electronics *products* themselves. An initial driving force for this was the corporate environmental policy formulated by Mr Timmer. Another reason was the growing public pressure to find socially responsible ways of disposing of used consumer electronics goods. Additional factors were the (professional) customers' requirements with respect to the use of certain chemical substances and the short-term cost-effectiveness of some environmental improvements (e.g. through material saving;

application of recycled material).

In recent years, Philips Sound & Vision has initiated numerous activities to improve its products from an environmental perspective. A manual on environment-oriented product development ('eco-design') has been produced for designers. The manual includes mandatory environmental requirements for design, and voluntary guidelines to stimulate creativity for eco-design. For instance, a major project is being carried out to reduce the number of environmentally harmful substances in consumer electronics products. One example of this is the decision to stop using flame retardants in the plastic housing of televisions (which, in contrast to other brands, has been the case with Philips televisions since 1987). In addition, the manual contains guidelines concerning the best ways of designing consumer electronics products so that they can be reprocessed in environmentally sound ways at end-of-life. Training programs and workshops are organized to transfer environmental expertise to those responsible for product development.

All these activities have learned the organization that environmental improvements can lead to a win-win situation, in which business opportunities can also be created.

Based on this learning process, attention within Philips Sound & Vision is now turning to more far-reaching and complex solutions, aimed at radical redesign based on existing concepts and at product alternatives. In that context, it has developed the concept of the 'green television', which incorporates all the accumulated environmental know-how of the moment. This concept will be used as a measure prove for future generations of the product.

After gaining some experience with the design of these more far-reaching environmental product improvements, the need was recognized to structure the way in which decisions about strategic environmental product planning were prepared. No guidelines or rules of thumb existed for determining how to select promising environmental opportunities.

The question arose of how the company could systematically elaborate its strategic environmental opportunities and decide which ones to take on board. Until recently, this had not been a prominent issue within Philips Sound & Vision.

Thus, originally the business strategy to be followed by Philips Sound & Vision was relatively simple: a defensive strategy in order to meet existing environmental regulation and covenants, or a cost-reduction strategy aimed at improving the environmental perfor-

mance in a way that realized short-term cost savings. However, the strategy became more complex as Philips Sound & Vision began to introduce more far-reaching environmental improvements. The growing interest in this latter type of product improvements went hand in hand with the adoption of a third, more offensive strategy. This latter strategy aimed at a better competitive market position through increasing its market share and improving its public image. Identifying promising environmental opportunities and selecting those options turned out to be much more complicated in this case. It required clear strategic choices with regard to the environmental issues which it wants to boast in the market. Not only Philips Sound & Vision but also most other companies had little experience with such an offensive strategy.

3. THE 'STRETCH' METHODOLOGY

To generate and select green opportunities in the context of an offensive strategy a methodology called 'STRETCH' ('Selection of sTRategic EnvironmenTal CHallenges) has been designed and tested within Philips Sound & Vision. The basic questions that needed to be answered were: What opportunities or threats does the environmental issue present for a company such as Philips, particularly for Sound & Vision? What technological options are available for dealing as adequately as possible with environmental problems? And finally, the most crucial question: *which environmental opportunities should be selected to enhance the business and improve the environmental performance of its products?*

In order to address these questions, data is needed on the key drivers that will determine the future business strategy in general. For instance, in the case of Philips Sound & Vision the collection of data consisted of information about economic factors (i.e. future market perspectives of the consumer electronics sector in general and of the company itself) and the technological innovations to be expected. Moreover, some information was needed about cultural trends and the possible set of environmental issues at stake in the future. On the basis of this information, a limited number of plausible scenarios can be formulated related to possible future product market strategies. These scenarios are used

to help priorities, select and finally implement the most promising environmental challenges to be adopted by the company.

In total, the 'STRETCH' methodology consists of the following five activities:

- Step 1:* the identification of the crucial driving forces that will influence the business strategy in general
- Step 2:* the design of a limited number of plausible scenarios that the company can adopt on the basis of step 1, leading to a list of potential product market strategies
- Step 3:* the specification of potential environmental opportunities and threats for each scenario on the basis of a checklist of environmental design options
- Step 4:* the selection of environmental challenges per product leading to a substantial improvement of its environmental performance
- Step 5:* the implementation of the environmental challenges ultimately selected

To illustrate the step-by-step plan sketched above, a description of how the methodology has been applied within Philips Sound & Vision is given below.

Step 1: Identification of crucial driving factors

Data collection about the market perspectives of consumer electronics products and their technological perspectives is no easy job. Due to rapid multimedia development, the consumer electronics products' business environment is changing quickly. The sector is moving from analog to digital signalling and to an integration of modes (such as text, sound, and visuals) that used to be completely separate. Moreover, a variety of once separated businesses are now starting to converge and compete against each other. This holds in particular for the following sectors: communications, entertainment and information and business/consumer electronics. Finally, the multimedia development gives to end consumers the opportunity to be less passive than before and have more control, choice of selection and/or interactivity.

At the moment it is very hard to predict the future trends in multimedia. Roughly speaking, four aspects can be distinguished in the realization of multimedia [6]:

1. hardware: the development and production of multimedia technology or multimedia hardware (including standardized software tools)
2. software: the development and the provision of multimedia services and applications
3. distribution: the transportation or distribution of multimedia services and applications to the users
4. application/use: the real use of multi media applications and services. This can be professional use within or between organizations, and consumer use.

At the moment the producers of multimedia hardware (especially the computer hardware and consumer electronics companies) are active in new growth markets due to stagnating turnovers and price erosion in their traditional markets. At the same time, the development and distribution sectors are growing. The application/use of multimedia seems to be the greatest bottleneck in the take-off of multimedia on a large scale. All kinds of questions are still unanswered. For instance, what the future home will look like in relation to multimedia developments and how multimedia will penetrate professional circles.

On the basis of a literature study and interviews the following three plausible scenarios can be formulated for thinking about future developments within the consumer electronics sector:

- Scenario 1: The consumer electronics companies continue to focus on making the hardware
- Scenario 2: The consumer electronics companies shift their emphasis towards the development of software/multimedia
- Scenario 3: The consumer electronics companies concentrate on providing services

Philips Sound & Vision has recently chosen a particular mix of the three scenarios as a starting point for its strategic planning for the coming 5-7 years. On the basis of this particular scenario, concrete product market strategies have been formulated.

Information on cultural trends has been provided by Philips Corporate Design (PCD), a department that works closely with trend labs to spot future cultural trends. Experience has shown that people can no longer be so easily classed as having a particular lifestyle. The consumer combines various lifestyles. However, according to these trend lab studies,

positive drivers for environmental awareness are in particular: 1. time; 2. quality instead of quantity; 3. health; 4. growing consciousness of waste and how a product is made; and 5. homeliness. The trend seems to be that the consumer will become more critical, ethical, spiritual, emancipated, demanding and creative. In order to gain a more detailed indication of the influence of cultural trends, focused marketing research at the level of individual products is necessary.

Step 2: Design of plausible scenarios

Within Philips Sound & Vision one particular scenario had already been chosen and elaborated in detail to distinguish between activities which are already mainstream for Philips, new to Philips and new to the outside world. For each of these three categories a list of products had already been defined which represents the particular category of activities. This list of products formed a good starting point to analyze the environmental opportunities and threats for the coming 5 - 7 years with the support of various Philips' experts. The most interesting in this respect were products in the categories: new to Philips and new to the outside world.

Step 3: Specification of potential environmental opportunities

After collecting and integrating available data in steps 1 and 2, the Environmental Competence Center (ECC) of Philips Sound & Vision/Business Electronics identified a number of promising environmental opportunities (step 3). The particular environmental issues which will be headline news in the coming 5 years, or even beyond that, cannot be predicted with great precision. The Environmental Competence Center (ECC) of Philips Sound & Vision has therefore developed a *general checklist of environmental product design options* that serves as a guideline for prioritization (see table 1).

This checklist has been compiled on the basis of various sources [7], [8], [9]. The list of environmental design options has served as a tool to assess the environmental challenges at stake when a company implements the product market strategies formulated in step 2. To priorities these potential challenges, the ECC organized two sequential brainstorming sessions. One of the first companies to try structuring such brainstorming sessions is D-OW [10]. The way in which this company designed the brainstorming process has been

an inspiring example in developing our own methodology within Philips Sound & Vision and is now being used within Philips too. The brainstorming sessions were held with representatives of various key persons within Philips, namely representatives of strategy development within Sound & Vision, representatives of Philips Corporate Design and environmental experts from Sound & Vision. This group of people then formulated a number of criteria to guide the process of prioritization.

Table 1: CHECKLIST OF ENVIRONMENTAL DESIGN OPTIONS

Minimisation of production impact

- * Minimisation of waste, emissions and energy use
- * Respect for biodiversity

Minimisation of product impact

- * Reduction of toxic substances
- * Minimisation of materials consumption (e.g. through miniaturization, weight reduction; systems integration)
- * Minimisation of use of non-renewable resources
- * Minimisation of fossil energy consumption (e.g. through energy efficiency and durable energy use)

Efficient distribution and logistics

- * Produce where you consume
- * Direct distribution to consumer

Intensity of use

- * Lease vs sell
- * Collective use

Durability of products

- * Reuse
- * Technical upgrading
- * Longer lifetime
- * Reparability
- * Refurbishing
- * Aging with quality

Recyclability of materials

- * Reduction of materials diversity
- * Materials cascading
- * Design for disassembly
- * Selected, safe disposal

These criteria were:

1. environmental improvements should provide a business opportunity or competitive advantage
2. projects should have clear environmental relevance
3. environmental improvements should preferably be quantifiable
4. environmental problems directly related to health and safety issues require more attention
5. implementation should not be hampered because of difficulties in cooperation with third parties or because of lack of expertise within the company.

With the help of the criteria mentioned above, the brainstorming group made an initial selection of nine promising projects.

Step 4: Selection of environmental challenges per product

In step 4 the environmental coordinators of each of the three main business groups (BG's) within Sound & Vision selected those items out of the list of nine division priorities that were considered relevant for their BG. Each BG selected five environmental priorities. Together, the BG's covered all nine priorities. Within the framework of the elaboration of each priority, brainstorming sessions and interviews were held with relevant persons from the particular BG, including product managers, marketing people and technical experts.

The elaboration of the various environmental challenges was tailor-made to each BG and each priority item.

To illustrate this point the following three examples will be given:

- the reduction in the energy intensity of Consumer Electronics products
- the reduction of the material intensity of Consumer Electronics products
- the development of potential strategies to enhance the durability of products

With respect to the item 'reduction in the energy intensity', an intensive brainstorming session was held in the BG's TV, Audio and VCR in order to generate and select more far-reaching environmental improvements in the energy consumption during use and

standby. As improvements could be made in various parts of the product (e.g. in the components or in the printed circuit board), experts from various backgrounds were present at these workshops. The options that these experts proposed are being elaborated in a technical, economic and marketing sense.

Secondly, the 'reduction of the material intensity of Consumer Electronics products' was also elaborated in a specific tailor-made way. In order to generate options for the reduction of material intensity, close cooperation was established between Philips and one of its main suppliers of materials. Various brainstorming sessions were held to identify promising alternative materials that are lighter, but at the same time have the appropriate functionality for fulfilling the demands on the product. The results of these brainstorming sessions are currently being elaborated in R&D projects.

The project related to 'the development of potential strategies to enhance the durability of products' was elaborated in a slightly different way. First, a summary of the potential options for optimizing the life of products was made on the basis of a literature survey. Next, the capability of Philips Sound & Vision in meeting these options as a way to achieve further optimization of the life of its products was assessed. At this stage it was found important to gauge the view of the outside world on this matter.

To this end, the Environmental Competence Center organized a brainstorming session with external stakeholders in The Netherlands which was attended by 15 representatives from environmental, consumer and women's groups, from the Dutch Ministry of Housing, Physical Planning and the Environment and the Dutch Ministry of Economic Affairs, from relevant research institutes and from Philips.

The participants at this session were asked which five (not more) activities they thought Philips Sound & Vision should give the highest priority in the context of the theme of 'optimizing product life'.

The reactions of the participants suggested a clear prioritization [11]. Particular attention was given to the following topics:

- making more robust constructions
- designing modular constructions
- selling the use of products/leasing

These results were presented in brainstorming sessions with the BG's Audio and VCR. Establishing which additional methods stand a good chance of success in the future of Philips Sound & Vision is currently part of further internal consultation and investigation.

Initial results show that products usually break down due to thermal problems (too high temperature) or defective components or joints. Only after more information has been gathered on the various advantages and disadvantages of improving the durability of the products will Philips take concrete action.

A PhD student from Delft University of Technology was appointed to the ECC/S&V in 1996 to elaborate concrete designs related to the durability issue.

The three examples clearly show that it usually takes a number of brainstorming sessions and specific R&D initiatives before a final assessment is made of the most promising environmental opportunities to be implemented. Through these sessions and specific projects, learning experiences are built up that are used to reduce the present uncertainties about environmental opportunities and market perspectives. When the company has learned more about these more far-reaching environmental improvements, it becomes easier to integrate these endeavors into the regular product development process.

Step 5: Implementation of the environmental challenges ultimately selected

The promising environmental challenges are presently being elaborated in particular R&D or product development projects. Before final decisions can be made, data should still be collected on market perspectives and consumer trends. If necessary, results of specific consumer tests assessing the interest in the new product should also be available. Because the further elaboration of promising environmental challenges takes time, the final implementation of the results has not been effectuated yet.

4. STRUCTURAL EMBEDDING OF STRETCH WITHIN PHILIPS SOUND & VISION

The selection of promising environmental challenges, as described above, is one of the two main pillars of strategic environmental product planning. The other pillar concerns the structural embedding of this endeavor within the organization. In practice, this is an even harder job than identifying and selecting strategic options. It requires a strategic way of thinking about environmental issues within the organization, especially at senior management level.

The implementation of this strategic approach can only be successful if the environmental aspects are incorporated into the process of product planning as a structural component. Companies usually structure this whole process, from generating to ultimately realizing new products, in a more or less similar fashion. Within Philips Sound & Vision the product creation process is divided into two main phases: first, the strategy & planning (including "know-how" planning) phase and next the product realization process (from concept start to commercial release).

In the first phase, a product/marketing strategy is formulated, and the architecture and standard design planning is derived from this strategy. In the second phase, various quality controls and validation procedures are carried out by implementing numerous go/no-go decisions. Each step in the product realization process must conform to a set of standards and release criteria before the next step can be made. In this second phase, major changes in the product design cannot be implemented. Such decisions need to have been made in the first phase.

In the context of the structural embedding of STRETCH the *first action* within Philips Sound & Vision was the integration of environmental goals into an early phase of the product creation process. First of all, the written procedures already in place were evaluated with regard to environmental aspects. Where necessary, these procedures were reformulated in order to incorporate the environmental items to be taken into account. After having incorporated environmental aspects into the written procedures, the next step is to *deploy the environmental responsibilities*. This process, currently taking place, is the most difficult part of the integration process. It requires people at various levels

within the organization to take environmental aspects into account. This often involves substantial cultural changes to the way people think and act. Mental changes of this kind take time.

The *second action* to be undertaken in the context of the structural embedding of STRETCH concerns the attuning of the selected environmental challenges to the general marketing strategy of the company. In order to bring about these challenges, a *fundamental change is required in the company's marketing strategy on the environment*. The company needs to adopt a more offensive strategic attitude. This is quite different from following a defensive strategy that is designed to comply with all the relevant environmental legislation and regulations. A direct cost-reduction strategy which focuses mainly on measures which provide short-term solutions is strongly supportive but not the heart of the matter. A company that wants to introduce more far-reaching environmental measures derived from STRETCH must make strategic choices as to how the company wants to strengthen its market position by means of a better green profile than its competitors.

Not only Philips Sound & Vision but also most other companies hardly gained practical experience with such an offensive strategy yet. Exceptions in this respect have been market entrants with market-shaping strategies. They profile themselves from the start as environmentally responsible companies. Good examples of the latter (outside the area of consumer electronics) are companies such as Ben and Jerry's ice cream and the Body Shop. Most companies that have already built up a particular image and tradition have more difficulty in adopting an offensive environmental strategy. Such companies cannot just change their deeply rooted image, culture and knowledge overnight for the sake of the environment.

5. CONCLUSIONS

Until now no structured methodology existed for attuning environmental considerations to the business strategy of companies. The Philips Sound & Vision Environmental Competence Center has developed a *methodology* for this purpose. This methodology is

called 'STRETCH' (Selection of sTRrategic EnvironmenTal CHallenges). The objective of STRETCH is to incorporate environmental considerations into the business strategy and select strategic environmental challenges in an early phase of business development. The application of STRETCH provides the possibility of meeting *three main objectives*:

Firstly, focusing on long-term environmental product design strategies can elicit innovations that may enhance the competitive position of the company. Through the integration of eco-efficiency goals into product innovation in general, a company does not aim to beat the competitors purely on environmental grounds, but on its innovative product strategy in general. In this way economy and ecology can go hand in hand.

By taking environmental aspects into account at an early stage of product development, more far-reaching improvements can be made in future consumer electronics products compared with the current range of products. The first strategic environmental efforts, like those taken by Philips Sound & Vision, are still more the exception than the rule [12]. This approach, however, could provide a way forward to substantial improvements in eco-efficiency.

Secondly, the environmental opportunities and threats to be expected in the future can be anticipated in an earlier phase. Through this early warning system an attempt can be made to diminish the negative consequences in an early stage and a response is not required when it is actually too late. In this way actions are more pro-active rather than defensive. The company can even be one step ahead of all kinds of government demands and public pressure by redirecting product development in the context of sustainability in a more fundamental way. By pro-actively integrating environmental aspects into the earlier phases of the product creation process, external criticism can be avoided and the lead taken in environmental priority setting.

Thirdly, as a result of more far-reaching environmental improvements even higher eco-efficiencies are expected to be reached than through incremental improvements. At this stage, the exact data on eco-efficiency gains to be realized within the nine strategic projects currently being carried out within Philips Sound & Vision cannot be provided;

these will be collected during the execution of the projects.

On the basis of the STRETCH methodology, Philips Sound & Vision has prioritized nine projects for further investigation. Through the performance of these projects, learning experiences are built up that can reduce present uncertainties about the environmental opportunities and market perspectives. Once the company has learned more about the more far-reaching environmental improvements, it becomes easier to integrate these endeavors into the regular product creation process.

From initial experiences with the application of STRETCH within Philips Sound & Vision it could be learned that *environmental objectives can be attuned very well to the business strategy*. Moreover, it became clear that the implementation of environmental challenges is not only the task of product development departments but of the whole business.

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