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Designing for Designers – Ecodesign Tools to Inform and Inspire

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Abstract

In recent years, it has been widely recognised that design has the potential to play a valuable role in the development of environmentally superior products and in response to this a wide range of ecodesign tools have been developed. Despite this, ecodesign literature indicates that designers do not have the right mechanisms to support the integration of ecodesign into early product development [1]. Research has suggested that many tools fail because they do not focus on design, but are aimed at strategic management or retrospective analysis [2]. A recent study has highlighted that many of the tools currently available and much of the information they provide is inappropriate to the needs of designers in terms of the content they provide, the language they use, their presentation style and their style of access [3].

This paper presents the findings from a collaborative research project, building on the results of a doctoral thesis that began to identify the requirements that designers have of ecodesign tools. The follow on project uses these findings to develop a more appropriate tool for supporting practical ecodesign activities. The research illustrates the importance of using an holistic approach in the development of tools, identifying that a combination of guidance, education and information, along with well considered content, an appropriate presentation style and an appropriate means of access are all critical to the success of tools of this nature.

Keywords

Ecodesign tools, Industrial Design

1 INTRODUCTION

This paper introduces a new way of presenting ecodesign tools to Industrial Designers, which takes into consideration and is more appropriate to design culture. It outlines a number of the findings which emerged from a 3 year collaborative research project between Cranfield University and AB Electrolux, regarding the problems with current ecodesign tools. It then goes on to present a proposal for how these may be overcome, focusing on the type of service presented, the content required, the style of presentation and the mode of access provided. The proposal has emerged from empirical evidence collected from a broad range of design based case studies. The

web based ‘Information/Inspiration’ tool, initially developed as a prototype during this study, and now developed further, is then described. Conclusions are drawn regarding the benefits of using this type of tool.

2 METHODOLOGY

Within the exploratory doctoral study a pilot study and a main study were carried out in order to establish a better understanding of the problems faced by designers involved in ecodesign.

During the pilot study a wide range of data was collected via an in depth case study of Electrolux and four broad surveys which drew data from a variety of sources, including; designers in large multinationals, novice designers, design consultants with little experience in ecodesign, ecodesign experts and personnel within environmental affairs departments. Qualitative data was collected via a range of different techniques, such as semi-structured interviews, active and passive observation, and literature and web surveys [3].

At the end of the pilot study a prototype version of ‘Information/Inspiration’ was built using the findings which had been obtained. During the main study this prototype was used to obtain feedback from 21 different case studies in order to test the accuracy of the data collected in the pilot and the appropriateness of the way in which these findings have been translated into reality. Again data was collected via a number of different mechanisms such as ‘web-based feedback’, open ended interviews and observation [3].

The data that was obtained during the study was analysed using a coding and clustering approach, common in qualitative research [4-6]. The findings which emerged from the PhD study helped to develop a much better understanding of the types of problems which currently face Industrial Designers involved in ecodesign and of the types of strategies which can be applied to ecodesign tools to make them more appropriate to design.

3 PROBLEMS WITH EXISTING ECODESIGN TOOLS

Ecodesign literature shows that many existing tools fail because they do not focus on design, but instead are aimed at strategic management or retrospective analysis of existing products [2]. It is also considered that they

also do not take into account the culture of Industrial Design and the fact that industrial designers may have ‘their own way’ of carrying out ecodesign [7]. The fact that many ecodesign tools are unsuitable for Industrial Designers was further consolidated by the early empirical work carried out with the Electrolux design team. Many of the designers indicated that they felt they did not have the correct tools to support them in carrying out ecodesign. The empirical data collected during the pilot study helped to develop a more detailed understanding as to why the tools available were inappropriate and not used by Industrial Design. The main issues identified are described below within four categories; service, content time and style.

3.1 Service

The designers involved in the pilot study felt that existing ecodesign tools failed on a number of accounts. Primarily, they felt they did not recognise that ecodesign is not a priority issue but one of a number of things that designers have to contend with. Secondly, many of the designers complained that the tools available did not show them how to *do* ecodesign. Although the tools did help them to highlight the issues they needed to consider, there was no support provided to help them take these issues further, nor any support for designers who did not know where to look for ecodesign information – a common complaint. In addition to this, a number of the designers commented that ecodesign checklists were often too general and therefore misleading, with others finding them to be overwhelming, seeing them as an imposing list of requirements to be added to an already taxing design brief.

3.2 Content

In terms of the content provided by the tools many designers felt that the available tools did not provide relevant information for designers. They felt the information was often too technical and scientific being aimed at production or design engineers rather than industrial designers. Additional research also showed that asking designers to consider irrelevant issues (such as the environmental impact of the extraction of selected materials) often has a negative effect and can alienate them from ecodesign [8]. The findings from the pilot study strongly suggested that industrial designers need content which is specific to design and design issues rather than general environmental information.

3.3 Time

In the cases where the participating designers were familiar with ecodesign tools, the feedback highlighted that these tools were too time consuming to be carried out on a regular basis. For example, many of the established ecodesign tools available, such as the LIDS wheel [9] and the EcoReDesign programme [10] require the whole production team to spend a day together to map out the ecodesign process and plan future directions for the project. In general, this is incongruous with the way in

which design teams tend to work. Although it is common for small teams, with specific aims, to work together, it is rare to have the opportunity to bring together representatives from the entire project, especially in lower profile projects. The findings suggest that in order to complement their way of working, designers need ecodesign support mechanisms that can be used by individuals on a less formal basis, as and when required.

3.4 Style

One of the biggest problems with the existing ecodesign tools lies with the presentation styles that they use. It is common practice for environmental teams to provide ecodesign information to design teams in lengthy technical documents full of graphs and wordy, technical explanations. However, both the literature and empirical evidence demonstrate that designers spend little time reading and generally only read things they are interested in or are appropriate to the project that they are working on [11]. As such, evidence shows that designers do not react well to manuals and often ‘file’ them, rather than use them. Another popular approach to supporting ecodesign is through the use of hands-on workshops, and although they appear to be much more appropriate in terms of the culture of Industrial Design, as was mentioned earlier, the time restrictions associated with product development means they are often not appropriate for tackling specific projects.

3.5 Summary

Many of the problems outlined above are believed to occur as a result of the tools being misaligned with the culture of Industrial Design. Previous research has outlined that this appears to be as a result of the fact that many of the tools available were developed for Design Engineering and production and that due to differences in their problem solving styles, tools which are appropriate to one discipline can not automatically be transferred to the other [8]. These findings reinforce the idea that industrial designers need tools which have been specifically designed for them rather than generic tools. The following section summarises the main findings that emerged from the Pilot Study and provides a number of criteria for design focused ecodesign tools.

4 CRITERIA IDENTIFIED FOR DESIGN FOCUSED ECODESIGN TOOLS

As a result of the findings obtained from the main study four criteria were identified as being important to the success of ecodesign tools for designers. These are outlined below.

4.1 Service

The research identified that contrary to previous ecodesign tools which have tended to focus on guidance, education or information provision, designers are actually looking for tools that combines all three elements.

In terms of the individual elements, the findings showed that designers are looking for simple guidance in the form of a 'short and punchy' lists of issues, in order to simplify the number of issues they need to consider at the beginning of the ecodesign process and act as a basis for their ecodesign work. They are also looking for simple, relevant, product focused information to support specific elements of their current projects. Finally the designers were using the prototype to raise their awareness with regards to the types of issues they need to consider and furthering their understanding as to what ecodesign is.

It is however the interaction between these three areas where the particular value lies. For example, the combination of information and guidance meant neither information nor guidance was provided in isolation and that users could identify important and then follow them up through links to more practical design focused information.

The combination of education and guidance meant that the designers could use the prototype to find more out more about the subject. In fact the feedback illustrated that they needed even more in terms of education and guidance, as designers wanted more guidance in terms of 'which strategies were the best to tackle first', and 'which materials are better to use and when'.

The value in combining education and information was demonstrated by the way in which some of the designers were referring to the tool as they might a magazine, looking for 'snippets' of ideas which interested them. Presenting information in this way meant that the tool acted as a resource from which they were able to build up tacit knowledge on ecodesign.

4.2 Content

The findings from the main study clarified the idea that designers are looking for two types of content - inspiration and information.

Through the study it was recognised that case studies from wide range of industry sectors have a valuable role to play in supporting and encouraging idea generation and in allowing designers to build up tacit ecodesign knowledge that they can draw on later.

It was also recognised that traditional ecodesign information can be very valuable to design, if presented in a way which is appropriate. It was seen that designers need ecodesign information, with a similar focus to that which they would use in regular design projects (i.e. materials information, fixings opportunities, relevant legislation). In addition to this, the findings suggested that providing additional ecodesign information with a product focus, is also of benefit to designers. For example, providing detailed information within the case studies on 'the strate-

gies used', 'how it works' and 'where to buy it' allows designers to learn from the case examples and apply their new knowledge to their own designs. This reflects design practice in 'regular' design when designers take competitors products apart to study how they were made etc. This type of information has a fundamental role in educating Industrial Designers and in providing them with useful information that can be transferred to other projects.

The findings from the main study emphatically demonstrated the benefit of combining ecodesign case studies and ecodesign information, showing that linking ecodesign information with examples, makes the information interesting and relevant whilst the information helps to bring the examples alive, making them real and tangible to designers.

4.3 Style

The findings from the main study also emphasized the importance of presenting information in a way which appeals to designers and supports their culture of fun. All the sources of information indicated that designers like information to be presented creatively with maximum use of graphics (pictures and colour) and minimal text, that they like to be stimulated with images and are happiest with 'nuggets' (small pieces) of information that can be easily digested.

It was also recognised that designers' favour a non technical approach and need ecodesign information presenting in a language that they understand and are interested in, rather than in the traditional language of environmental scientists.

Finally it was recognised that in developing ecodesign tools it is important to avoid tools that can be perceived as being academic or theoretical, instead they should be based on practice.

4.4 Access

During the study, two issues regarding the access of information were identified; that designers were only interested in looking information that was relevant to their current projects, and that they were ideally looking for a tool/resource that took up as little of their time as possible.

This type of accessibility need recognises that ecodesign is not a priority issue but one that has to be considered alongside all other aspects of product development and suggests that a tool that can be easily referred to as and when required, would be most appropriate to their needs.

5 INFORMATION/INSPIRATION – THE TOOL

The criteria outlined in the previous section were used to develop the 'Information/Inspiration' web tool that is described in this section. The tool became known as 'Information/Inspiration' for two main reasons. Primarily, the name described the unusual combination of content

provided by the tool. Secondly, it was felt that using a new and unusual name that placed more emphasis on the creative nature of the tool, would reduce the likelihood of the designers prejudging it as ‘another one of those’ ecodesign tool.

A web based format was chosen as it was felt that it supported many of the requirements identified as important in the pilot study:

- providing the potential for the content to be presented in a highly visual and interactive way, making it very relevant to the designers’ way of working.
- offering the opportunity for the amount of reading to be kept to a minimum.
- supporting the opportunity for the user to access it on demand, thus enabling designers to integrate it easily into their daily practice.
- providing a good opportunity for the ecodesign information to be kept up to date.

The ‘Information/Inspiration’ website consists of two streams, one providing information (‘Information’) and the other providing inspiration (‘Inspiration’), connected by a Homepage as illustrated by the schematic diagram in Figure 1.

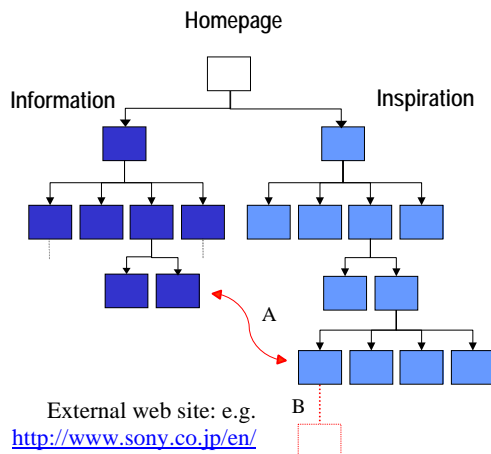


Figure 1 A schematic diagram of the navigation chart for ‘Information/Inspiration’

The navigation structure in Figure 1 illustrates the tiered system that is used to keep text to minimum and allow users to delve into the site to an appropriate level. In addition to this, the arrow ‘A’ illustrates the links which exist between the two sides of the site and the red box and dotted line ‘B’, represents links which exist to external web sites.

From the Homepage (Figure 2) the user can select either the ‘Information’ route, for specific detailed information, or the ‘Inspiration’ route for inspirational ideas on

ecodesign. This action would take the user to one of the two pages illustrated in Figure 3.

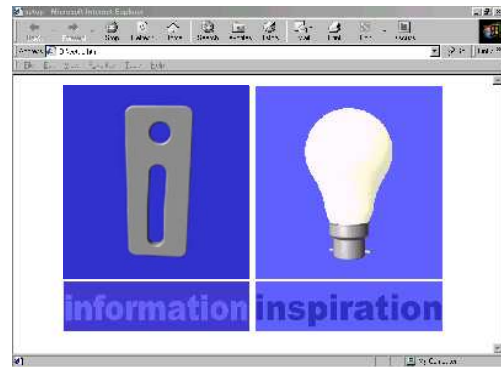


Figure 2 The Home page of the ‘Information/Inspiration’ web tool



Figure 3 Visual menus for ‘Information’ and ‘Inspiration’

Navigation through the website is made logical through the implementation of a consistent graphical theme [3].

5.1 Information

Within Information the content was presented via the eight categories introduced at the beginning of this section; ‘strategies’, ‘legislation’, ‘recycling’, ‘use’, ‘materials’, ‘packaging’, ‘end-of-life’ and ‘energy’. The information provided aims to be as appropriate as possible to the type of work that industrial designers become involved in.

The first page in each category contained a bulleted list of basic points that designers should consider. For example the ‘materials’ section included amongst other things information such as: ‘Less is always better’, ‘Select materials which are compatible for recycling where possible’, ‘use materials with recycled content where possible’ (see Figure 4). Where appropriate this information is hyper-linked to another page, which provides more detailed information.



Figure 4 Materials page in ‘Information’

Within each sub-category data is provided as ‘nuggets’ of information and illustrated with images wherever possible [12, 13]. For example, within ‘recycling’, data was broken down into bullet points and short lists of ‘rules’ were provided;

- Minimise the number of separate components and materials;
- Avoid glues, metal clamps and screws by using alternative fastenings such as ‘push, hook & click’ assembly methods;
- Make fasteners from a material compatible with the parts connected;
- Design interconnection points and joints so that they are easily accessible.

Each one of these points is connected by a hyperlink to more detail on the subject.

In addition to this, a series of questions such as “Who is going to disassemble it?” and “Can the disassembly rely on specialist tools?” are posed to encourage designers to think more holistically.

The layout or structure of ‘Information’ is such that each section provides guidance or checklists on the subject selected. This came about partly in response to the need for ‘nuggets’ of information and partly in response to the request for guidance and simple targets.

5.2 Inspiration

Within ‘Inspiration’ the case studies are grouped according to the product type, for example; ‘electrical products’, ‘white goods’, ‘packaging’, ‘textiles’, alternate energy

supplies’ and ‘furniture’ with additional sections containing ‘concepts’ and examples of ‘green design’. The aim of ‘Inspiration’ is to encourage, inspire and educate designers, by providing them with product examples of ecodesign work, to help them build up their tacit ecodesign knowledge, and/ or support idea generation at the beginning of an ecodesign project.

Selecting an image in the ‘Inspiration’ visual menu (Figure 3), for example, the ‘electrical products’ image, takes the user to a sub menu page (see Figure 5).

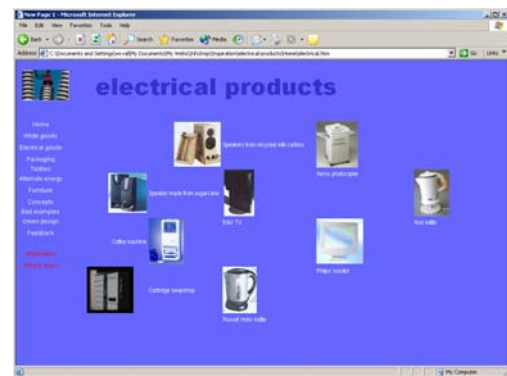


Figure 5 Electrical products sub menu within ‘Inspiration’

Clicking on the image of the Cartridge Swapshop, in the bottom left of the page, takes the user to the page type in Figure 6. Each product page in ‘Inspiration’ provides an enlarged image of the product and a brief description containing a number of facts, such as, a description of the product; its function, and the ecodesign strategies that have been employed to improve its design, e.g. materials composition, energy source etc.

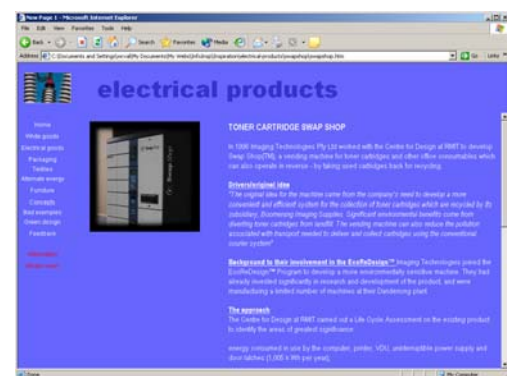


Figure 6 Cartridge SwapShop example in ‘Inspiration’

It is hoped that future developments will include working drawings of the type used to back up patent applications, to provide designers with even more detailed information. Finally, many of the product examples in ‘Inspiration’ have web links to further information, such as the company home page or stores where the item can be purchased, allowing the designers to further investigate them if required. Wherever possible throughout the site prod-

uct examples are linked to more detailed data within 'Information'. For example, the case study of the Sony loudspeaker cabinets made from Tetra-pak material [14], presented in 'Inspiration' is hyperlinked through to more information Tetra-pak (Tectan) material within reported in 'Information'.

6 CONCLUSIONS

Through this study a new, more holistic approach to developing ecodesign tools for Industrial Designers, has been identified. The approach used is more in keeping with the culture of Industrial Designers – fits their way of working better, communicates in a language that they understand, provides a resource of relevant, product specific ecodesign information and a starting point for ecodesign. As a result, 'Information/Inspiration' appears to open up ecodesign to designers who wish/ need to consider ecodesign strategies within their design work as a result of company initiatives or legislative requirements. It offers a much more user friendly, design specific service to designers, providing them with guidance, education and information, allowing them to source specific data or browse for interesting ideas. The tool also appears to have helped in the development of designers' understanding regarding the types of issues they need to consider within ecodesign, with all of the participants in the project identifying that the tool in some way raised their awareness: through an introduction to the basic principles of ecodesign; by introducing and encouraging them to think about ecodesign issues; or by providing them with more detailed ecodesign information [3].

Discussions with professionals outside of Industrial Design have suggested that within the makeup of the 'Information/Inspiration' approach there are a number of transferable attributes that could benefit other disciplines involved in ecodesign and product development. A number of design engineers have commented favourably on the ease of accessibility, the lack of technical language, and the interesting examples provided, and shown an interest in being involved further in the development of the tool. In addition to this, on several occasions environmental scientists involved in evaluating the tool have recognised that approach used could be beneficial to them in their quest to communicate environmental information more effectively, to other elements of the design team.

The 'Information/Inspiration' tool continues to be developed with the assistance of valuable input and feedback from a range of companies within the electrical and electronic sector in the UK. Feedback is sought as to the types of content required and the appropriateness of the presentation, research into these areas is carried out and fed into the developing resource. The aim is to provide a comprehensive range of design focused ecodesign information and interesting ecodesign examples along with

guidance and education as to the types of issues which need to be considered within an ecodesign brief.

7 ACKNOWLEDGMENTS

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